2016

Effects of Weather Hazards on Traffic Volume: A Case Study Focused on Atlanta, GA

Thana-On Punkasem
Louisiana State University and Agricultural and Mechanical College, thanaon.p@gmail.com

EFFECTS OF WEATHER HAZARDS ON TRAFFIC VOLUME:
A CASE STUDY FOCUSED ON ATLANTA, GA

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Science

in

The Department of Geography and Anthropology

by
Thana-On Punkasem
B.A., Chulalongkorn University, 2013
August 2016

Acknowledgments

I am sincerely thankful for the help and support of my committee members, Dr. David Sathiaraj, Prefessor Fahui Wang and Professor Barry Keim for their expertise and guidance in completing this thesis research. I am deeply grateful to Professor Barry Keim for his infinite help with the writing and methods for this thesis. I greatly appreciate Professor Wang helps for providing me with enormous amount of information and insightful resources. I would also like to extend my gratitude to my advisor, Dr. David Sathiaraj for guiding this research work support and programming effort, and for providing the research.

I would also like to thank my family. They have always shown me their unconditional love. I could not imagine myself getting this far without their love and support. I would also like to acknowledge Wanqin Su, for her patience and endless support to stay with me through all the difficulties. I might be lost without her unending love and inspiration. I also would like to extend my sincerest thanks to my Thai friends at Louisiana State University for supporting me through both good times and bad.

Additionally, I would like to thank my graduate assistant colleagues, Tri Nguyen, Xinbo Huang and SRCC system manager Yixin Luo for their help and support. I am immensely grateful for Tri Nguyen for providing me encouragement and suggestions. I also extend my gratitude to Teerapun Phuchpol, Peeraporn Boodgumarn and Rudy Bartels for their willingness to offer advice on this thesis. I would also like to express my gratitude to Transmetric LLC company and NOAA Southern Regional climate center for providing me with extensive research, programming and computing resources.

Last but not least, I feel so fortunate and honored to be graduating from Louisiana State University. The knowledge and friends I experienced here in the past 2 years will be one of the most cherished experience in my life.

Table of Contents

List of Tables

List of Figures

Abstract

Severe weather events can have a significant impact on transportation networks. Many previous studies tried to analyze and explore the tremendous impact of extreme weather events on traffic behavior, speed, travel time and capacity. The purpose of this research was to analyze and discuss the impact of precipitation, temperature, visibility and wind speed on hourly weekday traffic flow volume in Atlanta, Georgia. This study focused on investigating which weather variables affect traffic volume, developing a machine learning based predictive technique to derive weather-traffic volume decision rules, and building a decision support tool. The correlation between extreme weather events and traffic volume was investigated by comparing traffic volume between a base case scenario and an extreme weather scenario. This research used 2 main data sources: hourly traffic data as recorded by 50 Automatic Traffic Recorder (ATR) sites around Atlanta and hourly precipitation data from 4 climate stations retrieved from the Integrated Surface Hourly (ISH) weather data archives of the National Centers of Environmental Information (NCEI). The statistical analysis and spatiotemporal relationships between traffic volume and weather variables were analyzed individually and evaluated using statistical tests. A machine learning technique was also used to simultaneously examines weather variables and hours of days to predict leading variables that greatly contributed towards a reduction in traffic volume. According to the results of this analysis, there were significant impacts of visibility, precipitation and temperature on traffic volumes especially during certain hours of the day. Extensive statistical analysis proved that during certain hours of the day, individual weather elements such as precipitation, minimum temperature,

visibility and wind can have statistically significant individual impact in reducing traffic volume. Machine learning techniques helped derive models that can be used to predict conditions resulting in a decrease in traffic volume. A decision support tool was also developed to visualize traffic volume and weather interactions.

Chapter 1
Introduction

1.1 Background

The transportation sector is an important component of economic development. Efficient transportation can increase economic and social opportunities by improving accessibility to employment, markets, and additional investments [22]. As population and the number of vehicles increases, congestion on road networks becomes a common occurrence. This issue accounts for over 3 billion hours of travel delay annually in the U.S. alone [19].

Extreme weather events can be a crucial factor that adversely impacts traffic volumes. These weather events can have remarkable effects on the transportation network performance and their travel speed, time, capacity and volume [4]. Federal Highway Administration (FHWA) provided a statistical report showing that severe weather events cause up to 22% of vehicle accidents. Moreover, more than 5897 deaths and 445,303 injuries occurred in the U.S. during a 10-years period because of extreme weather events [6]. To properly maintain, plan and design road networks and reduce the risk of fatalities, obtaining a better understanding of weather factors affecting traffic flow can eventually help both government and other infrastructure agencies.

This research investigates and analyzes the impact of 4 weather variables; precipitation, visibility, temperature and wind speed on hourly traffic volume. The focus of the study was on the city of Atlanta, Georgia. Atlanta was chosen for the following reasons: firstly, an extensive literature review did not reveal any study on the effects of severe weather events on hourly traffic volume in the city. Secondly, based on the NOAA climate normal report, Atlanta receives an average annual rainfall of 1262.63 millimeters (49.71 inches) which is 27% more than the average in other similarly-sized US cities [3]. This provided the impetus to study the impact of extreme weather events on road networks in Atlanta.

Two major data sources for this research were provided by Transmetric LLC, an Atlanta based transportation firm. Hourly weather data were obtained from the Integrated Surface Hourly data archives. This research analyzed the relationship between precipitation and traffic volume by applying statistical analysis and machine learning. Based on the statistical results, a decision support tool was built for visualizing the impacts of inclement weather events on transportation networks in Atlanta.

1.2 Research Questions

To have a better understanding of the impact of extreme climate events on traffic volume in Atlanta, this research mainly focused on analyzing and examining the following research questions:

- Does precipitation, temperature, visibility and wind speed as extreme events have a significant impact on hourly traffic volume in Atlanta?

- If so, does the impact have a specific pattern? Is the impact different based on different times of the day and volumes of precipitation, temperature, visibility and wind speed?

- Is it possible to statistically correlate these impacts?
- Is it possible to develop a machine learning model that can account for interdependent weather variables and predict impacts on hourly traffic volume?

For the purpose of answering these research questions, this study analyzed and examined the impact of weather events on hourly traffic volume. These data came from 48 permanent traffic counter sites and was analyzed by applying statistical techniques to study correlation and machine learning models to predict traffic volume impacts under extreme weather events.

This research also built a decision support geographic tool for visualizing and presenting the correlation between traffic volume and an inclement weather event. The goal was to visualize these datasets and yield interesting insights on climate impacts on transportation networks.

1.3 Study Area

This research generally focuses on the Atlanta Metropolitan Statistical Area (MSA), which is one of the most important business capitals of the southern U.S. With more than 5,000,000 population, the city is one of the busiest in terms of activities and transportation. According to the Georgia Department of Revenue Motor Vehicle Division Registration, there are almost 3,000,000 personal passenger cars in the area, and more than 500,000 daily ridership. This is the perfect combination of these two variables, thereby making Atlanta the best candidate for this research.

This study explored impacts of weather variables including precipitation, visibility, wind speed and temperature on traffic volume on the core of MSA area including Cobb, Fulton, Dekalb and Clayton counties (Figure 1). This study area covered approximately 135 square miles from 34.0683 N to 33.4623 N and -84.1462 E to -84.6059 E. According to the NOAA Climate Normals report in 2011, this city averages 113 days of rain and 1263 millimeters (49.7 inches) rainfall annually. These numbers accounted for 27% more than the average rainfall in other cities with similar size across the U.S. This research retrieved the precipitation, visibility, wind speed and temperature dataset from Integrated Surface Hourly (ISH) weather data collected by National Climatic Data Center (NCDC) comprising 4 weather stations within the study area from 2010 - 2015 (Figure 2), including KATL, KFTY, KPDK and KMGE. This research used spatial interpolation techniques to get approximate precipitation values at each traffic counter location (Figure 3).

Figure 1.1: Counties in the Atlanta MSA study area.

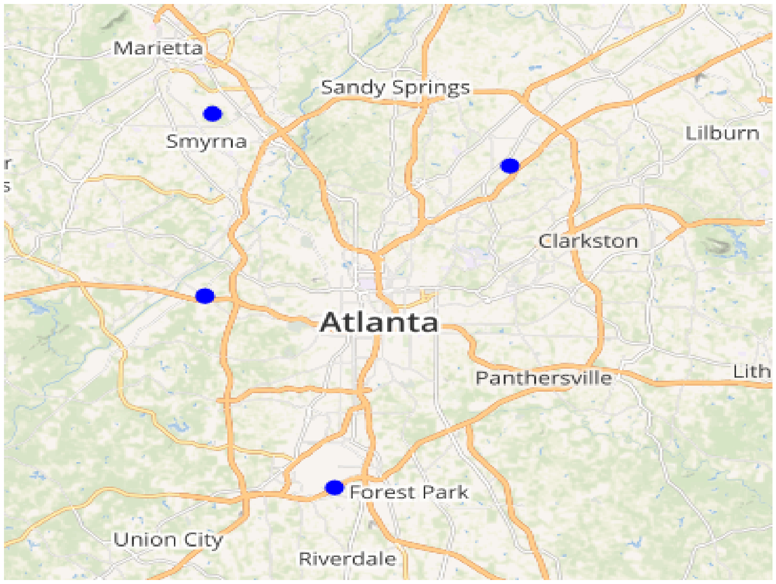

Figure 1.2: Weather stations locations within the study area including including KATL, KFTY, KPDK and KMGE.

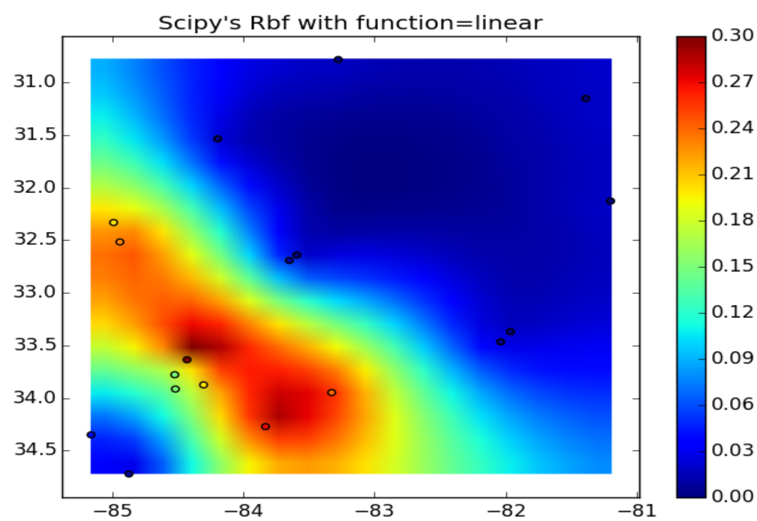

Figure 1.3: A sample result of estimated precipitation values from the spatial interpolation technique (RBF).

1.4 Thesis Outline

This thesis consisted of 3 components including 1) examining correlations between individual weather elements and traffic volume through statistical models 2) developing a machine learning model to predict the change in traffic volume based on weather conditions 3) building a decision support tool to visualize hourly traffic volume and its interaction with studied weather elements. The chapters were organized accordingly.

Chapter 2 included a comprehensive literature review of relevant research. Afterwards, a review of datasets used in this thesis was discussed in chapter 3. This chapter also elaborated on data collection, storing and processing. Chapter 4 presents methods and statistical approaches that were used in this project. Results will be presented in Chapter 6. Every programming and Geovisualization technique applied in the visualization tool is discussed in Chapter 7. The conclusion is discussed in Chapter 8.

Chapter 2
Literature Review

2.1 Spatial interpolation techniques for estimating the spatial distribution of weather events

Weather events are a continuous phenomena but measurements are restricted to discrete observation sites [25]. Many interpolation methods have been developed to resolve this drawback. These techniques can help researchers predict spatial values at unsampled sites [31]. Methods typically applied are spatial interpolation techniques such as Kriging, Spline, and Inverse Distance Weighting (IDW). Each technique has its own processing methodology and characteristics. For example, IDW is a simple interpolation method based on the geographical law of gravity where closer samples have more influences than those that are further away[18]. The *Spline* technique applies a mathematical function to create a smooth surface [2]. Kriging is a technique based on spatial autocorrelation and uses minimization of variance [9].

Previous studies that have applied spatial interpolation techniques for precipitation analysis have found the IDW method performed more accurately than Kriging and *Spline* techniques [9]. For example, a study of geostatistical interpolation of daily rainfall along catchment sites indicated that IDW was the best compared to other methods [17]. Another study that focused on geostatistical interpolation of daily rainfall at a catchment scale discovered that IDW was also considered to be the best method because it provided the smallest RMSE value [17].

Some studies applied Radical Basis Functions (RBF) based on unidirectional artificial Neural Networks (ANN) to estimate spatial variables. This function was an interpolation method that used semivariograms of different sills and scale parameters to predict values[17]. A study by a science professor from North University of Baia Mare [26] confirmed that RBF can be used for spatial interpolation which gave better results compared to Kriging and IDW. Another study[17] that emphasized spatial interpolation techniques found RBF also produced the most accurate results.

This research applied and analyzed all three interpolation techniques: IDW, Kriging and Radial basis functions (RBF). The interpolation technique with the best fit and accuracy was used to estimate the precipitation, temperature, visibility and wind speed measurement at each traffic counters.

2.2 Studying the effect of inclement weather occurrences on traffic characteristics

Previous studies examined relationships between weather events and traffic characteristics. Studies have shown that extreme weather conditions could ultimately lead to reduction in speed, travel time, road capacity, and volume. For instance, research from the Federal Highway Administration showed that light rainfall could reduce driving speed up to 6 to 9 percent in several cities [12]. This decrease in car speed during extreme weather also resulted in a driver spending 3.5% percent more on travel time compared to regular days[30]. Heavy rain resulted in a 14 - 15% reduction in traffic speed and capacity [1], and heavy snow events reduced the capacity of road networks by up to 28% [1].

Some studies investigating traffic behavior using weather variables have applied machine learning models to predict traffic characteristics in different weather conditions. These machine learning models could accurately classify which leading weather variable contributed to change in traffic behavior. For example, a study of the effect of traffic parameters on road hazards using a classification tree model identified hazardous situations on the freeways [10]. Results of this research showed that traffic flow and vehicle speed were the most important factors that influence traffic volume. Another study of the mixed effects of precipitation on traffic crashes has used a machine learning technique to build a crash risk prediction model based on precipitation and snowfall. This study discovered that if precipitation increased by 1 centimeter, the fatal crash rate would increase about 3% [7].

This research mainly emphasized the effect of extreme weather events on traffic volume. In previous research, researchers found decreases in traffic volume during different severe weather events. For example, an average winter storm event can reduce traffic volume by 29 % [13]. Another study used a probabilistic approach to find reductions in traffic volume during intense snow and rain events [27]. Moreover, a study of hourly traffic volume and precipitation in Buffalo, NY investigated relationship between traffic volume and precipitation by dividing traffic volume into 2 subgroups including 1) traffic volume during non-inclement weather (base case) and 2) inclement weather (inclement case) [4]. This research applied a regression model to the dataset to create the predictive model under specific weather conditions. The result of this study illustrated the significant correlation between hourly rainfall and traffic volume (2012) [4]. Not only precipitation and snow cause dramatic reduction in traffic volume but wind speed, temperature and visibility could also create hazardous driving environments and cause a drop in traffic volume. A study of the effect of weather attributes considering wind speed, temperature, precipitation and visibility on traffic capacity in Minnesota found that precipitation had the most severe impact on traffic capacity reducing it by 19 to 28 percent[1]. Cold temperatures and low visibilities had moderate impacts on the capacity leading to a 10 to 12 percent decrease. However, wind speed did not have any noticable effect on capacity reduction in Minnesota[1].

Although some studies focused on time series analysis of hourly traffic and hourly precipitation, researchers rarely applied spatial interpolation techniques to their research analysis methods. The previous studies were more likely to study just one traffic counter close to a metropolitan airport. A better understanding of this correlation ultimately led to the proper planning, design and maintenance of road networks during inclement weather events.

2.3 Geographic information support tools

Geovisualization or Geographic Visualization is a set of theories, methods, tools and techniques that includes interdisciplinary fields such as Cartography, GIScience, Scientific Visualization, Data Science and Computer Sciences. This field mainly focuses on visualizing spatiotemporal data sets [5]. Cartographic knowledge bolsters the popularity of geovisualization techniques ultimately leading to innovation. Computer-based visualization is one of the most effective techniques in geovisualization and facilitates smooth processing, visualizing and sharing of spatial information [29].

This research developed a geographic decision-making tool based on results of this study by integrating extreme weather events and traffic data. This tool applied multidisciplinary knowledge from data science and geography to create a meaningful tool that can be used for effective decision support among transportation planners, emergency managers and other professionals. Development of this web-based traffic volume and extreme weather geovisualization tool also eventually led to better data sharing platform and further collaboration between urban planners, climate scientists, and traffic administrators and other relevant infrastructure planning personnel.

Chapter 3
Data Processing

3.1 Weather and Traffic Data

This chapter describes the data processing techniques involved in this research. This analysis investigates the correlation between traffic volume and four weather variables by using two data sources: hourly traffic volume and weather variables.

3.1.1 Hourly weather variables

Severe weather events frequently caused damages across the United States. These events were extremely problematic for the southeastern region of the U.S. because of its subtropical climate. This study analyzed four hourly weather variables on an hourly basis including precipitation, visibility, wind speed and temperature. Weather data used in this analysis were collected from 4 climate stations retrieved from the Integrated Surface Hourly (ISH) weather data archives of the National Centers of Environmental Information (NCEI). This analysis retrieved almost 225,000 records of hourly weather observations spanning the time period, 2011 - 2015. These data were then converted from UTC timezone to Atlanta's local timezone which is the Eastern Time Zone, while implementing daylight savings time.

One major problem was that the data were collected at isolated observation sites, which were used to capture temperature, wind speed, visibility and precipitation data at the traffic observation sites. This research uses spatial interpolation techniques such as Inverse Distance Weighting (IDW), Kriging and radial basis function (RBF) to estimate the weather variables geographically.

- Inverse Distance Weighting is a spatial interpolation technique that simply generates a gridded dataset from measured values close to predicted locations. This technique is based on an uncomplicated assumption that in any given location i could be best approximated by a combination of K closest known points weighted by an inverse function of the distance between the unknown and known points [18]. In other words, points close to one another would have more influence than points that are further away.

- Kriging is a statistical method that produced an estimated value in unknown areas by forming weights from surrounding measured values to predict values at unknown locations. This function was a linear interpolation formula that applied a variogram to calculate the spatial autocorrelation to determine weights that should be applied at various distances [9].

- Radial Basis Functions are unidirectional artificial neural networks which are based on the distance from known points to each unknown centroids. This function basically has three layers including[26] 1) an input layer that used to correspond to each predictor variable, 2) a hidden layer which is used to apply radio basis functions which is composited in each neuron located at the center of a point, and 3) an output layer that is used to compose neurons. The role of this method is to detect the weights that are produced from a hidden layer and apply the weight to nearby input vectors. Then, the output layer computes the weighted sum of the information from a hidden layer to form the network outputs. This technique searched directions of the control points used in the interpolation for a specific grid point [26] .

3.1.2 Measures of Predictive Accuracy

To choose the most accurate spatial interpolation technique, this study investigated which spatial interpolation technique most accurately predicted weather events, including precipitation, temperature, visibility and wind speed in Atlanta by applying an accuracy test for each spatial interpolation technique. This analysis collected sample weather datasets and divided them into two subgroups. The first is weather data from weather stations across Georgia (base dataset). A total of 933,310 weather records from different 32 weather stations (figure 1) were collected from the ISH database. This dataset was used as an input dataset for spatial interpolation. It included station id, coordinate of each station, date stamp for the date that the record was collected, and four weather variables. This was stored in a table in Postgres database. The second subgroup of weather data is from one weather station as a reference for comparing with predicted data (reference dataset). A total of 55,184 records of each weather variable including visibility, precipitation, temperature and wind speed were randomly picked from the ISH database and stored in another table in PostgreSQL database. This dataset was used as a reference comparison for base cases which contained the actual value of weather variables recorded by NCEI.

After both datasets were stored in a local PostgreSQL database, this research applied each spatial interpolation technique to the first dataset (base dataset) to get the predicted weather variables in given locations (reference dataset). To examine which spatial interpolation technique produced the most accurate results for weather variables, this research applied a statistical model which was based on the root-mean-square error (RMSE). This is a widely used statistical model to measure accuracy by calculating the differences between predicted and measured values.

For the purpose of spatial interpolation analysis, this research used programming languages R and Python to analyze three major spatial interpolation methods, including Inverse Distance Weighted, Kriging and RBF. Two weather datasets for this analysis were retrieved from PostgreSQL database through the RPostgreSQL package. For the base and extreme cases, the base weather dataset was applied with every spatial interpolation function. Then, the predicted values were extracted from a gridded spatial attribute and stored in the same table with the reference dataset for examining which interpolation techniques produced the most accurate weather variables.

Table 3.1: Root Mean Squared Error (RMSE) values from each spatial interpolation techniques.

	IDW	Kriging	RBF
Precipitation	0.07596666	0.08476519	0.2435945
Temperature	1.778402	4.97	6.026029
Visibility	1.273612	1.49855	1.292256
Wind Speed	3.191654	3.201029	3.124553

Based on the RMSE result, it was obvious that IDW was the spatial interpolation method that produced the most accurate interpolated result for precipitation, temperature, and visibility. However, for wind speed, the RMSE result from Radical Basis Function produced a smaller value compared to IDW and Kriging. For precipitation, IDW and Kriging produced a similar estimation, with 0.01 millimeter difference. In contrast, the RMSE value from RBF was slightly higher than IDW and Kriging which was 0.2435. For temperature and visibility, IDW also produced significantly lower RMSE scores compared to Kriging, and RBF. However, for wind speed, the spatial interpolation technique generated the least RMSE score was RBF. In conclusion, this research utilized the predicted values of temperature, rainfall and visibility from Inverse Distance Weighted and wind speed from Radical Basic Function because these functions produced the most accurate interpolated results.

3.2 Hourly traffic variables

This research was conducted using hourly traffic data recorded by 48 Automatic Traffic Recorder (ATR) sites for the 5-year period from 2011 - 2015. The ATR stations were permanently installed on the Road Inventory network to count the number of all vehicles passing through each counter location on State Routes, major county roads, and major city streets continuously 7 days a week, 24 hours a day, 365 days a year. This traffic dataset consisted of latitude and longitude of the sites, names of the roads where each camera was located, amount of hourly traffic volume, and datestamp that the camera recorded the traffic volume. This research collected traffic data through a web-based GIS from Transmetric LLC company and stored it in a local PostgreSQL database.

3.3 Database Scheme

This analysis consisted of three main tables including weather variables, metadata of traffic stations and traffic records. The postgreSQL database schema can be seen in Figure 3.1.

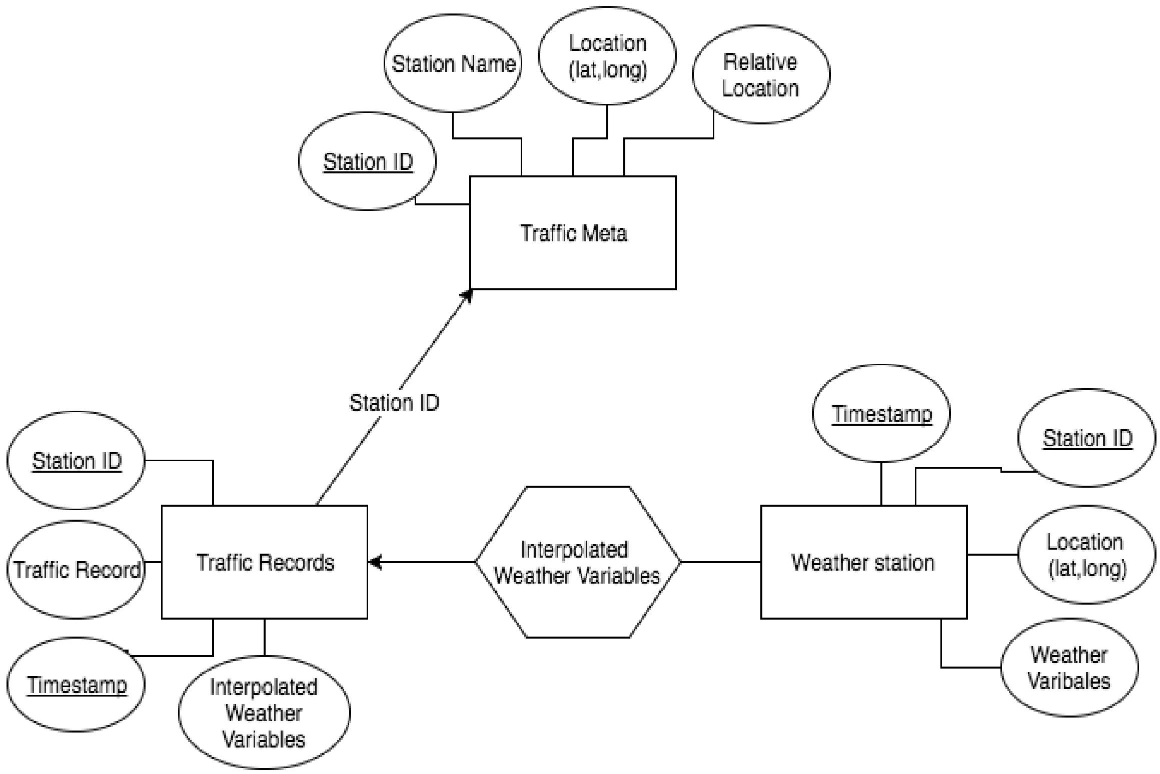

Figure 3.1: Database schema for this study

Chapter 4
Methodology

4.1 Parameters

This study explores the influence of extreme inclement weather events on traffic volume. There were three significant parameters in this research. First, this study focused only on weekday traffic volume, as this research assumes that weekday traffic capacity typically has less variability than weekend traffic volume. Another parameter was the temperature dataset was drawn from only months within winter season, defined as December to February. This research retrieved temperature data only in winter because this process could help reduce a skewed distribution between two sample groups when the extreme temperature cases occurred only in this season. The last was to determine base case and extreme case. According to American Meteorological Society [11], extreme climate events were defined as

- precipitation that is more than 7.62 millimeters (or .30 inch) per hour
- visibility that is less than 5 kilometers (or 3 miles)
- temperature that is below 0°C (or 32°F)
- wind speed that is more than 10.8 meters per second

This study highlights precipitation events that had more than 7.62 millimeters (0.30 inches) per hour, visibility less than 3 kilometers and, temperature that was below 0°Celsius and wind speed that was stronger than 10.8 meters per second as extreme cases.

Table 4.1: Weather variable criteria used in the Atlanta transportation study

Weather variables	Base Case	Extreme Case
Precipitation	0 mm per hour	> 7.62 millimeters per hour
Wind Speed	< 10 meters/sec	>= 10 meters/sec
Visibility	> 3 kilometers	<= 3 kilometers
Temperature	> 32 F	=< 32 F

4.2 Spatial Interpolation Analysis

This analysis applied spatial interpolation techniques to weather variables to estimate weather at traffic counter sites. Inverse Distance Weighting technique was applied to precipitation, temperature, visibility and wind speed to predict the values across 48 traffic stations. These techniques were calculated using the programming languages R and Python. Every weather variable –including temperature, precipitation, visibility, v and wind speed – was interpolated for the 48 weather stations. The hourly weather variable was individually retrieved from the database and applied to the interpolation function. After a gridded fit was created, predicted values were extracted based on traffic counter sites' locations and stored in the same database table with the traffic records table for further analysis.

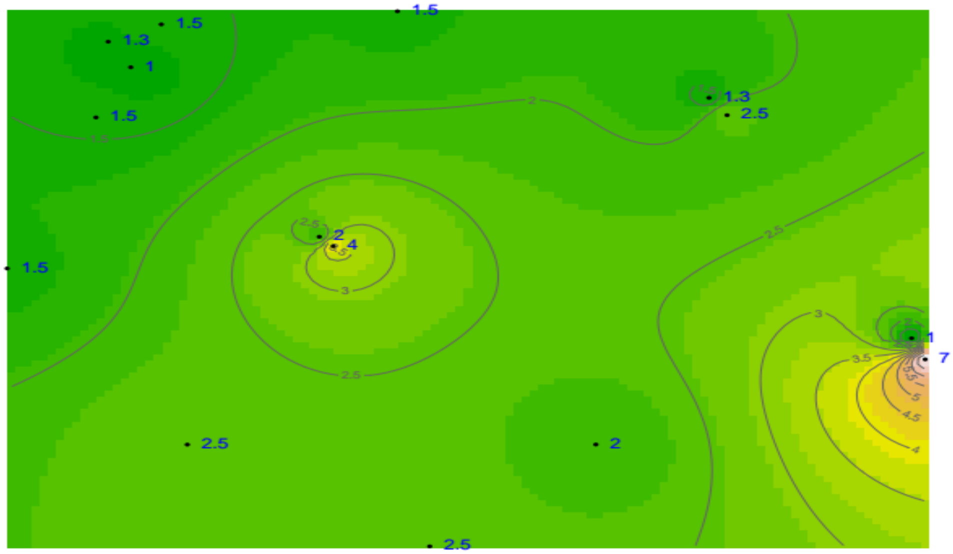

Figure 4.1: A sample result of Inverse Distance Weighting technique.

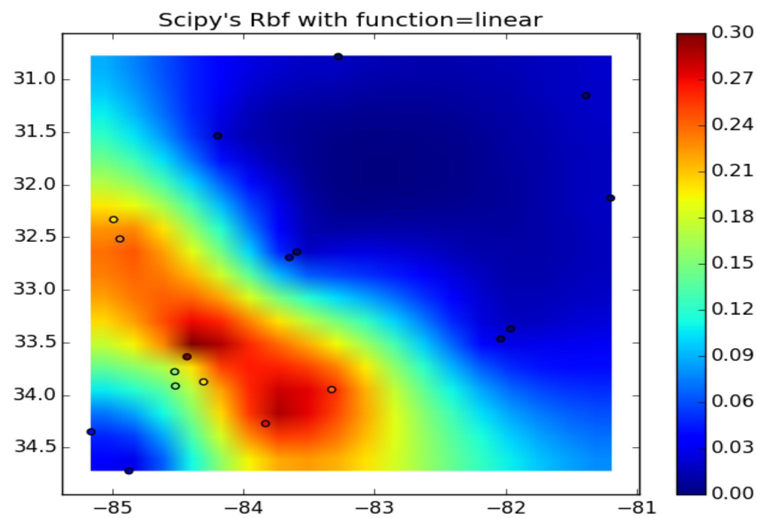

Figure 4.2: A sample result of Radical Basis Function technique.

4.3 Preliminary Results

After applying spatial interpolation techniques to get estimated precipitation values at every traffic counter site, the next step was to find basic correlations between traffic volume and hourly weather events. This was achieved by comparing two traffic volume datasets from one traffic station. Two datasets included the average hourly traffic volume for the five-year period and the hourly traffic volume from the chosen day that had extreme rainfall, low visibility, strong wind speed and low temperature.

Based on the comparison graph (Figure 4.3), it could be clearly seen that traffic volume during extreme weather conditions was significantly lower compared to long term average of traffic volume from the same traffic station. This research applied statistical models and a machine learning technique to further analyze the correlations.

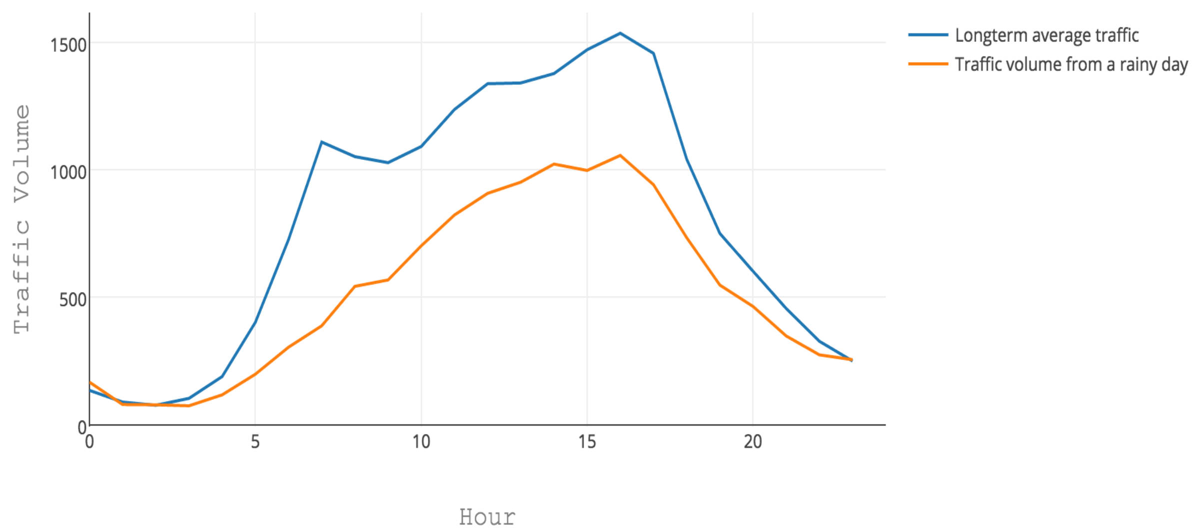

Figure 4.3: Comparison of traffic volume between longterm average and during an rainfall event from station id 17585 on 2011-01-11

4.4 Correlation Analysis

This analysis focused on examining the influence of individual hazardous weather events on traffic volume by comparing traffic volume between base condition and extreme condition. To do so, the traffic dataset was divided into two subgroups based on interpolated weather variables. Each weather variable was categorized based on the criteria from table 4.1.

This study compared two subgroups of traffic volume based on time index (hour) from each station separately. For correlation analysis, this research hypothesized that there was a difference between the mean of hourly traffic volume in normal driving conditions and the mean hourly traffic volume due to an extreme climate event. To investigate whether there was a correlation between individual hazardous weather events on traffic behavior, 3 statistical tests were conducted on each of the four weather elements used in the study. The tests used included T-test, Wilcoxon, and Mann-Whitney.

1. T-test Analysis

   Two sample t-test is a widely used statistical method that compares sample group means. Some previous studies have used the t-test statistical model to compare traffic volume. For example, a study of variability in traffic volume applied t-test analysis to compare mean traffic volume in different heading directions [32]. Moreover, another study from a journal of transportation used a t-test to examine the correlation between truck volume in normal snowfall driving conditions and freezing temperature [23].

For this research, t-test comparison analysis was used to compare traffic volume in normal weather conditions and extreme weather conditions. The t-test formula was depicted as:

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

2. Wilcoxon Signed-Rank test

   The Wilcoxon rank-sum test is a nonparametric statistical hypothesis test, and is considered an alternative to the paired t-test. This model is based on two main assumptions [28] which are 1) Data come from the same population, and 2) data are randomly paired. A previous study on the effects of staggered working hours on traffic volume had applied the Wilcoxon test to determine the statistical significant of the decrease in traffic volume [20]. For this analysis, Wilcoxon rank-sum was assigned to a subgroup of traffic volume between base case and extreme case similar to the t-test analysis.

$$z = \frac{R - \mu_R}{\sigma_R}$$

   where:

   R = the sum of the ranks for the smaller sample

3. Mann-Whitney U test

   Mann-Whitney U test is also nonparametric. A distinct difference between the t-test and Mann-whitney test was this test did not require data to be normally distributioned[8]. This statistical analysis is based on two major assumptions: 1) all observed records from both group had to be independent of each other, and 2) the distribution of both populations should be equal. This study applied the Mann-Whitney model for comparing two population groups between traffic volume in the base case and extreme case. This model separately analyzed traffic volume for each weather variable, station, and hour of day. The records of the base case were also randomly chosen and the distribution had the same sample size as the extreme case. For the purpose of cross validation process, this analysis randomly chose equal numbers of records from the base case and extreme case. The Mann-Whitney equation is as follows:

$$U = n_1 n_2 + \frac{n_1(n_1 - 1)}{2} - W_1$$

where:

W = sum of the ranks of values in group 1

n = number of samples

This research applied three statistical test in R programming by the same procedure as follows: every statistical comparison analysis was used to compare traffic volume in normal weather conditions and extreme weather conditions. Each model separately analyzed traffic volume from each weather variable, station, and hour of day. It is important to realize, for some cases, numbers of base cases outnumbered extreme cases more than five times. To avoid issues from different sample sizes, this research applied a bootstrapping technique by randomly picking equal numbers of extreme case records and base case records and recreated the t-test model 100 times. The p-values were sorted in ascending order. Then, p-values at the 80 percentile was chosen to be a representative of the group. If more than 80% of the results fell under 0.05, it was understood that there was a significant difference between the means of the extreme and base case groups. The total of 1,152 p-values from the comparison between traffic volume from every traffic station (48) and every hour of day (24) were stored in a table.

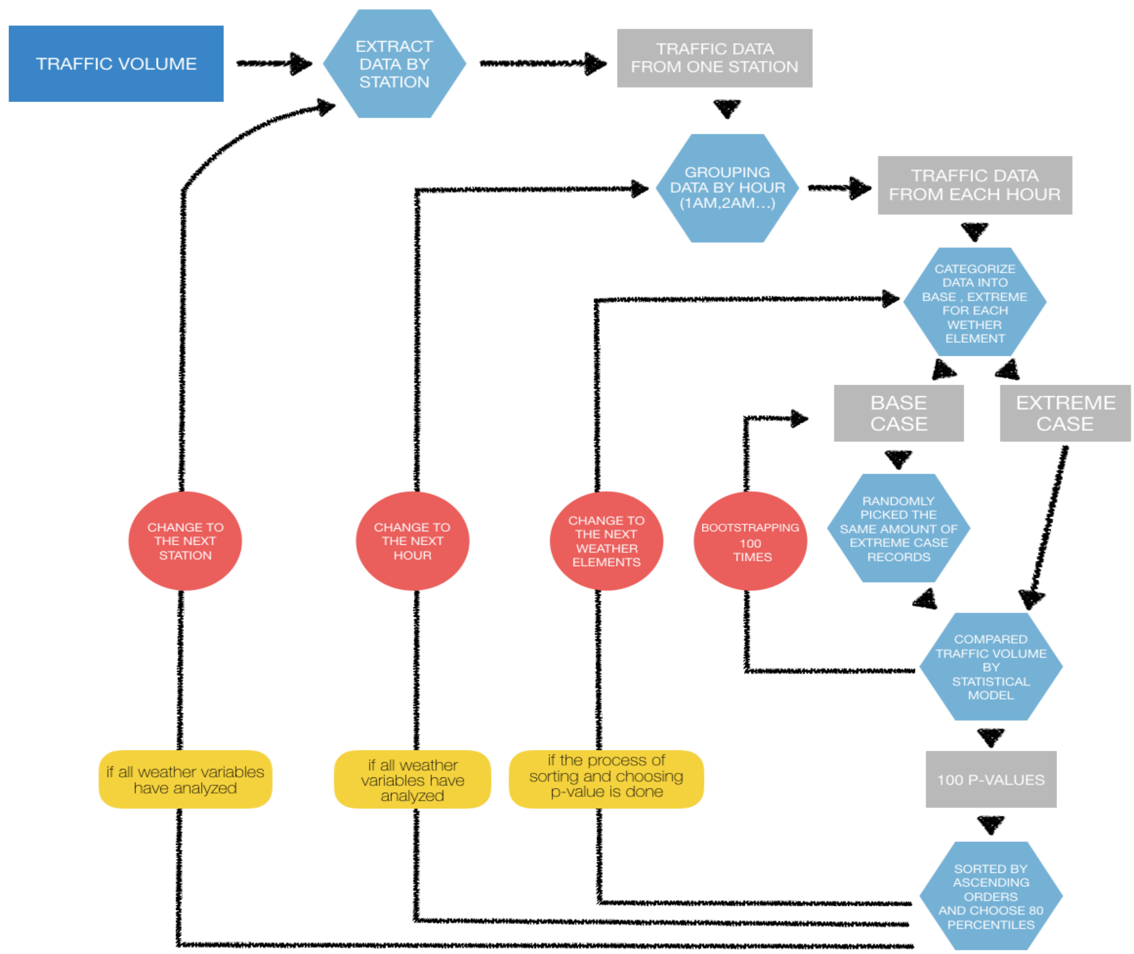

Figure 4.4: Demonstration of statistical analysis

4.4.1 Decision Tree Learning

This research used a decision learning tree method to investigate the impact of extreme weather events on traffic volume because it allowed all of the independent variables to be considered at the same time and did not assume an underlying distribution. Decision tree learning was one of the most widely used predictive machine learning techniques. This method was a non-parametric supervised statistical method for classification and regression. The purpose of this model was to predict values of a target variable by producing tree structures. This technique processes data based on pseudocode for tree step construction[16].The formula of decision tree learning could be depicted as:

$$Entropy(S) = \sum_{i}^{C} p_i \log_2 p_i$$

where:

S = entropy of a dataset

Pi = the proportion of instance in the dataset at ith value of the target attribute

C = different values

Some previous research had applied an entropy based decision tree to predict climate events and traffic behavior. For example, one study used a decision tree classifier to predict precipitation in India. This study showed that the decision tree learning approach provided an average accuracy of 79.42% [21]. Another study used a decision tree approach to analyze air traffic delay by comparing the accuracy of results from three machine learning models[15]. For this research, a decision tree algorithm was used for classifying and predicting which weather variables significantly contribute to the decrease of traffic volume. The model split the traffic dataset in to nodes and branches which indicated specific value from each variable that contributed to the reduction of traffic volume. This research generated a training set by classifying traffic volume into two categorical classes – normal and abnormal. The traffic volume that fell within one standard deviation was considered as the normal class, otherwise, it was considered as the abnormal class. The training data used was hour of day, temperature, precipitation, visibility and wind speed. Analysis of traffic behavior by the decision tree learning was conducted as follows. From the traffic volume database, each station's data is extracted. Data extracted included hour of observation, traffic volume, and the weather observation for that hour. The data were then normalized, and then a training set was generated. The training set comprised of normal and abnormal case scenarios. Then, a decision tree model was calculated to predict the traffic volume case scenarios based on the training data. This process is described as Figure 4.5.

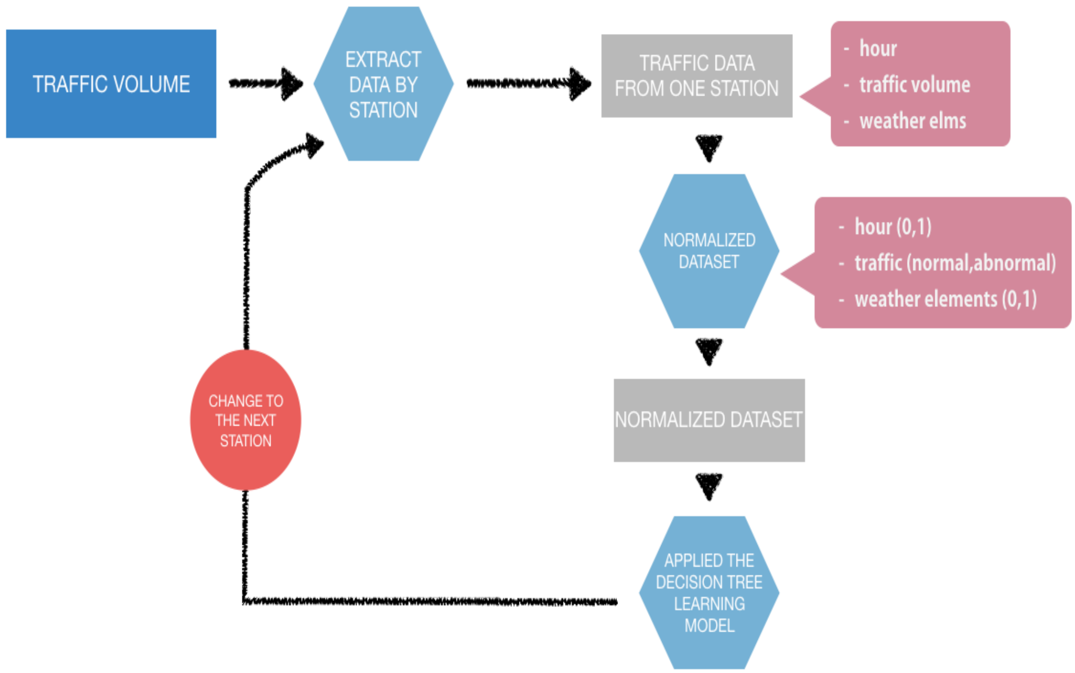

Figure 4.5: The process of machine learning analysis

Chapter 5
Results

Results of this research consisted of three components: conducting extensive statistical tests, deriving a predictive machine learning model, and developing a decision support tool. The statistical analysis examined the correlation between individual weather elements and traffic volume. A machine learning model was built to analyze all weather elements simultaneously and to predict under which conditions traffic volume drops or stays normal. The decision support tool visualized the interaction between weather elements and traffic volume on an hourly and daily basis.

5.1 Independent test for each weather variable

After every traffic dataset was computed by T-test, Wilcoxon and Mann-Whitney analysis model and a cross validation process for 100 times, the p-values from each dataset were collected and stored in a table (Appendix table 1 - 12). Tables of p-values were converted into visual graphs by depicting number of stations on hourly basis. The analysis of hourly p-values showed statistical significant correlation between weather variables and traffic volume at varying times of the day.

5.1.1 T-test Analysis

The graph of p-values from t-test analysis indicated the influence of weather events on traffic volume throughout the day. Further analysis showed that temperature, precipitation and visibility had significant impact on traffic volume especially during 16:00 - 17:00 hour, which includes evening rush hour.

Temperature had a significant and relatively constant, but not consistent impact on traffic volumes. More than 60% of traffic stations had a significant decrease in traffic volume in more than 10 - 11 separate hours. Most of the correlation between traffic volume and temperature occurred between 18:00 to 4:00. The peak of the impact on traffic volume happened at 4:00 when more than 80% of traffic stations markedly indicated a decline in traffic volume.

For precipitation, this variable accounted for the remarkable decrease of traffic volume from afternoon to late night. Every hour during this period illustrated more than 70% of traffic stations had a significant drop in traffic volume. Moreover, precipitation had the dramatic impact on traffic volume during 19:00 - 21:00. More than 85% of the traffic counters observed a decrease in traffic volume. However, precipitation did not show any significant impact from 23:00 - 9:00.

For visibility, with more than 95% of traffic stations showing a significant impact, this weather type produced the highest impact among all weather elements. This weather type had a great impact on traffic volume, especially during 17:00 - 23:00. From 19:00 - 20:00, this variable drastically reduced traffic volume at more than 95% of traffic stations. It also had a slight effect on traffic volume during 3:00 - 4:00 and 15:00 - 16:00. However, similar to precipitation, visibility did not show any declines from 5:00 - 9:00.

For wind speed, this weather variables did not have a significant impact. However, it still had slight impact on traffic volume from 1:00 - 4:00.

In conclusion, wind speed, precipitation and visibility had significant impacts on traffic volume. Especially around 18:00 - 22:00. These three variables accounted for the decrease in traffic volume according to 85% of traffic stations. Except from those hours, each climate event produced different correlation patterns throughout the day. Temperature had the greatest impact on traffic volume from late night to early morning. Precipitation caused a decrease of traffic volume in the afternoon to the evening. Visibility had slight impact on traffic volume during late night to early morning.

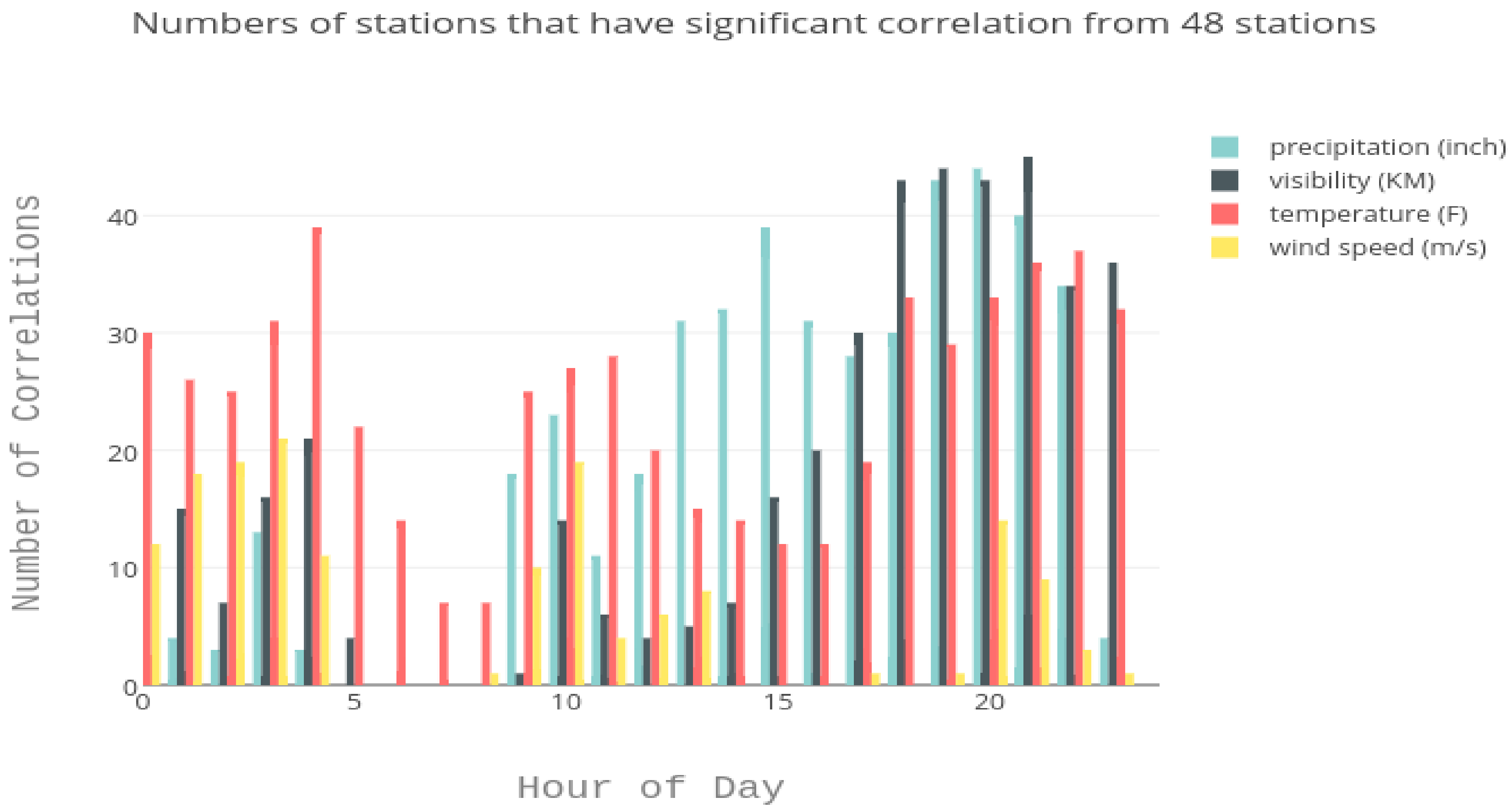

Figure 5.1: Number of traffic stations that have significance decrease on traffic volume from T-test analysis

5.1.2 Wilcoxon Analysis

Based on the graph of p-vlaues from the Wilcoxon model, precipitation was the variable that produced the largest impact on traffic volume. This event accounted for the significant decline of traffic volume for more than 70% of traffic stations from 13:00 - 22:00. Especially during 19:00 - 20:00, the numbers of traffic stations that had recorded decreased traffic volume were more than 95%. This reduction might happen because it occurred after rush-hour, and people chose to postpone there activities and stay home during severe weather. This climate element also had slight impacts from late morning to afternoon. However, there was no evidence of correlation between precipitation and traffic volume during 23:00 to 8:00.

For visibility, this variable reduced traffic volume for more than 75% of traffic stations during 18:00 - 21:00. Particularly during 19:00 - 21:00, more than 85% of traffic stations showed reductions in traffic volume from this element. Except for those particular hours, visibility still had a slight influence on some traffic stations around 22:00 - 23:00. But, there was no correlation from about 0:00 to 9:00 .

For temperature, there were slight to moderate effects on traffic volume throughout the day especially from 9:00 - 11:00 and 19:00 - 22:00.

For wind speed, this variable did not indicate significant influence on traffic volume. However, it still had a slight impact on traffic volume during 1:00 - 3:00.

In sum, precipitation, visibility and temperature were the weather variables that accounted for the reduction of traffic volume. Precipitation and visibility indicated the same pattern of correlation during evening rush hour to late evening. However, in the afternoon, the correlation of precipitation on traffic capacity extended longer than visibility. Temperature did not have the impact of precipitation and visibility, but the correlation of temperature on traffic counts were relatively constant.

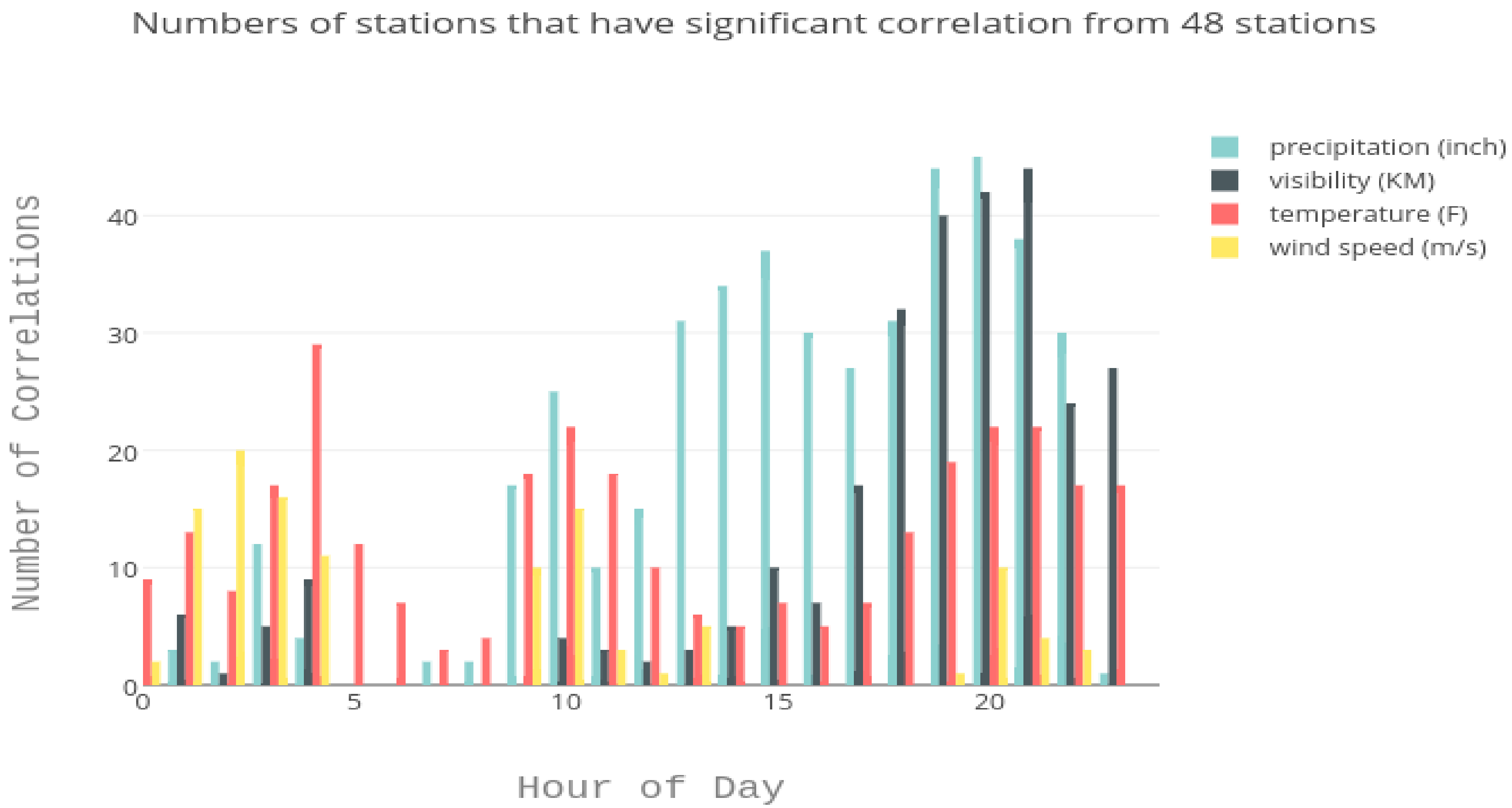

Figure 5.2: Number of traffic stations that have significance decrease on traffic volume from Wilcoxon analysis

5.1.3 Mann-Whitney Analysis

According to the graph of p-values from Mann-Whitney analysis, the results of this model was similar to results from the t-test. Temperature was the variable that created the significant impact throughout the day. This event accounted for more than 60% of traffic stations that had significant reduction in traffic volume in 11 hours. Most of the correlation between traffic volume and temperature happened between 19:00 to 0:00. Temperature also contributed to the most significant decline in traffic volume which accounted for more than 75% of traffic stations from 22:00 - 0:00.

For precipitation, this variable accounted for the remarkable decrease of traffic counts during afternoon to late night. During this period, more than 70% of traffic stations showed a significant drop of traffic volume. Particularly, this variable had the dramatic impact on the decline of traffic volume for more than 95% of traffic stations from 19:00 - 20:00. As such, precipitation became the variable with the second highest impact on traffic volume among all weather variables.

For visibility, with more than 95% of traffic stations having significant results, this weather variable also produced the most significant impact on traffic volume. This type of weather had the most significant impact on traffic volume during 17:00 - 23:00. Especially during evening rush hour to early night, more than 95% of traffic stations showed a dramatic drop in traffic volume. It also had the slight effect on traffic volume in some areas of the city from 1:00 - 4:00 and 15:00 - 16:00.

For wind speed, this variable did not have any significant impact on traffic volume. However, it still had a slight impact on traffic volume from 1:00 - 4:00.

In summary, based on the result of Mann-Whitney U test, precipitation, visibility and temperature still were the most important factors that accounted for decreases of traffic volume in Atlanta. These variables had dramatic impacts on traffic volume from 19:00 - 21:00. Apart from the evening rush hour, temperature had the largest impact on traffic volume from 19:00 - 0:00. Precipitation caused the decrease of traffic volume from 13:00 - 22:00. Visibility made the huge impact on traffic volume from 20:00 - 22:00.

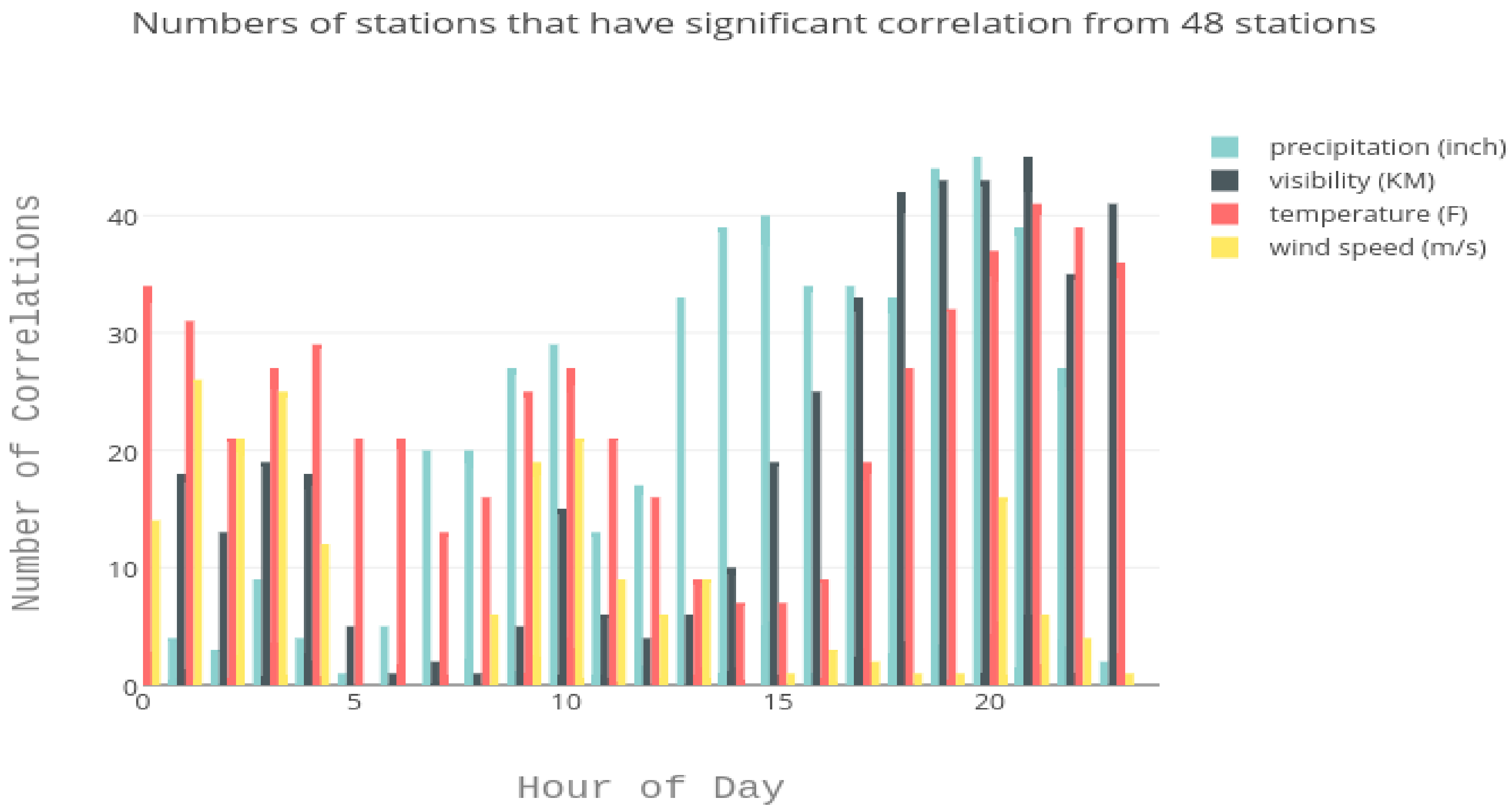

Figure 5.3: Number of traffic stations that have significance decrease on traffic volume from Mann-Whitney analysis

5.2 Predictive machine learning model

5.2.1 Decision Tree Learning

The machine learning model predicts weather variables that accounted for the reduction of traffic volume for each traffic station in Atlanta. This study used five variables including temperature, precipitation, visibility, wind speed, and hour of day as targets to classify which variables contributed to significant decreases of traffic volume over the course of a day. Based on results from the model, hour of day was the most important variable affecting the significant decrease in traffic volume. Then, traffic volume patterns depended on temperature and precipitation. The patterns of traffic volume were different before and after 10:00. For the pattern before 10:00, temperature was the major variable that caused the drop in traffic volume. Then, precipitation was the second leading cause of the decline of traffic volume. It could be clearly seen that traffic volume dropped when temperature was less than 2°Celsius (or 36°Fahrenheit) and precipitation was more than 4 millimeters (or 0.15 inch) per hour. However, for the pattern of traffic volume after 10am, precipitation was the most significant variable. Then, temperature was the second most important variable that led to the significant decreases in traffic volume. During these hours, traffic volume dropped drastically when precipitation was more than 5 millimeters per hour and temperature was around 1.2 - 2°Celsius (or 33 - 35°Fahrenheit). However, when temperature rose to more than 10°Celsius (or 50°Fahrenheit), wind speed was the supporting element that contributed to the drop in traffic volume.

In conclusion, after analyzing all variables together, precipitation and temperature were variables that greatly affected traffic volume in Atlanta. But, wind speed did not produce a significantly drop in traffic volume. Notably, the combination of temperature when it was below 1.2°Celsius (or 5°Fahrenheit) and precipitation that was more than 5 millimeters (or 0.19 inch) per hour created the most significant impact on traffic volume throughout the day. Moreover, results from the machine learning model showed that temperature had significant impact on traffic volume in the early morning yielded the results with individual weather elements.

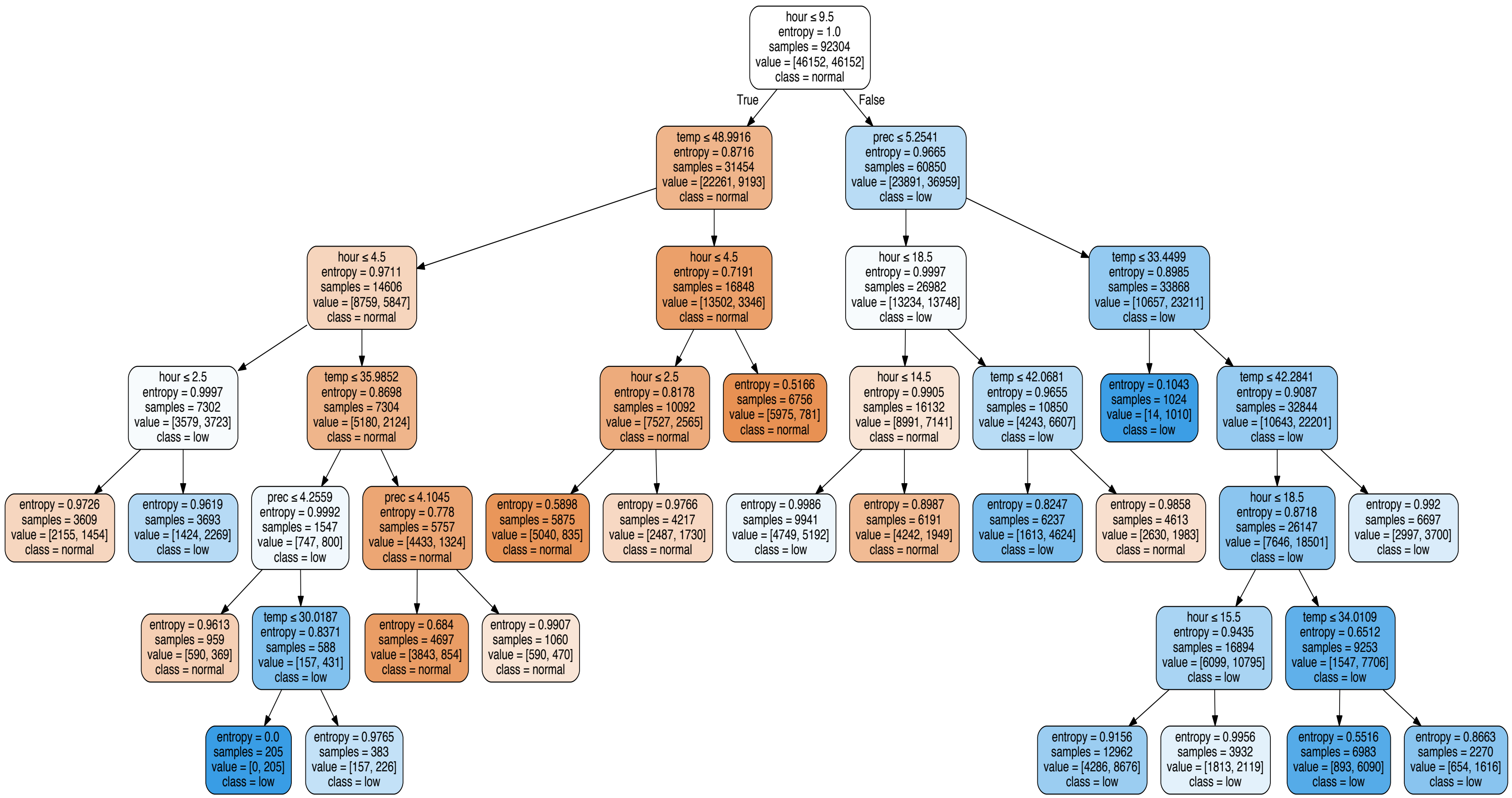

Figure 5.4: Decision tree analysis results for traffic station id 49159 for traffic patterns in Atlanta, GA

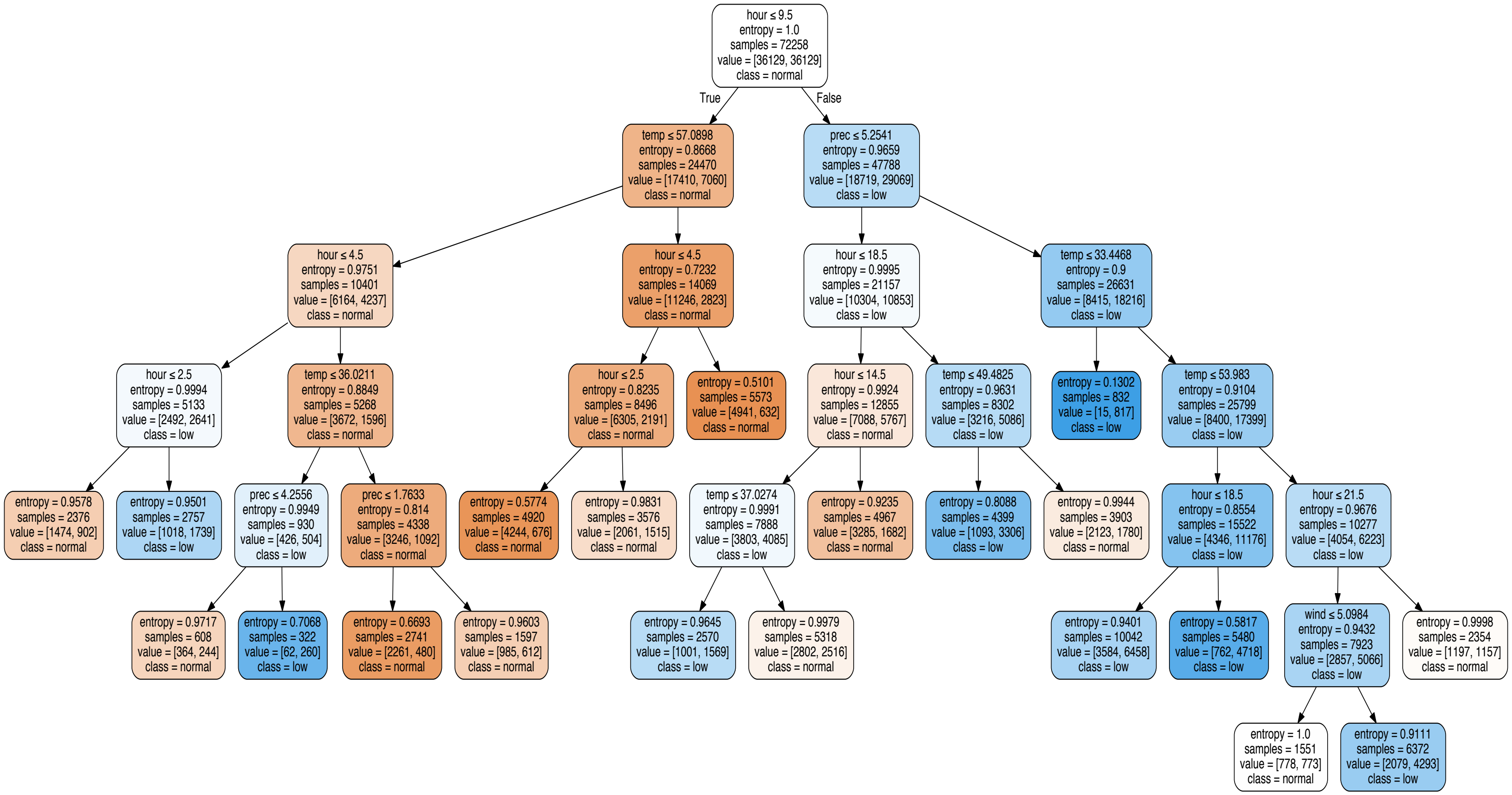

Figure 5.5: Decision tree analysis for traffic station id 15287 for traffic patterns in Atlanta, GA

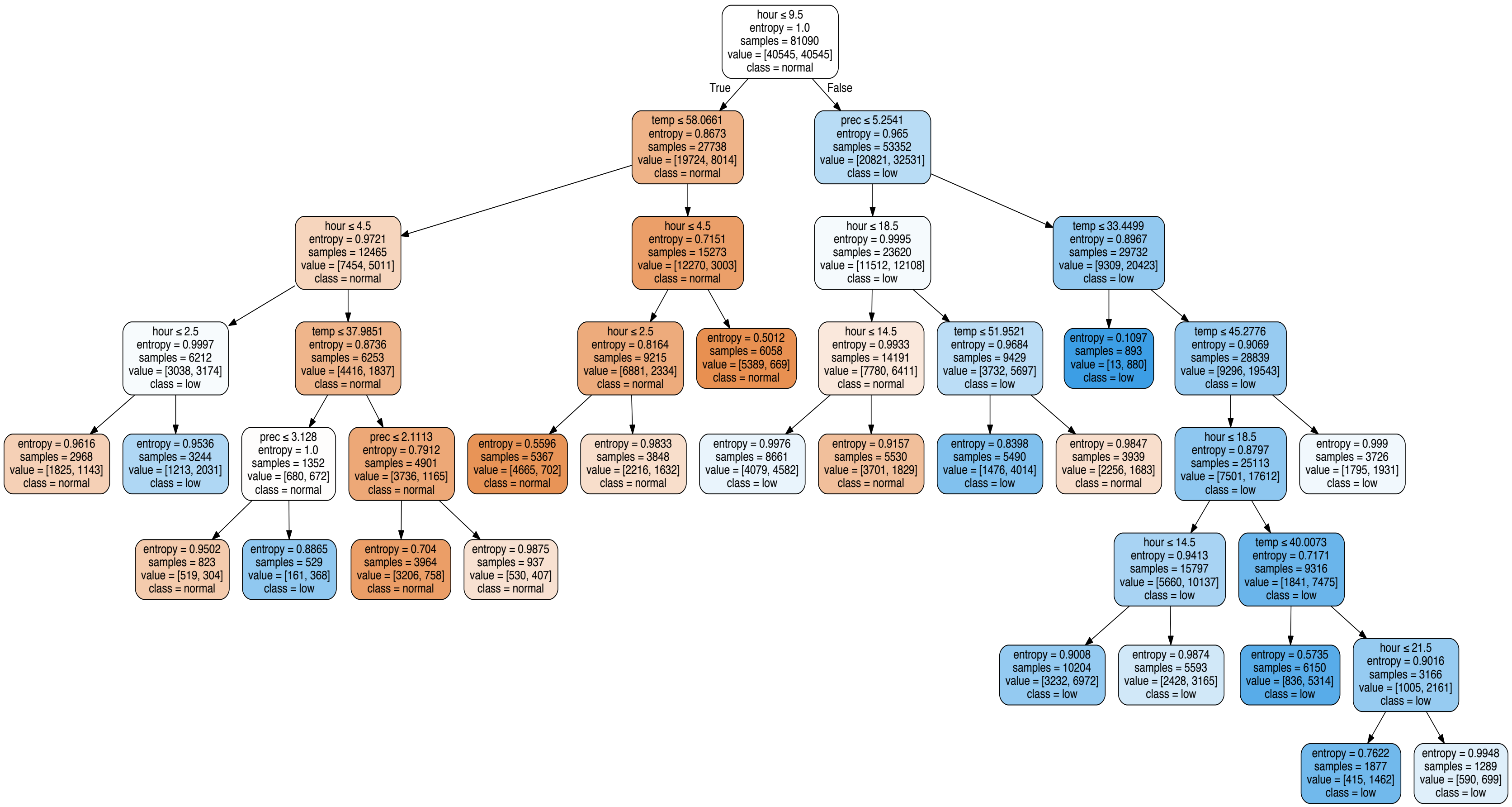

Figure 5.6: Decision tree analysis for traffic station id 15180 for traffic patterns in Atlanta, GA

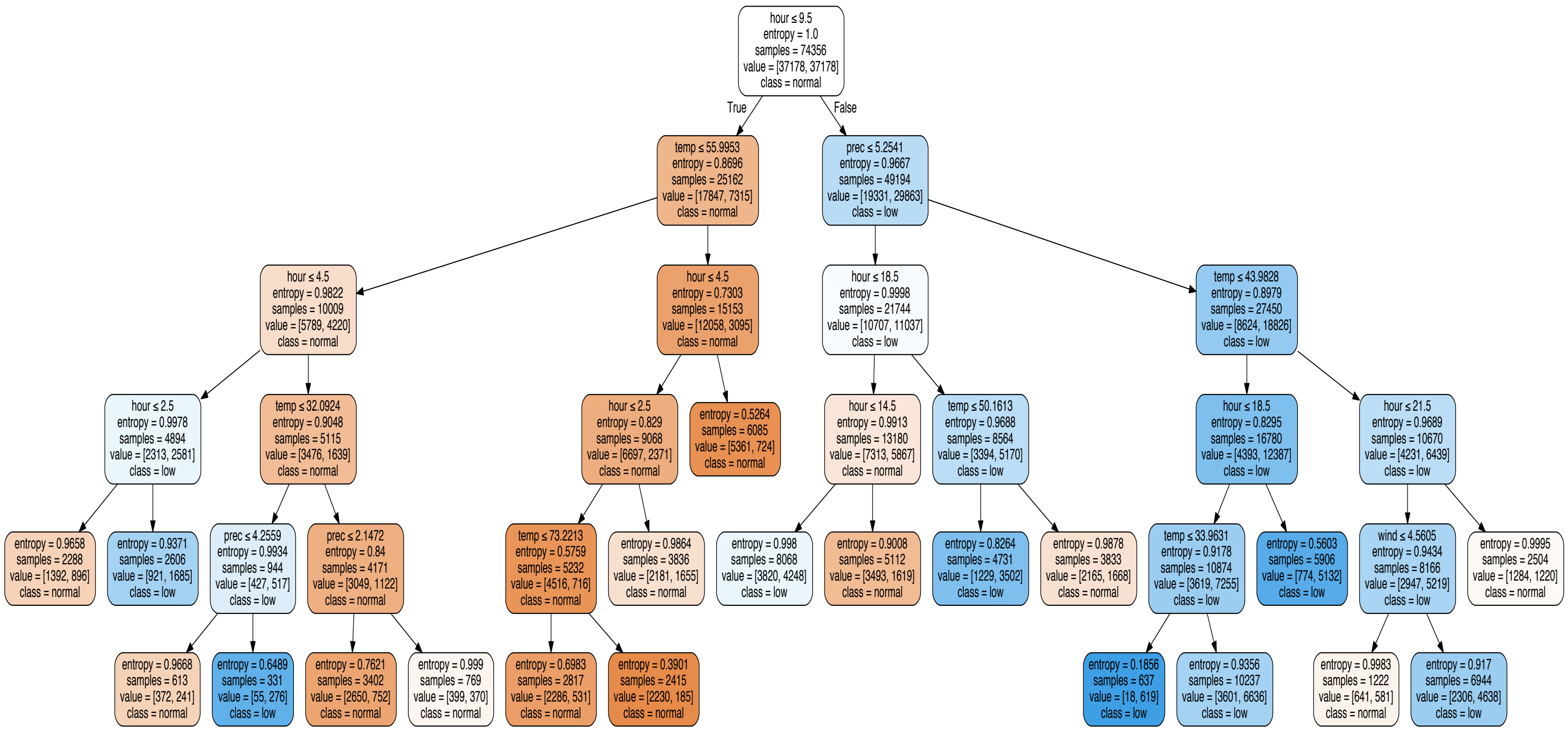

Figure 5.7: Decision tree analysis for traffic station id 34123 for traffic patterns in Atlanta, GA

5.3 Summary

Results from the T-test, Mann-Whitney test and Decision Tree Learning indicated that precipitation, visibility, and temperature were the most important factors for the significant decline in traffic volume. However, there were different impact patterns among these three weather elements. From midnight to late morning, temperature appears to be the major cause of the decline. Then, precipitation was the secondary variables that contributed to the drop in traffic capacity. However, from noon to midnight, precipitation was the most important factor for the decrease. Then, temperature took a supporting role to reduce traffic volume. Surprisingly, the impact of temperature was different as the temperature changes.

Results from the Wilcoxon sign-ranked test was moderately different from the other tests because the Wilcoxon model was used to examine the mean difference between dependent observations. However, this study focused on the analysis of independent observations of traffic volume in different weather conditions. All three models including T-test, Mann-Whitney and Decision tree, had major requirements that observations had to be independent which was similar to this study.

Chapter 6
Geovisualization

International Cartographic Association defined the main purposes of geovisualization as exploration, analysis, synthesis and presentation. The goals of geovisualization are spatial analysis and visualization with respect to three dimensions consisting of [14] 1) Sharing new and existing knowledge that could reveal unknowns or construct new knowledge, 2) creating the interactive visualization interface that could create impact and influence to users, and 3) creating the work for a wide range of audiences from a single private user to large public audiences.

For this analysis, geovisualization techniques were used to build a web-based geographic decision support tool. This tool was built to visually support and provide a better understanding of the impact of hazardous weather events on traffic volume. This application provided locations of all traffic stations including historical daily and hourly traffic volume trend, hourly weather conditions (temperature, precipitation, visibility and wind speed) and traffic volume conditions in normal weather conditions and during extreme climate events. The geographic information tool can be found at http://dew.srcc.lsu.edu/traffichttp://dew.srcc.lsu.edu/traffic

6.1 Methods

This study built the geographic decision support tool based on the Common Gateway Interface model. This Web based mapping technique was the combination of main three components including [24] 1) at least one front-end client for interacting with the data, 2) one or more server-side repositories for storing and retrieving the data from a data warehouse, and 3) one or more intermediate script or web service requests for sending the requests from front-end to the data repositories in the server-side and retrieving the data from server-side to client-side. The basic process of this model is when a client makes a query request to a server, the server sends a query to retrieve information that matches the criteria from the query back to server. Then, the server will analyze and process that information before sending that detail back to the client (Figure 6.1).

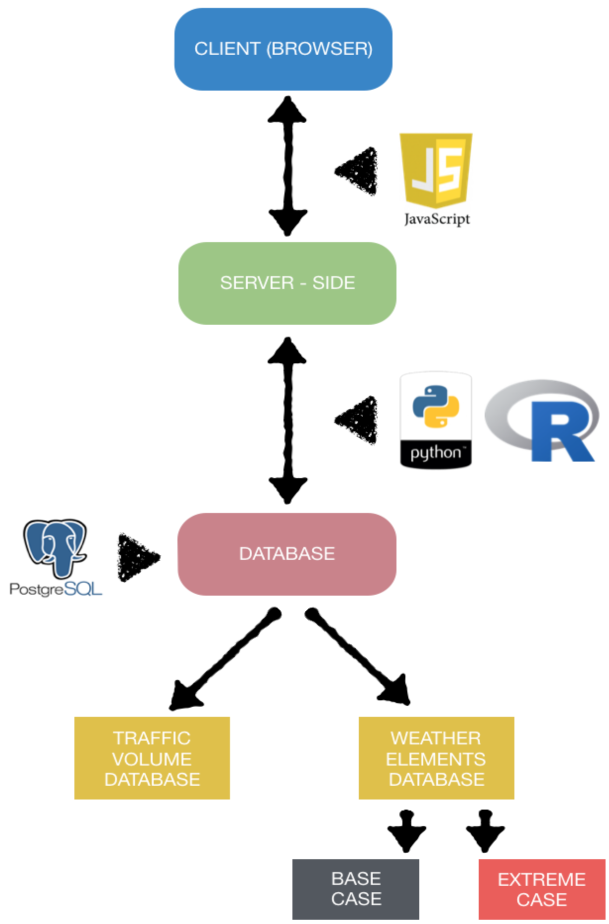

Figure 6.1: An example diagram for structure of decision support tool.

6.1.1 Database

This was a main data warehouse of this web-based GIS tool. This research stored every datum for this analysis in a local PostgreSQL database. This database consisted of three main tables; traffic station metadata, traffic record for each traffic station, and weather variables.

6.1.2 Web Server

Web server was a remote web application server that processes web requests and sent information to the client side. This server retrieved the HTTP Requests from clients and ran scripts for computing and responding to the requests with correct data and information. There were many programming languages that were commonly used for the web server. This web server worked as a manager of this application for accepting requests from users. Then, the web server would send the SQL queries to the database and retrieve the required information. The web server computed, integrated, formatted, and sent this information back to the client side for data visualization purposes. This study used Python with Django template as a medium source of web server. The roles of this server were to receive requests from clients, gathering information from the database, and analyzing information before sending it back to the client.

6.1.3 Client Side

Client Side was a web browser which is designed to manipulate and display the content that returns from the web server. Everything that is visualized on the web-based application on the web browser was considered as client-side. Users could create requests and actions to get specific or desired information from the web server and retrieve it back in text or visual format. For this application, client side was built based on Javascript with the extension of visualization libraries including Mapbox.js for a geographic visualization and D3.js for Graphs and Charts visualization.

6.2 Decision tools for traffic volume and weather variables

There were five main interactive graphic components of this application including a map component, daily traffic volume, hourly traffic volume, hourly weather variables, and comparison of traffic volume in normal and extreme driving circumstances.

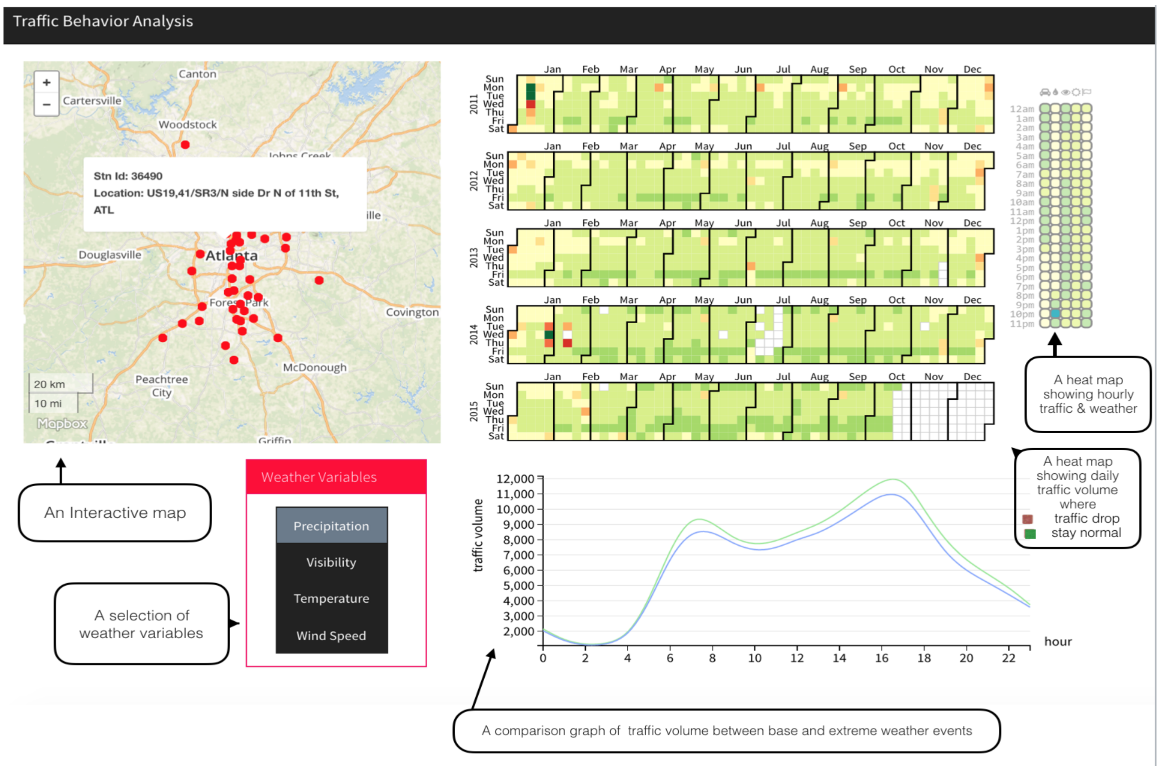

Figure 6.2: Traffic behavior geographic information tool.

6.2.1 Map Component

The map was interactive; it was scrollable, clickable and draggable. Users could drag the map to see the specific area or area of interest. The map visualized the traffic stations distribution in a study area (Figure 6.3). Traffic counter sites are represented by red circle markers. The information of each traffic station would visualize after users clicked on the marker. The role of this marker was to send a set of queries to retrieve the information of a chosen traffic station from the web server. Then, retrieving the computed information from the web server and visualizing other components which were the interactive graph of daily traffic volume, hourly traffic volume and the comparison of traffic volume.

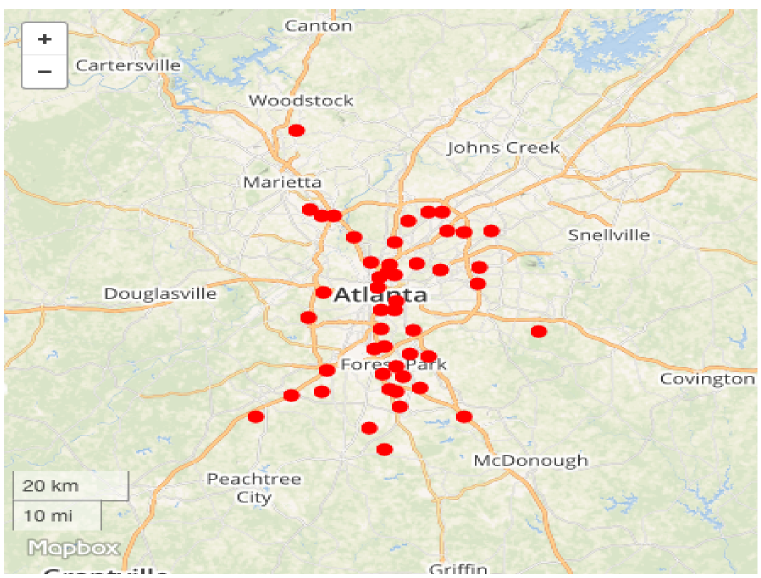

Figure 6.3: The interactive map of traffic stations in Atlanta

6.2.2 Daily Traffic Volume

This daily traffic volume graph was generated by a heat map calendar visualizing values over days in a calendar-like view (Figure 6.4). The purpose of this graph was to indicate the change in daily traffic volume throughout five years. This graph contained daily traffic volume indicator D from (D) = x(Traffic Volume on a selected day) / Average Daily Traffic Volume from a five-year record. The red to green color scheme was applied to show D, based on this criteria:

when D is more than 100%, traffic volume is represented by dark green

when D is 90% - 100%, traffic volume is represented by yellow

when D is 80% - 90%, traffic volume is represented by orange

when D is 70% - 80%, traffic volume is represented by dark orange

when D is below 70%, traffic volume is represented by red

When a user clicked on each day, another set of queries would send to the web server to retrieve the data of hourly traffic volume in that chosen day.

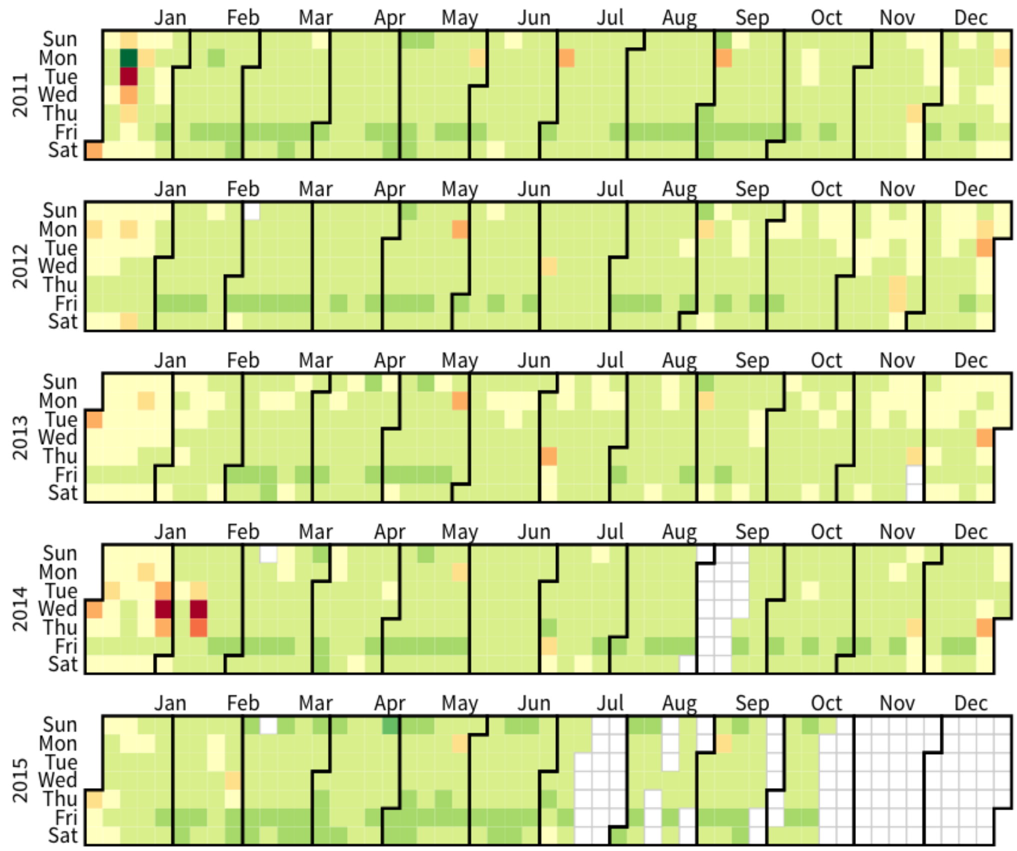

Figure 6.4: Daily summary of traffic volume during 2010 - 2015 from station id 15287

6.2.3 Hourly Traffic Volume

The hourly traffic volume was also visualized by the heat map calendar, but instead of having a calendar-like view, this graph consists of 24 vertical squares and 5 horizontal squares in terms of table-like view (Figure 6.5). The vertical grids represented hourly data from 24 hours of days and five horizontal grids indicate traffic volume, precipitation, visibility, temperature and wind speed variables. The purpose of this hourly traffic volume was to visualize the comparison of hourly traffic volume to average hourly traffic volume and hourly weather variables. The traffic data and weather variables would be normalized to scale from 0 - 1 based on indicator Htraffic hour, precipitation, temperature, visibility and wind speed which is hourly value from a chosen hour / average hourly value from five-year record. The blue to red color scheme was applied to show H based on this following criteria

when H is more than 0.9 but less than 1, the squares that represent each variables will be dark darkgreen

when H is more than 0.8 but less than 0.9, the squares that represent each variables will be green

when H is more than 0.7 but less than 0.8, the squares that represent each variables will be light green

when H is more than 0.6 but less than 0.7, the squares that represent each variables will be orange

when H is more than 0.5 but less than 0.6 , the squares that represent each variables will be light red

when H is below than 0.5 , the squares that represent each variables will be red

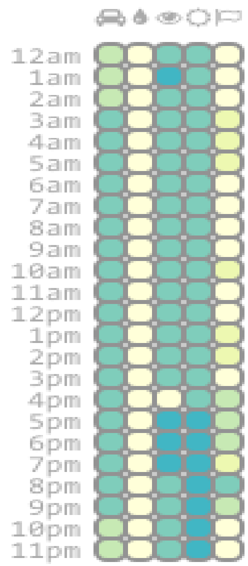

Figure 6.5: Hourly summary of traffic volume in a chosen day from a single traffic station

6.2.4 A comparison of traffic volume

This component consisted of a select option to choose weather variables and a simple line chart to indicate the change in traffic volume between normal weather condition and extreme climate events from a selected variable. The select options contained four variables which are precipitation, temperature, visibility and wind speed (Figure 6.6). When a user selects an option, the client side sends the request to the web-server to retrieve and analyze the change in traffic volume from the given weather variable. This application separated traffic volumes into two groups based on the weather criteria. Then, the model would calculate an average hourly traffic volume for each hour separately, but simultaneously between two traffic groups. Eventually, the hourly average traffic volume from each group would be visualized in a separate line on the same chart.

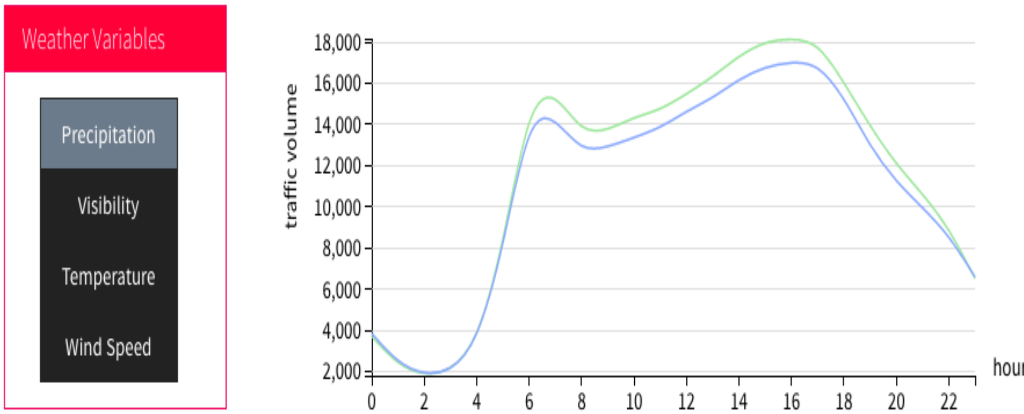

Figure 6.6: Comparison of traffic volume under normal and extreme weather conditions

Chapter 7
Conclusion

This research focused on the impact of weather variables, including precipitation, temperature, visibility and wind speed on hourly traffic volumes in Atlanta, Georgia. This study consisted of three main components which were analyzing the impact of individual weather elements on traffic volume, developing a predictive machine learning model to predict conditions that caused the change in traffic volume, and a decision support tool to visualize traffic volume and its interaction with studied weather elements.

For the first component, this thesis analyzed the influence of hazardous weather events on traffic volume through 3 statistical models including a T-test, Wilcoxon, and Mann-Whitney. Results from two statistical models, T-test and Mann-Whitney, produced similar results. Based on the results, precipitation, temperature and visibility were three major factors that indicated the significant influence on traffic volume. These elements had the dramatic impact on traffic volume during evening rush hour from 18:00 - 21:00. Moreover, each variable also illustrated the remarkable influence on the decline in traffic volume in different hours of the day. Temperature had the greatest influence on traffic volume from 19:00 - 21:00 ; however, precipitation showed the most significant impact on traffic volume from 13:00 - 22:00. In contrast, visibility had a remarkable impact on traffic volume between 20:00 - 22:00.

For a predictive machine learning model, the result from the model was similar to the model from statistic tests. Temperature and precipitation were the most significant factors that reduced traffic volume. Notably, temperature was the only variable that the change of itself created the different magnitude impact on traffic volume. The combination of precipitation and temperature was the most important factor that had the great influence on the decline of traffic volume. However, there were different patterns of correlation between these variables and traffic volume based on specific hours of the day. Before 9 hour, temperature was the most significant variable that accounted for the significant declination in traffic volume. In contrast, from 10 to 23 hour, precipitation was the most important factor to make the decrease in traffic volume.

For a decision support tool, this research provided an easily accessible traffic and weather data visualization for administrators, planners and commuters to use this information for further studies. This geographic information tool consisted of four main components that could help users understand the hourly and daily traffic volume and weather situations in the period of 2010 - 2015 in Atlanta, GA. This tool also depicted the comparison of traffic volume between normal and extreme weather conditions to show the impact of each weather variable on traffic volume.

Results from this research could ultimately provide a reference for an overall hourly assessment of extreme weather impact on traffic volume in Atlanta, GA by providing a reference of traffic efficiency during extreme weather events.

7.1 Limitations and Future Study

This study provided a better understanding of the impact of hazardous weather events on hourly traffic volume in Atlanta. However, one major limitation of this research was the availability of hourly weather variables. There were only 4 weather stations in the study area that measured hourly precipitation, visibility, temperature and wind speed. However, these stations could have been combined with daily cooperative network stations to better simulate and estimate weather parameter between these 4 gauges. This will be considered in future research. Moreover, there were only 4 weather stations that were located within 5 miles of the study area. This issue might affect the interpretation of weather variables.

For further studies, this research provides reference for further studies on people's traveling behavior during extreme weather events by exploring which weather variables contribute to the decrease in traffic volumes, as well as, evaluation and improvement on existing transportation system in Atlanta.

References

[1] Manish Agarwal, Thomas H Maze, and Reginald Souleyrette. Impacts of weather on urban freeway traffic flow characteristics and facility capacity. In *Proceedings of the 2005 mid-continent transportation research symposium*, pages 18–19, 2005.

[2] Sharolyn Anderson. An evaluation of spatial interpolation methods on air temperature in phoenix, az. *De-partment of Geography, Arizona State University*, 2002.

[3] Anthony Arguez, Imke Durre, Scott Applequist, Russell S Vose, Michael F Squires, Xungang Yin, Richard R Heim Jr, and Timothy W Owen. Noaa's 1981-2010 us climate normals: An overview. *Bulletin of the American Meteorological Society*, 93(11):1687–1697, 2012.

[4] Andrew Bartlett, Winnifred Lao, Yunjie Zhao, and Adel W Sadek. Impact of inclement weather on hourly traffic volumes in buffalo, new york. In *Transportation Research Board 92nd Annual Meeting*, number 13-3240, 2013.

[5] Jin Chen, Robert E Roth, Adam T Naito, Eugene J Lengerich, and Alan M MacEachren. Geovisual analytics to enhance spatial scan statistic interpretation: an analysis of us cervical cancer mortality. *International journal of health geographics*, 7(1):1, 2008.

[6] US DoT, Dismal Nitch, Megler Rest Area Safety, and Access Improvements FLAP. Federal highway administration. *Money*, 103:85–925, 2015.

[7] Daniel Eisenberg. The mixed effects of precipitation on traffic crashes. *Accident analysis & prevention*, 36(4):637–647, 2004.

[8] Michael P Fay and Michael A Proschan. Wilcoxon-mann-whitney or t-test? on assumptions for hypothesis tests and multiple interpretations of decision rules. *Statistics surveys*, 4:1, 2010.

[9] A Dewi Hartkamp, Kirsten De Beurs, Alfred Stein, and Jeffrey W White. Interpolation techniques for climate variables. 1999.

[10] Md Mahmud Hasan. Investigation of the effect of traffic parameters on road hazard using classification tree model. *International Journal for Traffic and Transport Engineering*, 2(3):271–285, 2012.

[11] Stephanie C Herring, Martin P Hoerling, James P Kossin, Thomas C Peterson, and Peter A Stott. Explaining extreme events of 2014 from a climate perspective. *Bulletin of the American Meteorological Society*, 96(12):S1–S172, 2015.

[12] Robert Hranac, Emily Sterzin, Daniel Krechmer, Hesham A Rakha, Mohamadreza Farzaneh, Mohamadreza Arafeh, et al. Empirical studies on traffic flow in inclement weather. 2006.

[13] KK Knapp, LD Smithson, and AJ Khattak. The mobility and safety impacts of winter storm events in a freeway environment, mid-continent transportation symposium 2000 proceedings. *Iowa, USA*, 2000.

[14] Menno-Jan Kraak and Alan M MacEachren. Geovisualization and giscience. *Cartography and Geographic Information Science*, 32(2):67–68, 2005.

[15] Deepak Kulkarni, Yao Wang, and Banavar Sridhar. Analysis of airport ground delay program decisions using data mining techniques. In *14th AIAA Aviation Technology, Integration, and Operations Conference*, page 2025, 2014.

[16] Wei-Yin Loh. Classification and regression trees. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 1(1):14–23, 2011.

[17] Sarann Ly, Catherine Charles, and Aurore Degre. Geostatistical interpolation of daily rainfall at catchment scale: the use of several variogram models in the ourthe and ambleve catchments, belgium. *Hydrology and Earth System Sciences*, 15(7):2259–2274, 2011.

[18] Lubos Mitas and Helena Mitasova. Spatial interpolation. *Geographical information systems: principles, techniques, management and applications*, 1:481–492, 1999.

[19] Lalit Sivanandan Nookala. *Weather impact on traffic conditions and travel time prediction*. PhD thesis, University of Minnesota Duluth, 2006.

[20] RD Owens and GH Vanwormer. The effects of staggered working hours on traffic volumes at a large industrial complex. *Traffic Engineering, Inst Traffic Engr*, 43(11), 1973.

[21] Narayan Prasad, Prudhvi Kumar Reddy, and Mannava Munirathnam Naidu. A novel decision tree approach for the prediction of precipitation using entropy in sliq. In *Computer Modelling and Simulation (UKSim), 2013 UKSim 15th International Conference on*, pages 209–217. IEEE, 2013.

[22] Jean-Paul Rodrigue and Theo Notteboom. Comparative north american and european gateway logistics: the regionalism of freight distribution. *Journal of Transport Geography*, 18(4):497–507, 2010.

[23] Hyuk-Jae Roh, Satish Sharma, Prasanta K Sahu, and Sandeep Datla. Analysis and modeling of highway truck traffic volume variations during severe winter weather conditions in canada. *Journal of Modern Transportation*, 23(3):228–239, 2015.

[24] Robert E Roth, Anthony Robinson, Michael Stryker, Alan M MacEachren, Eugene J Lengerich, and Etien Koua. Web-based geovisualization and geocollaboration: Applications to public health. In *Proceedings of the Joint Statistical Meeting, Invited Session on Web Mapping*, 2008.

[25] Michelle Marie Russo. *Extreme Precipitation Events in East Baton Rouge Parish: An Areal Rainfall Frequency/magnitude Analysis*. PhD thesis, Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Science in The Department of Geography and Anthropology by Michelle Marie Russo BS, Louisiana State University, 2004.

[26] Cristian Rusu and Virginia Rusu. Radial basis functions versus geostatistics in spatial interpolations. In *Artificial Intelligence in Theory and Practice*, pages 119–128. Springer, 2006.

[27] David Samba and Byungkyu Brian Park. Probabilistic modeling of inclement

weather impacts on traffic volume. In *Transportation Research Board 89th Annual Meeting*, number 10-0646, 2010.

[28] Sidney Siegel. Nonparametric statistics for the behavioral sciences. 1956.

[29] Puyam S Singh, Dibyajyoti Chutia, and Singuluri Sudhakar. Development of a web based gis application for spatial natural resources information system using effective open source software and standards. *Journal of Geographic Information System*, 4(3):261, 2012.

[30] Andrew D Stern, Vaishali Shah, Lynette Goodwin, and Paul Pisano. Analysis of weather impacts on traffic flow in metropolitan washington dc. In *Proceedings of the 19th International Conference on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology*, 2003.

[31] David F. Watson. *Contouring: a guide to the analysis and display of spatial data*. Pergamon Press, 1992.

[32] Tommy Wright, Patricia S Hu, Jennifer Young, and An Lu. Variability in traffic monitoring data. *Final Summary Report, Oak Ridge National Liboratory, US Department of Energy*, 8, 1997.

Appendix

Table A.1: T-test of p-values from analysis of traffic volume and precipitation

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
17056	0.003318	0.213089	0.097296	0.706453	0.022562	0.626764	0.768091	0.780879	0.541816	0.743632	0.423174	0.188842	0.107789	0.142254	0.054557	0.043433	0.049876	0.085785	0.427131	0.123878	0.083028	0.029832	0.019484	0.268108
15157	0.201261	0.0741	0.10844	0.021424	0.229023	0.276316	0.453387	0.10127	0.241749	0.025228	0.003467	0.123506	0.043663	0.005792	0.002097	0.003259	0.002703	0.004491	0.000135	2.00E-06	7.00E-05	0.000463	0.004004	0.129171
16622	0.562971	0.227843	0.255281	0.022069	0.735875	0.563935	0.772454	0.276682	0.054644	0.006391	0.001503	0.008416	0.002199	0.000491	0.000619	0.000141	0.000128	0.000197	0.000638	2.00E-06	0.000185	0.0069	0.019942	0.221594
37613	0.349565	0.350828	0.478655	0.215084	0.579811	0.692053	0.272259	0.249471	0.203671	0.134162	0.040473	0.037891	0.017422	0.001305	0.002011	0.000372	0.000745	0.014382	0.010802	7.00E-05	0.000478	0.001659	0.017056	0.32713
36416	0.10789	0.050222	0.400422	0.666003	0.275654	0.782972	0.74164	0.360188	0.245297	0.10673	0.016172	0.048709	0.00192	0.001009	0.464596	0.113003	0.010395	0.10966	0.220943	0.011227	0.001561	0.077189	0.047997	0.323726
37788	0.093893	0.101443	0.078072	0.016914	0.077884	0.708196	0.194432	0.12347	0.073516	0.022936	0.002435	0.052836	0.027141	0.005346	3.60E-05	0.000222	0.000558	0.002838	0.000794	1.00E-06	9.00E-06	7.60E-05	0.014935	0.396434
39446	0.125177	0.327431	0.309018	0.217512	0.65369	0.506729	0.459103	0.228249	0.367624	0.263981	0.476157	0.090092	0.142672	0.026418	0.000194	0.001426	0.001272	0.011158	0.023963	0.002313	0.003123	0.010111	0.028219	0.169859
36752	0.094767	0.145225	0.401988	0.417589	0.379686	0.577361	0.40634	0.321866	0.638676	0.469064	0.227616	0.090839	0.113257	0.06838	0.006553	0.004115	0.00447	0.019286	0.018967	0.00513	0.00065	0.014418	0.022305	0.190379
25113	0.376568	0.116435	0.294531	0.102811	0.678486	0.626582	0.418081	0.55711	0.519755	0.221003	0.294901	0.326398	0.11025	0.064022	0.03535	0.006754	0.047024	0.062584	0.071987	0.000719	0.000289	0.003893	0.000575	0.099785
36001	0.864916	0.565733	0.474311	0.209275	0.336846	0.648358	0.531196	0.239805	0.235891	0.022729	0.012512	0.07658	0.066515	0.003517	0.009648	0.003408	0.026807	0.064748	0.019367	0.000294	0.012837	0.051701	0.03224	0.525954
15494	0.643849	0.372208	0.676812	0.384727	0.468566	0.676375	0.628076	0.37646	0.773472	0.667616	0.256285	0.672358	0.485689	0.090768	0.032462	0.006307	0.005231	0.004222	0.168486	0.001653	0.175814	0.222207	0.026859	0.762854
24895	0.255091	0.209115	0.661365	0.409565	0.47214	0.704926	0.636994	0.691533	0.736588	0.5632	0.473598	0.353165	0.163866	0.092942	0.322913	0.110905	0.201444	0.274013	0.140545	0.052752	0.006701	0.015562	0.037663	0.120275
34123	0.544884	0.313301	0.122808	0.028745	0.642159	0.694346	0.381647	0.302455	0.249804	0.026415	0.007089	0.04905	0.00144	0.000209	0.00107	0.002192	0.092971	0.085904	0.106438	0.011312	0.005298	0.023042	0.034462	0.440801
49159	0.818714	0.299387	0.690438	0.674242	0.636129	0.767801	0.509909	0.540662	0.684375	0.174407	0.319519	0.479555	0.178563	0.025418	0.014524	0.001424	0.020375	0.030286	0.034409	0.007617	0.006874	0.114325	0.092834	0.660301
37390	0.843977	0.75502	0.649985	0.249159	0.683455	0.77873	0.590617	0.18144	0.088907	0.0739	0.012524	0.119748	0.140799	0.026951	0.006461	0.014869	0.023755	0.027402	0.02593	0.000791	0.006625	0.019259	0.261684	0.771297
15287	0.436898	0.106353	0.152082	0.195629	0.36224	0.652468	0.31586	0.446207	0.213746	0.037883	0.018557	0.379834	0.323812	0.311118	0.449582	0.39698	0.312202	0.258672	0.064494	0.002056	0.011816	0.013225	0.019011	0.35151
37354	0.137198	0.185002	0.261905	0.007885	0.184154	0.242386	0.239364	0.129277	0.226615	0.029704	0.007359	0.316125	0.189908	0.017476	0.002582	0.001802	0.01535	0.016009	0.028513	0.000878	0.035157	0.081457	0.014013	0.093311
17585	0.02787	0.159338	0.054718	0.272613	0.454665	0.702805	0.639848	0.577352	0.285905	0.308004	0.212896	0.132006	0.071404	0.047509	0.061777	0.030407	0.071823	0.08602	0.105141	0.002357	0.001278	0.00862	0.105988	0.223659
25065	0.482888	0.284207	0.383056	0.087031	0.608118	0.505921	0.60542	0.238636	0.214478	0.174454	0.077191	0.167692	0.160754	0.025465	0.004103	0.000703	0.012753	0.030642	0.033919	0.000888	0.001915	0.008894	0.055537	0.414975
25347	0.312053	0.315646	0.287569	0.035938	0.010447	0.178977	0.082446	0.228266	0.079192	0.459446	0.074491	0.10033	0.178703	0.153264	0.216069	0.05502	0.234581	0.087712	0.010179	0.004563	0.004162	0.01013	0.175103	0.615306
24268	0.191107	0.283374	0.437162	0.013849	0.412023	0.264001	0.420529	0.197228	0.054698	0.01156	0.001255	0.255327	0.440194	0.078939	0.005342	0.001161	0.000727	0.002379	2.00E-06	3.00E-06	0.000412	0.005577	0.134559	0.388945
37933	0.008986	0.015886	0.03954	0.028546	0.275922	0.413446	0.364916	0.098707	0.169078	0.030195	0.002504	0.025726	0.009504	0.005849	0.00092	0.00057	0.0077	0.016584	0.00774	0.00229	0.000606	0.000903	0.003322	0.036697
14938	0.233094	0.279067	0.123036	0.132144	0.79044	0.723774	0.466188	0.194432	0.384772	0.020301	0.006466	0.09682	0.03912	0.006118	0.004574	0.006396	0.00736	0.042188	0.017966	7.80E-05	0.003878	0.007239	0.011829	0.422186
37305	0.708916	0.327176	0.530212	0.089637	0.740642	0.783754	0.78212	0.76545	0.593917	0.422702	0.472758	0.206067	0.166396	0.131315	0.059742	0.044924	0.092671	0.106135	0.085309	0.009825	0.010308	0.048955	0.158657	0.516673
36950	0.012882	0.159889	0.141314	0.054376	0.15517	0.748674	0.52309	0.486394	0.779047	0.033763	0.000439	0.000941	0.000156	5.00E-06	2.00E-06	0.000639	0.01217	0.025979	0.016268	1.80E-05	0.000507	0.002744	0.001957	0.190975
15180	0.171556	0.124506	0.079128	0.765738	0.625456	0.564941	0.547632	0.654987	0.56569	0.070922	0.377444	0.666445	0.370339	0.334477	0.764446	0.62685	0.438456	0.319459	0.571984	0.014872	0.00484	0.007046	0.011911	0.608669
34093	0.342544	0.2441	0.037585	0.144818	0.544548	0.715933	0.386199	0.414064	0.082524	0.007534	0.002907	0.031863	0.000808	0.000936	0.001694	0.003616	0.077542	0.042617	0.019107	0.042346	0.029783	0.001952	0.046588	0.138708
15128	0.38773	0.274789	0.063891	0.386544	0.796306	0.637119	0.217678	0.449128	0.556722	0.00135	0.002324	0.003584	0.000248	0.001448	0.008968	0.079122	0.017264	0.00263	0.002455	3.00E-06	4.10E-05	0.009379	0.109065	0.661003
25676	0.350397	0.210703	0.376608	0.089769	0.142089	0.257848	0.072874	0.285515	0.285038	0.260537	0.223151	0.514896	0.819792	0.819335	0.40837	0.244857	0.114181	0.133943	0.092056	0.000699	0.000109	0.01722	0.073505	0.287327
36764	0.088004	0.148432	0.355395	0.278214	0.31515	0.703338	0.378621	0.317689	0.545779	0.284935	0.101819	0.285306	0.064651	0.062259	0.024257	0.007108	0.005619	0.0196	0.150654	0.016179	0.001737	0.005755	0.022626	0.231159
36776	0.067759	0.16744	0.604206	0.482251	0.465619	0.726345	0.570769	0.329144	0.550771	0.110336	0.012584	0.082072	0.00876	0.008405	0.023381	0.008867	0.002049	0.035639	0.120764	0.063191	0.011397	0.01446	0.006288	0.109737
38747	0.349528	0.327217	0.078501	0.070701	0.240512	0.499313	0.177695	0.236842	0.211228	0.046144	0.065034	0.051497	0.037458	0.018953	0.032751	0.007407	0.066767	0.039536	0.008484	0.001361	0.003932	0.02619	0.033267	0.82664
38104	0.239903	0.214102	0.103222	0.070693	0.494903	0.387196	0.362878	0.16752	0.219478	0.098754	0.215925	0.117368	0.196931	0.019931	0.08686	0.020964	0.032443	0.039464	0.035236	0.001776	0.002916	0.001716	0.011076	0.193795
36490	0.173394	0.133224	0.525528	0.128087	0.158744	0.733125	0.756663	0.760318	0.772478	0.79483	0.681623	0.753546	0.361687	0.159197	0.237387	0.037669	0.306946	0.375383	0.247043	0.082	0.002102	0.001797	0.001651	0.076296
15534	0.363284	0.137495	0.226189	0.010705	0.254564	0.072663	0.339525	0.176842	0.136165	0.099023	0.05026	0.070108	0.064955	0.001782	0.006474	0.003657	0.093747	0.070666	0.070752	0.000401	0.000714	0.000628	0.000729	0.083135
37110	0.001615	0.16505	0.060053	0.012221	0.655604	0.511904	0.499325	0.386588	0.684711	0.277488	0.153723	0.511314	0.175641	0.186176	0.008426	0.011939	0.027156	0.048872	0.008584	9.00E-06	0.000645	0.001329	0.000208	0.003153
37997	0.003775	0.003986	0.003597	0.026937	0.033591	0.20423	0.171406	0.218807	0.323067	0.320567	0.093558	0.044126	0.005265	0.006827	0.002154	0.001176	0.007673	0.018297	0.006383	4.90E-05	0.000187	0.000841	0.024178	0.017191
17696	0.16727	0.286986	0.138758	0.435482	0.604859	0.636412	0.594309	0.621875	0.191529	0.236188	0.133068	0.019238	0.016986	0.001598	0.000319	0.000584	7.10E-05	0.000215	0.000316	0.000118	0.001816	0.001501	0.151217	0.498874
15451	0.318534	0.061032	0.223757	0.719482	0.368767	0.353436	0.226364	0.1923	0.151442	0.011043	0.034529	0.247758	0.136246	0.024973	0.036298	0.045728	0.060191	0.203325	0.143641	0.006293	0.001614	0.015812	0.022828	0.226329
25358	0.651492	0.538487	0.735577	0.729494	0.692955	0.796654	0.826394	0.767352	0.759169	0.687681	0.777362	0.78065	0.675796	0.610742	0.509846	0.576404	0.604087	0.218729	0.173495	0.687269	0.424071	0.533707	0.62017	0.741421
37761	0.046569	0.044407	0.101912	0.013243	0.238508	0.604879	0.280146	0.083629	0.166541	0.019767	0.00032	0.006726	0.007757	0.000661	3.20E-05	0.000242	0.002408	0.006462	0.000272	0.032	5.00E-06	0.00023	0.002476	0.110345
25248	0.591144	0.032217	0.157602	0.004304	0.160449	0.688425	0.700573	0.536327	0.40131	0.113817	0.077334	0.179954	0.041727	0.021501	0.055108	0.005761	0.025918	0.019101	0.006075	0.002068	0.002585	0.008761	0.171521	0.724522
37875	0.12434	0.220342	0.827579	0.406821	0.754907	0.54275	0.402191	0.243767	0.188488	0.045659	0.059596	0.347949	0.132518	0.004676	0.072897	0.0095	0.051993	0.093923	0.025231	0.001713	0.106523	0.089377	0.802071	0.621218
15472	0.325238	0.221612	0.554172	0.212552	0.2708	0.282786	0.356092	0.138699	0.19675	0.105097	0.04988	0.506931	0.426584	0.203707	0.025037	0.004674	0.003707	0.003786	0.009132	0.003635	0.031547	0.020751	0.043547	0.240897
24443	0.070236	0.176218	0.635499	0.206648	0.219246	0.729711	0.387939	0.496335	0.517035	0.529585	0.252061	0.250606	0.288012	0.38208	0.461837	0.110072	0.264082	0.227739	0.166239	0.025105	0.000842	0.015309	0.002821	0.048646
37474	0.769707	0.483565	0.443836	0.159257	0.72034	0.693908	0.399221	0.498543	0.152156	0.056464	0.012139	0.112057	0.037117	0.00879	0.032061	0.025629	0.029413	0.016989	0.004158	0.001291	0.003818	0.076596	0.410628	0.802974
25395	0.598523	0.075174	0.148131	0.226262	0.282339	0.654705	0.715627	0.638491	0.572805	0.468916	0.035042	0.078279	0.111342	0.032242	0.067743	0.024464	0.051036	0.050501	0.004428	0.003265	0.001144	0.014077	0.049344	0.841952
24448	0.192244	0.772244	0.459982	0.344639	0.534077	0.691409	0.400867	0.232747	0.276589	0.017857	0.013515	0.104133	0.058408	0.01877	0.001131	0.000769	0.04365	0.056942	0.035833	8.00E-05	0.000118	0.000377	0.010169	0.32735

Table A.2: T-test of p-values from analysis of traffic volume and temperature

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
36764	0.135295	0.096624	0.139265	0.102165	0.084164	0.108951	0.127025	0.135519	0.218857	0.136772	0.091808	0.105656	0.098935	0.356202	0.515213	0.103533	0.091402	0.070875	0.030915	0.038751	0.016281	0.005735	0.00416	0.085174
17696	0.014809	0.018877	0.050794	0.001215	0.001714	0.053398	0.155225	0.058693	0.111893	0.025583	0.010928	0.029109	0.040464	0.069253	0.088856	0.019525	0.19029	0.116317	0.02223	0.029778	0.027062	0.015279	0.013046	0.007416
15180	0.05506	0.12257	0.082669	0.770742	0.132666	0.200599	0.147635	0.139177	0.220956	0.105464	0.126234	0.101424	0.25733	0.381981	0.54834	0.687205	0.497673	0.647228	0.308591	0.237445	0.055753	0.092588	0.192925	0.293072
15287	0.041537	0.031076	0.025277	0.078225	0.220512	0.102883	0.172283	0.375897	0.238637	0.107442	0.312879	0.358447	0.413744	0.822517	0.827871	0.646088	0.346962	0.251498	0.028358	0.009623	0.000591	0.00051	0.00108	0.000542
17056	0.006614	0.026257	0.122895	0.00809	0.001671	0.107781	0.405731	0.199815	0.427787	0.305782	0.135748	0.217281	0.380888	0.605638	0.633692	0.14098	0.10719	0.060353	0.004577	0.004374	0.00156	0.000856	0.000584	0.000525
25248	0.112198	0.203623	0.201263	0.028249	0.007315	0.113026	0.044622	0.084612	0.171435	0.079062	0.086169	0.114901	0.264277	0.269492	0.209864	0.139664	0.125209	0.08435	0.047303	0.077918	0.326276	0.22943	0.219659	0.252487
15494	0.05896	0.064646	0.039417	0.00324	0.004408	0.029332	0.065649	0.051828	0.081887	0.032347	0.030872	0.026292	0.094202	0.609437	0.595777	0.046195	0.131593	0.045469	0.051385	0.063995	0.05186	0.045749	0.047885	0.056469
36776	0.07851	0.09861	0.305688	0.36694	0.00381	0.018306	0.028938	0.094969	0.167271	0.036377	0.111435	0.048153	0.041517	0.13502	0.473562	0.077976	0.058554	0.029167	0.011263	0.003082	0.004364	0.000583	0.000118	0.068109
24895	0.165474	0.0908	0.477243	0.276861	0.000325	0.029767	0.022333	0.062142	0.077382	0.038175	0.009263	0.007702	0.024118	0.044751	0.062218	0.057204	0.092957	0.008711	0.010242	0.007792	0.01012	0.00136	0.000402	0.041904
25347	0.044626	0.014302	0.017204	0.003268	0.034674	0.281214	0.169415	0.20695	0.445203	0.334537	0.208794	0.623157	0.569949	0.630121	0.23307	0.053858	0.180239	0.049152	0.011336	0.0159	0.0353	0.023137	0.019286	0.011814
36752	0.063048	0.121014	0.34194	0.463976	0.838805	0.424691	0.118454	0.106935	0.31645	0.288137	0.147724	0.139259	0.136768	0.198529	0.271728	0.169174	0.266411	0.206054	0.101385	0.071832	0.03796	0.005803	0.006354	0.006307
24443	0.00333	0.046476	0.325588	0.04429	5.80E-05	0.042985	0.027398	0.182834	0.211403	0.105947	0.015882	0.017378	0.094707	0.278271	0.313051	0.444655	0.328433	0.133108	0.037171	0.004849	0.001256	0.006967	0.002428	0.004138
37613	0.017745	0.026123	0.044871	0.007907	3.00E-06	0.023466	0.083437	0.106528	0.078663	0.012588	0.003689	0.003252	0.01139	0.031429	0.02767	0.009896	0.07798	0.062744	0.034307	0.055589	0.04036	0.022191	0.02003	0.008262
25395	0.010913	0.0254	0.03732	0.014839	0.021147	0.113893	0.059427	0.129063	0.101098	0.069939	0.052345	0.135107	0.422014	0.336883	0.257911	0.074887	0.187384	0.027612	0.045182	0.034538	0.047721	0.058142	0.016414	0.074615
16622	0.002528	0.001788	0.011918	0.001204	0.004472	0.045048	0.075474	0.12927	0.018046	0.006352	0.009742	0.0396	0.235602	0.096571	0.032635	0.003322	0.007451	0.009302	0.005273	0.001535	0.001028	0.001736	0.000687	0.000209
15472	0.033312	0.026837	0.013177	0.002891	0.033202	0.162655	0.176888	0.133805	0.134908	0.04678	0.07637	0.115932	0.38114	0.340872	0.399726	0.170217	0.256481	0.188577	0.321091	0.269077	0.171942	0.129331	0.185843	0.201424
36416	0.437767	0.088292	0.122017	0.123825	0.040031	0.229424	0.239763	0.285541	0.231275	0.046884	0.003386	0.003545	0.000807	0.006512	0.326753	0.169119	0.181404	0.255311	0.044893	0.063393	0.027816	0.023997	0.025862	0.001502
17585	0.00485	0.001005	0.013042	0.010999	0.00452	0.101859	0.064264	0.021584	0.120871	0.10279	0.070036	0.029356	0.018436	0.110422	0.175228	0.108071	0.202344	0.050988	0.018109	0.023301	0.015119	0.012942	0.008903	0.003953
25065	0.077879	0.170361	0.279546	0.201424	0.000358	0.01922	0.032106	0.039331	0.048181	0.006872	0.001142	0.016732	0.03787	0.063916	0.126443	0.075594	0.047043	0.023374	0.036317	0.032396	0.113124	0.169306	0.111174	0.139006
15451	0.013803	0.014253	0.013971	0.182531	0.047389	0.074619	0.150768	0.295283	0.383748	0.151737	0.201919	0.08545	0.196673	0.13019	0.586093	0.631752	0.334241	0.229818	0.039071	0.010435	0.003562	0.000479	0.002129	0.001937
25358	0.017059	0.086906	0.395748	0.134281	0.0021	0.060042	0.12258	0.205558	0.235326	0.099683	0.016369	0.012949	0.023469	0.025695	0.03513	0.128489	0.043983	0.009719	0.006012	0.005894	0.042349	0.07466	0.094488	0.120321
15534	0.282355	0.159704	0.063383	0.007291	0.007372	0.004842	0.018663	0.094214	0.381055	0.307487	0.08775	0.086829	0.087048	0.039672	0.025723	0.141404	0.323552	0.259378	0.33547	0.332005	0.133001	0.075918	0.081358	0.095577
25113	0.053938	0.058928	0.176348	0.074464	0.000369	0.131323	0.156554	0.196176	0.307716	0.078529	0.030247	0.011161	0.045874	0.079032	0.097035	0.099387	0.138778	0.058141	0.027572	0.014788	0.0173	0.015144	0.010895	0.045522
15157	0.00491	0.002991	0.001907	0.000464	0.013124	0.014952	0.050914	0.158263	0.096976	0.064102	0.03806	0.035539	0.141551	0.103022	0.047397	0.030666	0.03388	0.021659	0.016355	0.007305	0.001172	0.000655	0.000925	0.001451
38747	0.035859	0.041909	0.814618	0.095561	0.000221	0.057455	0.103451	0.142173	0.06216	0.023348	0.003475	0.067571	0.129466	0.035971	0.02762	0.120328	0.023448	0.023001	0.050159	0.079719	0.092894	0.115886	0.113849	0.116439
25676	0.156263	0.042433	0.113255	0.018399	0.020163	0.093428	0.163828	0.26318	0.295555	0.199434	0.155949	0.078768	0.030873	0.648772	0.814466	0.620578	0.327749	0.148173	0.071823	0.038941	0.006203	0.002926	0.008502	0.009865
37305	0.114927	0.264443	0.203198	0.016633	1.00E-06	0.000232	0.001433	0.032646	0.055666	0.015058	0.001032	0.000498	0.001112	0.004865	8.00E-04	0.00388	0.020614	0.033259	0.03099	0.015053	0.092638	1.00E-06	3.00E-06	0.394915
39446	0.037841	0.03709	0.115637	0.135377	0.31664	0.300864	0.125699	0.279507	0.265198	0.033117	0.199434	0.321305	0.161643	0.15284	0.52328	0.061178	0.638046	0.308995	0.046051	0.067737	0.045837	0.030238	0.027345	0.026502
34123	0.001935	0.01191	0.005743	0.016641	0.011831	0.023183	0.083908	0.162827	0.033033	0.003259	0.001494	0.004383	0.044649	0.056345	0.097967	0.132679	0.300325	0.155838	0.040569	0.00073	0.002049	0.001063	0.000855	0.003954
37110	0.001117	0.003021	0.005045	0.000263	0.020794	0.281215	0.039043	0.024571	0.009112	0.227769	0.807943	0.780691	0.862317	0.821258	0.762538	0.38622	0.158644	0.027523	0.030767	0.013914	0.009821	0.000498	0.016293	0.001457
38104	0.061777	0.112633	0.115038	0.077093	0.060475	0.109585	0.183271	0.07798	0.138919	0.064512	0.090969	0.039226	0.08225	0.048102	0.097776	0.105897	0.480918	0.235711	0.085003	0.208787	0.235623	0.197658	0.191714	0.19675
37788	0.039183	0.088865	0.074358	0.085955	0.007123	0.114421	0.234044	0.305458	0.20325	0.022047	0.014674	0.038605	0.111295	0.090881	0.077708	0.057936	0.11833	0.083692	0.024825	0.096274	0.183541	0.179605	0.152983	0.161218
34093	0.114526	0.094763	0.04397	0.068647	0.399262	0.10005	0.146912	0.129938	0.083643	0.023639	0.028289	0.144651	0.074051	0.191956	0.279489	0.31815	0.445659	0.210616	0.082433	0.012769	0.008317	0.012918	0.009356	0.023221
24268	0.14029	0.059397	0.014249	0.018262	0.101191	0.61245	0.336964	0.393243	0.61626	0.272301	0.216617	0.799572	0.866434	0.794003	0.838734	0.61286	0.407512	0.438515	0.171956	0.152763	0.069367	0.080199	0.042059	0.0233
14938	0.006952	0.012852	0.013277	0.000568	0.000419	0.004019	0.021348	0.147841	0.06531	0.008625	0.004117	0.005341	0.021091	0.021686	0.047413	0.005007	0.018452	0.015183	0.012267	0.005358	0.000321	0.000251	0.000212	0.000176
37997	0.020531	0.054795	0.315849	0.018691	0.028731	0.070991	0.099951	0.100646	0.092526	0.027514	0.013218	0.032454	0.051373	0.098776	0.064212	0.160498	0.336992	0.128196	0.058525	0.134796	0.213855	0.19608	0.19366	0.130618
37875	0.015737	0.006002	0.002348	0.000353	0.002407	0.022048	0.030635	0.055801	0.022626	0.005814	0.000513	0.000677	0.001827	0.003343	0.005915	0.006596	0.011049	0.015812	0.017121	0.029988	0.016951	0.016964	0.016985	0.017079
37761	0.002943	0.001266	0.000956	0.000179	0.000147	0.023104	0.060252	0.107153	0.070473	0.004473	7.10E-05	0.000195	0.000459	0.000538	0.001094	0.018444	0.042803	0.023348	0.005766	0.0161	0.011112	0.003557	0.003055	0.002821
36001	0.038855	0.087646	0.010789	0.000574	0.002462	0.010868	0.033565	0.037028	0.046473	0.006902	0.001062	0.003155	0.004424	0.011924	0.00319	0.014011	0.08061	0.065107	0.098851	0.054356	0.052447	0.038755	0.050958	0.064467
37390	0.003255	0.007281	0.008759	0.000168	0.000647	0.006051	0.023649	0.016206	0.010668	0.009759	0.004843	0.007045	0.013652	0.008929	0.014049	0.006904	0.007113	0.010444	0.006808	0.011569	0.009736	0.003574	0.002599	0.00216
37933	0.00808	0.00226	0.002731	0.000683	0.01909	0.025979	0.111436	0.194631	0.21727	0.127705	0.091651	0.076213	0.135164	0.072742	0.087641	0.065832	0.077379	0.038081	0.039696	0.018646	0.003482	0.002094	0.002499	0.00176
36490	0.275682	0.571131	0.803609	0.711429	0.239419	0.024369	0.006683	0.046071	0.075676	0.190688	0.067211	0.028143	0.051666	0.064676	0.125702	0.16012	0.295002	0.114588	0.022679	0.143273	0.043232	0.025426	0.047382	0.02147
24448	0.040649	0.092225	0.043256	0.0398	0.043754	0.090113	0.193634	0.13531	0.147751	0.058304	0.016618	0.074469	0.270037	0.072568	0.064664	0.164241	0.206709	0.160823	0.057637	0.079491	0.039304	0.016961	0.020924	0.02736
37474	0.019222	0.070772	0.034483	0.008466	1.00E-04	0.009742	0.069653	0.150031	0.102895	0.01911	0.012643	0.001479	0.005054	0.020824	0.079709	0.0161	0.013084	0.006572	0.007919	0.025055	0.038823	0.011736	0.012429	0.007975
37354	0.034733	0.030293	0.024271	0.001208	0.002805	0.082356	0.192398	0.100234	0.072043	0.106921	0.080501	0.039499	0.168566	0.095888	0.092141	0.059219	0.106427	0.167781	0.097473	0.128879	0.147057	0.040343	0.035627	0.044592
15128	0.00164	0.007755	0.014943	0.007077	0.00189	0.018347	0.018054	0.295704	0.089826	0.000211	0.001919	0.029621	0.020844	0.038299	0.044734	0.110548	0.022568	0.002433	0.005401	0.001154	0.001537	0.000138	0.000306	0.00036
49159	0.031835	0.039386	0.021347	0.019989	0.014155	0.034059	0.171955	0.137535	0.115645	0.031626	0.008912	0.162318	0.134978	0.057732	0.026326	0.059572	0.148216	0.101356	0.06794	0.064082	0.033313	0.017224	0.01813	0.025276
36950	0.064595	0.044168	0.052948	0.007095	6.00E-05	0.004547	0.05842	0.119634	0.115093	0.004619	0.000931	0.002353	0.011307	0.081077	0.076798	0.082921	0.146211	0.089284	0.024956	0.029437	0.05942	0.000127	0.000221	0.001244

Table A.3: T-test of p-values from analysis of traffic volume and wind speed

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24895	0.023667	0.045872	0.516154	0.402827	0.459952	0.82973	0.18715	0.438876	0.819209	0.750284	0.709538	0.617277	0.589525	0.777473	0.065269	0.815069	0.122487	0.353935	0.738172	0.799596	0.787966	0.55185	0.546887	0.258756
37110	0.461699	0.349739	0.077888	0.829572	0.777545	0.731354	0.285736	0.463381	0.838284	0.695304	0.77685	0.266122	0.875456	0.831498	0.711996	0.08069	0.063	0.019205	0.07996	0.481222	0.714913	0.160414	0.789225	0.737714
37390	0.546554	0.113729	0.015445	0.035103	0.169845	0.594044	0.70836	0.693246	0.038262	0.016631	0.004465	0.050265	0.047834	0.007987	0.058932	0.161141	0.781711	0.71894	0.634685	0.607313	0.067379	0.109589	0.053032	0.808265
25113	0.112344	0.008211	0.340881	0.064288	0.001462	0.788778	0.568872	0.687462	0.806618	0.525795	0.289015	0.235944	0.360567	0.493782	0.225754	0.837726	0.12112	0.575558	0.441538	0.812427	0.703187	0.447716	0.820307	0.237469
36490	0.276014	0.070294	0.154686	0.355174	0.031776	0.791789	0.37792	0.576893	0.629412	0.73154	0.796292	0.722912	0.770011	0.794619	0.734585	0.754508	0.750413	0.722936	0.543006	0.794306	0.625256	0.83084	0.816639	0.686493
15534	0.17638	0.103137	0.000655	0.001217	0.492979	0.836762	0.644895	0.738685	0.521453	0.745441	0.002385	0.158914	0.150873	0.065925	0.788225	0.787657	0.751155	0.714111	0.659229	0.551835	0.058983	0.038224	0.096	0.316025
38747	0.73466	0.115182	0.008843	0.101218	0.08788	0.80588	0.560603	0.754145	0.772765	0.217288	0.091643	0.240158	0.15497	0.778036	0.795682	0.496259	0.714457	0.765304	0.290382	0.352166	0.054266	0.505301	0.762891	0.348475
17056	0.728386	0.076282	0.182984	0.057568	0.014514	0.741284	0.786179	0.799938	0.737332	0.615196	0.788643	0.776563	0.843997	0.303	0.77808	0.78495	0.599442	0.294619	0.151233	0.534841	0.823409	0.840119	0.803979	0.330947
36764	0.341745	0.445934	0.165036	0.304421	0.107182	0.394001	0.821241	0.747873	0.829351	0.151489	0.25494	0.737892	0.670381	0.783052	0.698132	0.82106	0.511512	0.794738	0.245325	0.808694	0.290638	0.307515	0.715551	0.629828
15451	0.043604	0.136362	0.602425	0.270638	0.694525	0.794271	0.81586	0.789377	0.324454	0.299212	0.331382	0.835126	0.731887	0.765817	0.764599	0.421153	0.37509	0.891382	0.802746	0.792422	0.003172	0.06116	0.284406	0.414822
25065	0.231496	0.078557	0.237832	0.074893	0.004573	0.631767	0.450298	0.805851	0.79695	0.388293	0.203983	0.10719	0.515075	0.60467	0.834716	0.767065	0.825463	0.807145	0.703621	0.83652	0.239646	0.560009	0.763282	0.853681
36776	0.109392	0.294149	0.522985	0.543536	0.311516	0.814363	0.354245	0.763424	0.796182	0.266603	0.328178	0.505528	0.452887	0.834816	0.817764	0.775463	0.306698	0.346707	0.467118	0.843857	0.378904	0.338919	0.285569	0.618532
15472	0.043188	0.043469	0.001391	0.002231	0.568015	0.77345	0.800026	0.779783	0.139754	0.325047	0.081697	0.445104	0.622113	0.448693	0.701797	0.488411	0.803204	0.392125	0.655132	0.282672	0.062155	0.222049	0.391188	0.600586
37997	0.149689	0.01493	0.0578	0.051057	0.231271	0.802169	0.432022	0.775257	0.791554	0.083873	0.205666	0.170105	0.458462	0.47733	0.828985	0.7444	0.320048	0.61685	0.684657	0.722883	0.539073	0.398778	0.414605	0.400631
36950	0.107528	0.023333	0.003915	0.000864	0.000195	0.473638	0.602604	0.753499	0.413014	0.003438	0.006356	0.061948	0.121183	0.014989	0.355046	0.688591	0.693926	0.687632	0.841408	0.155775	0.002784	0.029784	0.112406	0.234374
37933	0.063193	0.007616	4.40E-05	8.20E-05	0.656064	0.81078	0.828574	0.80221	0.324136	0.170138	0.036084	0.164204	0.100645	0.021309	0.512425	0.761419	0.674439	0.523185	0.818659	0.864589	0.110638	0.297714	0.235108	0.704983
36001	0.040168	0.058691	0.000616	0.001101	0.297007	0.672713	0.751309	0.75863	0.067821	0.003164	0.000932	0.071046	0.040239	0.089	0.492244	0.351813	0.548877	0.832079	0.801524	0.230969	0.006424	0.068391	0.087731	0.394308
25248	0.232629	0.221074	0.069718	0.005799	0.28257	0.650275	0.55929	0.747191	0.707193	0.317669	0.61234	0.592095	0.830883	0.834127	0.542363	0.615779	0.679127	0.089463	0.252635	0.617512	0.64314	0.454488	0.366082	0.541083
16622	0.047542	0.039456	0.171462	0.044075	0.711912	0.73649	0.828976	0.628834	0.72716	0.08079	0.044973	0.210309	0.557801	0.868514	0.305731	0.677078	0.747829	0.678382	0.833182	0.803663	0.595396	0.059196	0.523945	0.202937
37875	0.593406	0.236226	0.016135	0.054883	0.703612	0.792826	0.664866	0.736476	0.110611	0.113361	0.000342	0.223328	0.022652	0.025357	0.285049	0.565733	0.854957	0.764751	0.768465	0.290324	0.776695	0.618702	0.437247	0.845163
34093	0.049069	0.53185	0.017051	0.318935	0.472479	0.840985	0.63584	0.800679	0.58995	0.070352	0.201563	0.228678	0.41812	0.237052	0.825523	0.654993	0.43014	0.150357	0.824297	0.437993	0.007386	0.014741	0.105277	0.348284
37305	0.495625	0.050822	0.155697	0.028032	0.000374	0.373399	0.572397	0.85619	0.743637	0.681632	0.172669	0.296426	0.175508	0.786261	0.78053	0.671135	0.727592	0.811481	0.620769	0.856694	0.773879	0.643646	0.80781	0.770449
25347	0.280686	0.063513	0.327541	0.059047	0.60858	0.790936	0.648015	0.810792	0.785031	0.749087	0.796551	0.76371	0.802425	0.417964	0.66995	0.843775	0.098702	0.322838	0.817753	0.798863	0.637647	0.704165	0.780802	0.269293
25676	0.121506	0.011793	0.123489	0.020654	0.054545	0.526806	0.781883	0.773623	0.802686	0.232185	0.061579	0.633217	0.639259	0.513681	0.843829	0.807717	0.548549	0.548079	0.561353	0.398218	0.034749	0.042	0.485833	0.287286
37354	0.236931	0.061569	0.089683	0.047937	0.08443	0.71871	0.620276	0.732054	0.222381	0.301822	0.027566	0.312173	0.214039	0.066643	0.487535	0.790947	0.822231	0.597945	0.576051	0.552012	0.030862	0.704008	0.257971	0.536301
25395	0.062573	0.00473	0.07954	0.011688	0.100813	0.764095	0.75465	0.230893	0.354264	0.023054	0.008824	0.168756	0.219907	0.179389	0.561182	0.36419	0.726865	0.819024	0.815929	0.18493	0.040318	0.025555	0.00055	0.329963
15128	0.016597	0.129603	0.025061	0.190711	0.033553	0.574093	0.703426	0.378696	0.697734	8.00E-06	0.000241	0.000358	0.000228	0.019187	0.869419	0.382776	0.090891	0.349009	0.529237	0.016953	0.0036	0.004235	0.033382	0.140721
17585	0.086313	0.00259	0.105655	0.024109	0.110513	0.753285	0.821981	0.819835	0.799352	0.422754	0.714304	0.719802	0.451926	0.451507	0.447769	0.704919	0.500613	0.571806	0.397127	0.768516	0.384331	0.089867	0.580804	0.319448
14938	0.031788	0.077683	0.001256	0.00101	0.083214	0.649404	0.712913	0.721707	0.13665	0.067273	0.014881	0.114535	0.060107	0.061265	0.527445	0.721318	0.808641	0.721227	0.595059	0.789024	0.000688	0.031769	0.080094	0.305693
36752	0.554133	0.477076	0.271134	0.313113	0.054345	0.20978	0.740602	0.819121	0.782154	0.284373	0.140126	0.528914	0.577297	0.738042	0.844091	0.799004	0.759131	0.864169	0.600638	0.797853	0.256326	0.192721	0.80144	0.539333
37613	0.816833	0.199705	0.234484	0.317412	0.003108	0.62565	0.77974	0.733946	0.714413	0.100808	0.024314	0.076597	0.251691	0.325881	0.388764	0.596833	0.792832	0.791856	0.75905	0.889363	0.41226	0.346787	0.746115	0.756377
15494	0.042324	0.293943	0.679231	0.212953	0.845036	0.762741	0.783024	0.698541	0.470292	0.210715	0.376606	0.511201	0.101474	0.052485	0.212327	0.697674	0.687979	0.291217	0.627758	0.134227	0.081492	0.651553	0.854421	0.09075
34123	0.229413	0.874456	0.002872	0.012854	0.070137	0.754128	0.464486	0.730902	0.355282	0.028718	0.001682	0.095078	0.236837	0.203018	0.852075	0.755735	0.524815	0.666418	0.818852	0.324006	0.000469	0.000495	0.06136	0.196524
24268	0.318948	0.087823	0.016665	0.011191	0.23857	0.562565	0.604614	0.440674	0.256802	0.004025	0.036637	0.414648	0.6358	0.55718	0.796659	0.685717	0.720186	0.65226	0.292659	0.852614	0.29472	0.184438	0.724633	0.373001
36416	0.589387	0.307251	0.383749	0.380814	0.382627	0.781744	0.521075	0.231407	0.85663	0.112731	0.066736	0.056738	0.021307	0.232463	0.519038	0.447996	0.694428	0.415997	0.285701	0.698838	0.842521	0.761837	0.457816	0.345993
15287	0.050835	0.047338	0.928075	0.326281	0.720475	0.806263	0.698896	0.677755	0.547184	0.288926	0.117019	0.819442	0.817324	0.862494	0.586217	0.202914	0.313081	0.613907	0.062495	0.785395	0.015677	0.317254	0.329956	0.616532
38104	0.257423	0.167376	0.024512	0.107352	0.545906	0.427437	0.766852	0.851365	0.378882	0.513146	0.332307	0.493282	0.772928	0.675418	0.518597	0.726017	0.294235	0.782743	0.850975	0.360099	0.033199	0.100836	0.47582	0.902115
49159	0.21837	0.030827	0.007579	0.195495	0.683212	0.674956	0.254374	0.798983	0.601781	0.053041	0.192159	0.288768	0.237759	0.29313	0.425278	0.41795	0.812343	0.695924	0.781428	0.429559	0.140126	0.181084	0.33099	0.301234
25358	0.309851	0.043256	0.182125	0.033455	0.764749	0.860815	0.252758	0.712176	0.754993	0.39168	0.795512	0.809726	0.465374	0.800129	0.578913	0.837785	0.067561	0.483631	0.35493	0.697334	0.807004	0.364105	0.647363	0.115744
15180	0.037899	0.172036	0.115213	0.627838	0.571103	0.793992	0.824795	0.359333	0.775934	0.78335	0.854638	0.769072	0.819041	0.765411	0.090644	0.112403	0.084373	0.477703	0.366083	0.391167	0.048891	0.305793	0.7846	0.29749
24443	0.033844	0.034007	0.408661	0.050029	0.523068	0.734787	0.668637	0.744459	0.814622	0.346001	0.365053	0.649943	0.794372	0.769168	0.469126	0.759189	0.272974	0.379953	0.476927	0.792014	0.35965	0.819836	0.012783	0.044879
15157	0.107385	0.024305	0.000951	2.60E-05	0.491583	0.821551	0.828461	0.725098	0.342949	0.156838	0.047926	0.430394	0.214236	0.196138	0.855513	0.612989	0.711221	0.838551	0.596708	0.833336	0.088939	0.04165	0.084388	0.386647
39446	0.607721	0.289239	0.235968	0.205776	0.724092	0.684881	0.772081	0.545926	0.810333	0.38898	0.329499	0.206701	0.331742	0.722369	0.225822	0.27985	0.778265	0.68341	0.325938	0.760333	0.817817	0.494268	0.853893	0.726512
24448	0.013647	0.273472	0.001122	0.016468	0.563193	0.793412	0.487692	0.621084	0.266582	0.047237	0.031205	0.209259	0.280876	0.091716	0.827879	0.650348	0.805021	0.539522	0.667246	0.338662	0.028175	0.089188	0.065376	0.382979
17696	0.606005	0.031271	0.089812	0.204178	0.152791	0.751753	0.67163	0.764725	0.776557	0.434458	0.331511	0.436045	0.606778	0.809439	0.483639	0.308041	0.779141	0.588269	0.82808	0.854666	0.361867	0.190224	0.504904	0.426075
37474	0.30323	0.004633	0.00251	0.012632	0.004301	0.113435	0.788689	0.67676	0.321379	0.074168	0.04317	0.023145	0.036501	0.011859	0.503694	0.182723	0.074041	0.103471	0.463522	0.262018	0.171118	0.117361	0.053531	0.170911
37761	0.077329	0.008433	0.004546	0.026425	0.009783	0.76991	0.369352	0.809938	0.568616	0.005705	0.012568	0.048645	0.123841	0.001861	0.379255	0.774059	0.375701	0.333281	0.595607	0.797991	0.230639	0.088194	0.376324	0.592759
37788	0.226854	0.057756	0.056657	0.111422	0.001206	0.267332	0.758929	0.793823	0.219247	0.001019	0.010097	0.01618	0.129828	0.015536	0.210115	0.538112	0.524605	0.469047	0.460498	0.869722	0.207254	0.388351	0.763736	0.832385

Table A.4: T-test of p-values from analysis of traffic volume and visibility

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24895	0.292908	0.305569	0.309981	0.430961	0.035382	0.3166	0.655598	0.685423	0.871625	0.822986	0.407671	0.151502	0.079703	0.07823	0.129373	0.246019	0.07116	0.017043	0.016348	0.039794	0.005303	0.027218	0.062358	0.092899
37110	0.039584	0.331768	0.827195	0.355944	0.172592	0.208315	0.551019	0.846748	0.791047	0.100517	0.038667	0.772727	0.687416	0.799618	0.802203	0.782338	0.8491	0.193437	0.036342	0.000638	0.010883	0.000946	0.012424	0.012411
37390	0.035769	0.06504	0.288326	0.086214	0.043116	0.133259	0.396366	0.493577	0.135291	0.315416	0.052417	0.253873	0.195433	0.153596	0.161666	0.046588	0.038957	0.019026	0.00904	0.001568	0.000871	0.000633	0.00831	0.013056
25113	0.042014	0.017974	0.570526	0.088227	0.018257	0.393781	0.550209	0.417932	0.540803	0.82892	0.397323	0.095372	0.164221	0.15466	0.08599	0.056466	0.015028	0.024691	0.014719	0.003385	0.000485	0.000342	0.005352	0.049351
36490	0.256111	0.337749	0.180287	0.27371	0.012724	0.191982	0.688923	0.833553	0.81539	0.826306	0.447116	0.388494	0.326513	0.126602	0.126801	0.199733	0.453889	0.367259	0.335229	0.064729	0.021766	0.101783	0.233428	0.050824
15534	0.302525	0.238872	0.063321	0.046117	0.029278	0.083757	0.185814	0.361767	0.706234	0.703251	0.247936	0.204816	0.113136	0.01953	0.017149	0.014832	0.024654	0.057216	0.010378	0.002878	0.0034	0.000444	0.009868	0.035788
38747	0.208463	0.47205	0.156949	0.248989	0.001307	0.032205	0.447091	0.566583	0.633695	0.851422	0.147595	0.098269	0.112155	0.302782	0.442613	0.522102	0.038583	0.004916	0.001057	0.005709	0.004721	0.001627	0.018371	0.041895
17056	0.008641	0.622123	0.659616	0.300525	0.08245	0.82318	0.241757	0.844732	0.816248	0.838562	0.333464	0.532139	0.757942	0.384566	0.14587	0.808893	0.152732	0.52347	0.067453	0.0505	0.078576	0.005296	0.07356	0.004756
36764	0.507079	0.665825	0.528071	0.518491	0.019159	0.026615	0.796681	0.860482	0.810876	0.819023	0.183907	0.313561	0.240982	0.315316	0.445786	0.37013	0.16107	0.08028	0.025888	0.012568	0.001173	0.003875	0.042401	0.269081
15451	0.003433	0.014472	0.011835	0.243448	0.115852	0.369647	0.496248	0.792494	0.485858	0.383892	0.365626	0.20041	0.207212	0.124929	0.047979	0.314573	0.330621	0.464117	0.029505	2.80E-05	2.00E-06	1.00E-06	0.000268	0.000986
25065	0.107333	0.142917	0.068993	0.068285	0.001662	0.133066	0.840182	0.52935	0.368679	0.853106	0.130327	0.083126	0.266711	0.079639	0.121759	0.023017	0.013182	0.017421	0.005027	0.001459	8.40E-05	3.50E-05	0.021709	0.110448
36776	0.277065	0.75478	0.564528	0.26941	0.087242	0.122214	0.812633	0.850396	0.792518	0.586408	0.085792	0.128642	0.183283	0.104585	0.648434	0.430062	0.109454	0.012444	0.010705	0.007722	0.00061	9.80E-05	0.110831	0.263162
15472	0.06399	0.061171	0.016691	0.008405	0.023888	0.164806	0.176418	0.095059	0.176968	0.129702	0.018004	0.17992	0.287418	0.267155	0.075017	0.005584	0.006132	0.000529	0.000461	0.000112	0.00012	0.002235	0.01919	0.00477
37997	0.010198	0.114914	0.148758	0.029305	0.035875	0.120467	0.378065	0.729924	0.676667	0.67865	0.171909	0.042642	0.117818	0.058283	0.02875	0.053493	0.201391	0.025038	0.009708	0.002538	0.039804	0.000501	0.052847	0.001715
36950	0.01551	0.017644	0.054236	0.029023	0.001009	0.04983	0.599927	0.463407	0.396778	0.132117	0.003279	0.011266	0.152502	0.221484	0.073049	0.000742	0.011618	0.010657	0.000546	2.50E-05	1.00E-06	0	0.000137	0.001301
37933	0.005892	0.004092	0.036034	0.006583	0.124167	0.267136	0.415292	0.272451	0.593763	0.233056	0.023541	0.074065	0.250002	0.229881	0.038658	0.007134	0.059077	0.023762	0.001684	0.000162	0.000233	2.20E-05	0.001085	0.000735
36001	0.056471	0.01257	0.053752	0.003488	0.074901	0.301573	0.386937	0.200814	0.575534	0.718902	0.034415	0.117172	0.582997	0.203576	0.174818	0.018242	0.065695	0.036247	0.013623	0.002986	0.002726	0.000455	0.03397	0.03082
25248	0.03051	0.016159	0.010913	0.026188	0.163923	0.180428	0.59466	0.378832	0.77562	0.744709	0.174659	0.122591	0.3219	0.150486	0.263849	0.056136	0.02108	0.004753	0.005301	0.00201	0.001963	0.00017	0.001394	0.019108
16622	0.352519	0.569088	0.848852	0.044122	0.156898	0.691259	0.891204	0.539837	0.409417	0.32284	0.061187	0.174833	0.654469	0.522965	0.127343	0.202559	0.039396	0.013501	0.007587	0.009212	0.001469	0.003013	0.103653	0.015456
37875	0.124917	0.114949	0.073639	0.039843	0.202713	0.714783	0.82415	0.390524	0.161748	0.178307	0.166789	0.281187	0.137084	0.038563	0.035879	0.020717	0.009587	0.033386	0.005501	0.001135	0.000751	0.000819	0.031846	0.063804
34093	0.011244	0.04804	0.159553	0.121403	0.183958	0.105686	0.407802	0.743978	0.851159	0.145293	0.398626	0.359763	0.139964	0.218787	0.355958	0.136453	0.352333	0.094157	0.011926	0.001243	9.30E-05	0.003194	0.044635	0.001435
37305	0.360976	0.148317	0.15797	0.029761	0.00337	0.312025	0.743883	0.39389	0.734871	0.835904	0.348663	0.562905	0.339495	0.144404	0.533702	0.199358	0.041763	0.028885	0.008342	0.043453	0.008865	0.005559	0.134972	0.150752
25347	0.028386	0.126656	0.438096	0.09276	0.265505	0.47071	0.682841	0.371154	0.599529	0.75969	0.407058	0.494333	0.6956	0.308237	0.523638	0.480945	0.27627	0.075939	0.040203	0.010619	0.007884	0.005957	0.027	0.053019
25676	0.090751	0.285552	0.713355	0.295059	0.154211	0.297357	0.801408	0.649448	0.805085	0.828925	0.282118	0.756031	0.738445	0.746063	0.630493	0.759106	0.167244	0.065991	0.012298	0.001317	3.00E-06	1.40E-05	0.002132	0.016919
37354	0.013886	0.050005	0.040324	0.086754	0.048946	0.255992	0.232554	0.253811	0.283637	0.155342	0.023943	0.06747	0.096236	0.127659	0.072548	0.037115	0.032136	0.042002	0.014379	0.009197	0.000151	0.002097	0.028637	0.007179
25395	0.001052	0.019834	0.021146	0.016406	0.30876	0.563326	0.866589	0.782588	0.787282	0.66657	0.389604	0.775087	0.858908	0.355739	0.338389	0.266492	0.018515	0.015792	0.006993	0.008493	0.002144	0.000316	0.001749	0.005803
15128	0.054026	0.045094	0.095186	0.3894	0.065885	0.210852	0.423966	0.816444	0.834707	0.040034	0.039941	0.2908	0.44077	0.464498	0.756812	0.40648	0.222695	0.005986	0.000121	0	0	0.000389	0.002006	0.015162
17585	0.028995	0.768489	0.658041	0.419846	0.06662	0.715264	0.573637	0.820967	0.856825	0.615413	0.412955	0.31313	0.205032	0.262205	0.105518	0.528236	0.224037	0.618827	0.039856	0.056632	0.103012	0.013012	0.147297	0.00554
14938	0.099889	0.019016	0.086747	0.004609	0.036701	0.308699	0.263043	0.297679	0.189806	0.224132	0.013368	0.087015	0.655433	0.537716	0.463162	0.024339	0.063891	0.006015	0.015207	0.000102	5.70E-05	0.000298	0.00092	0.01005
36752	0.60656	0.802587	0.810068	0.644148	0.090375	0.02124	0.652616	0.799337	0.846023	0.851616	0.514831	0.132881	0.261277	0.195283	0.182117	0.224598	0.137902	0.066415	0.010716	0.007701	0.001689	0.007687	0.097177	0.10061
37613	0.119854	0.540396	0.37424	0.201697	0.005829	0.101826	0.59465	0.818674	0.718231	0.695986	0.039736	0.035555	0.034679	0.036807	0.045736	0.098546	0.03222	0.005605	0.001176	0.000384	0.002092	0.009841	0.02403	0.007648
15494	0.187628	0.276237	0.126378	0.107337	0.056294	0.184228	0.170423	0.115564	0.216408	0.071363	0.053754	0.261026	0.815756	0.201719	0.196644	0.588473	0.030749	0.002137	0.00032	0.002051	0.643892	0.03976	0.073154	0.820722
34123	0.026566	0.133946	0.153209	0.271842	0.427202	0.370559	0.768483	0.851252	0.743416	0.811866	0.018587	0.068626	0.115785	0.488153	0.591311	0.201257	0.876564	0.264632	0.028491	0.000422	3.00E-06	0.000217	0.000878	0.003263
24268	0.363902	0.767753	0.833512	0.146783	0.100207	0.329913	0.876025	0.476604	0.577839	0.070709	0.020992	0.19165	0.240111	0.273904	0.156292	0.042179	0.042816	0.002862	0.002654	0.004639	0.001555	0.010441	0.020149	0.038786
36416	0.369107	0.852164	0.814897	0.834977	0.271756	0.558313	0.862646	0.844304	0.772329	0.805162	0.158311	0.269074	0.262979	0.029291	0.534221	0.547417	0.149275	0.208879	0.024944	0.024436	0.071303	0.099723	0.142368	0.191059
15287	0.031141	0.040339	0.361186	0.061209	0.262935	0.483151	0.758418	0.803484	0.824942	0.69631	0.370995	0.320609	0.759232	0.805738	0.82981	0.818018	0.852304	0.423146	0.024698	3.70E-05	2.00E-05	2.00E-06	0.000436	0.006917
38104	0.016197	0.031303	0.079459	0.026444	0.030815	0.06902	0.288938	0.416459	0.557946	0.648609	0.174731	0.147897	0.156476	0.130766	0.214938	0.027145	0.100312	0.039227	0.006824	0.001101	0.001673	8.20E-05	0.001753	0.008143
49159	0.050065	0.161709	0.287113	0.070173	0.386047	0.356022	0.764377	0.476626	0.743606	0.244162	0.055548	0.019431	0.117314	0.13077	0.124306	0.040904	0.209242	0.012576	0.034494	0.023881	0.001496	0.002946	0.026051	0.005458
25358	0.333665	0.214095	0.66499	0.429231	0.439425	0.634837	0.357739	0.407876	0.440936	0.355266	0.128718	0.267574	0.487289	0.688155	0.517218	0.510373	0.579284	0.360592	0.291301	0.379559	0.317225	0.649073	0.499507	0.362155
15180	0.00099	0.020259	0.046853	0.836541	0.337933	0.419392	0.547924	0.759488	0.585357	0.387277	0.305724	0.037169	0.068129	0.065773	0.331564	0.603921	0.274343	0.669305	0.117573	0.000814	1.00E-06	9.00E-06	0.00871	0.009503
24443	0.00867	0.081881	0.595512	0.697056	0.048783	0.418998	0.795509	0.713619	0.80278	0.646741	0.756676	0.550423	0.630205	0.215821	0.706936	0.654211	0.224251	0.11357	0.122436	0.020802	0.000253	0.001579	0.001632	0.028769
15157	0.01567	0.006017	0.096216	0.021494	0.14496	0.444683	0.456322	0.435341	0.723872	0.166236	0.15468	0.051724	0.282157	0.183304	0.083609	0.036337	0.036538	0.020351	0.002602	2.50E-05	8.00E-06	1.10E-05	0.001987	0.000617
39446	0.056755	0.447823	0.62764	0.122396	0.159048	0.459346	0.736175	0.785863	0.638478	0.626017	0.053801	0.117583	0.021567	0.019207	0.070429	0.097003	0.054541	0.02123	0.015324	0.013994	0.013354	0.006228	0.27892	0.039397
24448	0.011143	0.020029	0.065473	0.023552	0.143	0.150157	0.808573	0.714029	0.762527	0.550395	0.035081	0.101448	0.253346	0.214848	0.085755	0.051971	0.491505	0.150107	0.009743	0.00113	0.00045	0.000251	0.00189	0.016972
17696	0.002255	0.312481	0.277929	0.00856	0.016775	0.20359	0.832124	0.235121	0.15068	0.255059	0.228224	0.141667	0.037027	0.052023	0.009687	0.125116	0.008101	0.008252	0.000642	0.001739	0.004838	0.000771	0.059912	0.004832
37474	0.21137	0.248607	0.421804	0.145541	0.006123	0.053348	0.363671	0.222391	0.233929	0.219017	0.097912	0.192454	0.154938	0.066829	0.317903	0.044589	0.014187	0.012733	0.020148	0.011555	0.016933	0.005517	0.010383	0.010983
37761	0.018954	0.130905	0.437533	0.057081	0.005706	0.081315	0.651605	0.794279	0.502354	0.48142	0.027213	0.034414	0.048747	0.406128	0.173323	0.051564	0.067144	0.013946	0.000588	0.000596	0.00025	0.00011	0.000756	0.003857
37788	0.033072	0.188992	0.527891	0.124935	0.011578	0.135711	0.695659	0.406564	0.615884	0.483054	0.048757	0.171452	0.21682	0.734807	0.177434	0.047578	0.037082	0.011218	0.002062	0.000169	1.50E-05	5.20E-05	0.001551	0.013061

Table A.5: Wilcoxon of p-values from analysis of traffic volume and precipitation

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
17056	0.015572	0.372379	0.200603	0.725918	0.021601	0.642451	0.770321	0.71468	0.477591	0.732517	0.474733	0.157768	0.134844	0.137224	0.067025	0.0696	0.105017	0.059826	0.503083	0.131278	0.118234	0.032372	0.036493	0.259675
15157	0.37636	0.113992	0.135912	0.027692	0.227058	0.241698	0.273988	0.071777	0.224582	0.015815	0.003949	0.24085	0.076902	0.012709	0.002097	0.005642	0.004119	0.005906	0.000203	2.00E-06	0.000118	0.001872	0.004441	0.152909
16622	0.621292	0.443276	0.353527	0.023043	0.728881	0.534525	0.311607	0.132404	0.014688	0.001554	0.001046	0.014992	0.004606	0.000232	0.000287	1.30E-05	7.40E-05	0.000175	0.000473	2.00E-06	0.000512	0.016183	0.039768	0.271338
37613	0.414083	0.475665	0.505682	0.256912	0.65157	0.714345	0.193268	0.139768	0.117959	0.119347	0.029596	0.066632	0.025683	9.00E-04	0.000254	0.000172	0.001185	0.02565	0.011966	2.90E-05	0.000436	0.004873	0.026646	0.403954
36416	0.265183	0.09323	0.604513	0.619085	0.372827	0.739733	0.770211	0.357799	0.248664	0.162674	0.013173	0.097266	0.003556	0.002227	0.631799	0.174003	0.015735	0.139074	0.26862	0.016773	0.003679	0.156346	0.072501	0.443749
37788	0.143465	0.129943	0.066309	0.030876	0.043654	0.744368	0.135367	0.071875	0.059669	0.016719	0.000495	0.061334	0.041753	0.007262	1.20E-05	0.000197	0.001237	0.007492	0.001012	2.00E-06	2.30E-05	0.000171	0.017026	0.393176
39446	0.152116	0.451217	0.332496	0.253551	0.727097	0.600467	0.466457	0.149446	0.334882	0.213032	0.339272	0.112797	0.216166	0.017623	0.000115	0.001399	0.001502	0.013353	0.039784	0.001209	0.002875	0.016181	0.045414	0.254966
36752	0.125249	0.244923	0.483958	0.424612	0.56962	0.569239	0.476184	0.263799	0.538876	0.514323	0.23882	0.118402	0.19584	0.071196	0.005842	0.005701	0.008011	0.039772	0.027782	0.004808	0.001142	0.017013	0.031075	0.166617
25113	0.467791	0.13553	0.294887	0.193608	0.598708	0.61586	0.258482	0.27885	0.268933	0.114361	0.164827	0.316393	0.070487	0.016731	0.006107	0.004345	0.042587	0.091121	0.055315	0.000146	0.00012	0.00421	0.001687	0.131941
36001	0.776172	0.674539	0.421287	0.177804	0.410595	0.618973	0.418212	0.1193	0.136424	0.012716	0.007684	0.067675	0.107276	0.003888	0.003754	0.002303	0.025998	0.058953	0.024915	0.000204	0.005094	0.042574	0.041886	0.51589
15494	0.711195	0.464681	0.724137	0.671355	0.562342	0.677152	0.383904	0.251183	0.586384	0.484767	0.272603	0.738373	0.406465	0.133819	0.011623	0.00259	0.001618	0.004714	0.004249	0.001134	0.011827	0.095633	0.02938	0.606197
24895	0.395656	0.292985	0.724517	0.535402	0.504248	0.67384	0.507675	0.682361	0.718471	0.494274	0.385751	0.301479	0.14227	0.074161	0.320386	0.112946	0.193338	0.233128	0.18464	0.049842	0.01137	0.02631	0.059874	0.161545
34123	0.716726	0.475256	0.196346	0.044612	0.614224	0.665306	0.338131	0.30549	0.239385	0.032733	0.001702	0.033656	0.003322	0.000337	0.002151	0.003324	0.108659	0.094804	0.096523	0.001872	0.007236	0.057739	0.062403	0.546588
49159	0.796425	0.34556	0.681646	0.682859	0.626085	0.712829	0.390177	0.337299	0.686358	0.164653	0.336254	0.532122	0.230107	0.023925	0.017996	0.002877	0.02621	0.028381	0.033765	0.006624	0.006581	0.141152	0.17708	0.765327
37390	0.787876	0.813171	0.715425	0.399472	0.716128	0.75277	0.575033	0.213046	0.050412	0.04962	0.01416	0.345174	0.395349	0.056216	0.005419	0.010729	0.035077	0.030075	0.010637	0.000719	0.00996	0.05218	0.394192	0.773975
15287	0.536542	0.159191	0.195816	0.310782	0.335614	0.660362	0.309064	0.43459	0.228151	0.047456	0.028468	0.535982	0.559277	0.586217	0.650466	0.68233	0.475745	0.39628	0.109661	0.002747	0.017533	0.019191	0.025835	0.364184
37354	0.223628	0.278148	0.329094	0.025703	0.187922	0.262911	0.142843	0.081924	0.131446	0.025726	0.004511	0.267096	0.167402	0.013818	0.000368	0.00043	0.017461	0.018486	0.011981	0.000832	0.035352	0.108508	0.015254	0.092186
17585	0.073685	0.193994	0.107617	0.383814	0.467564	0.73734	0.547924	0.40474	0.213638	0.263875	0.263233	0.139343	0.104204	0.099826	0.088454	0.044873	0.055633	0.052379	0.102507	0.002888	0.001749	0.023051	0.135707	0.2813
25065	0.689783	0.495024	0.467058	0.128115	0.583528	0.46159	0.560991	0.099224	0.136179	0.120592	0.067293	0.13742	0.11619	0.006594	0.001057	0.000596	0.01577	0.068622	0.049868	0.000705	0.001507	0.00946	0.057162	0.534803
25347	0.370309	0.379747	0.392121	0.038927	0.013796	0.143384	0.087528	0.175586	0.069243	0.356897	0.06918	0.146991	0.234121	0.088438	0.189868	0.036192	0.272913	0.08993	0.002641	0.002505	0.00398	0.020069	0.286127	0.636685
24268	0.414824	0.465426	0.611212	0.016933	0.420742	0.25778	0.298518	0.135673	0.023069	0.0142	0.000852	0.119836	0.161208	0.061135	0.001724	0.000613	0.000704	0.001577	2.00E-06	2.00E-06	0.000557	0.014118	0.196992	0.543435
37933	0.052104	0.034463	0.062325	0.026382	0.23624	0.322324	0.275356	0.04933	0.120738	0.04856	0.003576	0.022615	0.013797	0.005249	0.000512	0.000798	0.008188	0.015047	0.009978	0.001606	0.000552	0.001965	0.008854	0.114802
14938	0.320493	0.338632	0.191448	0.152846	0.738579	0.698427	0.3292	0.109668	0.224482	0.009891	0.006333	0.136879	0.052444	0.00768	0.00427	0.010503	0.010464	0.035817	0.013964	0.000135	0.004899	0.012698	0.013308	0.347414
37305	0.636742	0.561591	0.599049	0.150206	0.376192	0.801284	0.780044	0.473335	0.338918	0.379113	0.410764	0.246047	0.232654	0.147841	0.054512	0.040308	0.15811	0.176248	0.10252	0.013041	0.006092	0.051876	0.134625	0.631926
36950	0.0315	0.328469	0.160391	0.086692	0.174729	0.749557	0.416339	0.406792	0.810737	0.053355	0.000289	0.001615	0.000361	4.00E-06	1.00E-06	0.000924	0.016096	0.030203	0.023782	8.30E-05	0.000671	0.003983	0.002454	0.235283
15180	0.246868	0.110675	0.123141	0.734152	0.67341	0.469846	0.488113	0.522558	0.592553	0.086555	0.450704	0.793872	0.510036	0.570469	0.808613	0.761369	0.576105	0.420695	0.660329	0.006706	0.005808	0.015595	0.018158	0.110421
34093	0.525237	0.288378	0.047942	0.155786	0.545136	0.674861	0.295349	0.37027	0.089268	0.011267	0.003206	0.022487	0.001713	0.001626	0.004137	0.005139	0.079772	0.030541	0.020442	0.01769	0.037778	0.004876	0.085442	0.183897
15128	0.547787	0.377461	0.125338	0.431512	0.809527	0.663336	0.203899	0.412223	0.594221	0.000872	0.004534	0.00457	0.000503	0.001912	0.010385	0.168704	0.037028	0.004475	0.004385	7.00E-06	0.000122	0.019409	0.180617	0.692875
25676	0.504825	0.360317	0.476076	0.126025	0.202045	0.290926	0.085513	0.231533	0.325061	0.321684	0.262869	0.659319	0.748178	0.721334	0.49818	0.428581	0.221215	0.180061	0.11402	0.001198	0.000369	0.03183	0.073451	0.353056
36764	0.088051	0.173159	0.324038	0.269511	0.431228	0.743993	0.389612	0.318708	0.558537	0.351365	0.091733	0.292913	0.071404	0.039718	0.014963	0.009415	0.011448	0.030686	0.253987	0.019552	0.002088	0.009192	0.031645	0.224418
36776	0.084023	0.237636	0.673354	0.580543	0.703372	0.703878	0.590363	0.329241	0.494124	0.076436	0.007919	0.087007	0.01131	0.008164	0.018191	0.018425	0.006151	0.044554	0.15637	0.089624	0.015456	0.03288	0.009029	0.098236
38747	0.670455	0.581849	0.225549	0.107455	0.397008	0.524306	0.142275	0.10685	0.141117	0.040886	0.034436	0.080017	0.067369	0.005243	0.00486	0.000949	0.078505	0.039083	0.003362	0.000316	0.000685	0.021411	0.044006	0.852626
38104	0.392098	0.253007	0.144045	0.058612	0.550019	0.355155	0.348785	0.133112	0.189592	0.098411	0.165902	0.142476	0.220871	0.00764	0.025576	0.01873	0.046047	0.035983	0.035242	0.001038	0.000672	0.001272	0.011021	0.212042
36490	0.11234	0.089877	0.651431	0.225557	0.213947	0.768382	0.71149	0.71238	0.750046	0.790649	0.728056	0.744209	0.403157	0.1705	0.264656	0.062899	0.293921	0.2119	0.297545	0.103184	0.001854	0.00263	0.001676	0.055026
15534	0.493529	0.181617	0.359724	0.01752	0.199477	0.060296	0.281463	0.100118	0.098769	0.12756	0.061152	0.104248	0.082443	0.001087	0.007086	0.007808	0.121378	0.067221	0.099735	0.00076	0.00069	0.001005	0.001029	0.084682
37110	0.016621	0.178862	0.075937	0.017197	0.662717	0.52011	0.535238	0.361809	0.659364	0.243702	0.145761	0.536724	0.150652	0.141048	0.004807	0.016732	0.035801	0.060618	0.013414	3.10E-05	0.001544	0.000428	0.000552	0.0077
37997	0.030955	0.011196	0.007784	0.051936	0.032618	0.157125	0.110541	0.080421	0.222357	0.203711	0.074076	0.049077	0.007838	0.005177	0.001386	0.001574	0.01365	0.025852	0.009616	0.000142	0.000352	0.001459	0.032202	0.051971
17696	0.272088	0.399427	0.192338	0.542088	0.665287	0.671104	0.385298	0.398284	0.133381	0.130723	0.12977	0.047067	0.02213	0.002762	0.000189	0.000419	0.000149	0.000356	0.000642	8.20E-05	0.00156	0.004305	0.178557	0.526282
15451	0.19686	0.089061	0.211546	0.688423	0.295975	0.284591	0.171413	0.153172	0.162966	0.00853	0.028218	0.238673	0.150929	0.026608	0.056622	0.064987	0.064621	0.184687	0.181921	0.007512	0.001721	0.022423	0.013342	0.097165
25358	0.677246	0.541626	0.786865	0.684814	0.695312	0.831055	0.898437	0.760864	0.831055	0.764648	0.807739	0.831055	0.735352	0.570312	0.528612	0.625	0.734375	0.300781	0.1875	0.8125	0.46875	0.625	0.652344	0.764648
37761	0.107074	0.080753	0.146361	0.040563	0.210362	0.61477	0.169546	0.049933	0.128089	0.015776	5.30E-05	0.008017	0.009699	0.000496	3.00E-06	0.000338	0.00387	0.006596	0.000236	0	1.40E-05	0.000309	0.00412	0.172264
25248	0.651844	0.044423	0.263356	0.002777	0.165583	0.614801	0.587442	0.46943	0.24736	0.078712	0.051616	0.15777	0.090268	0.030332	0.040106	0.005704	0.022661	0.02791	0.010428	0.001436	0.001469	0.007486	0.151986	0.773777
37875	0.307823	0.399639	0.832306	0.453111	0.743936	0.562448	0.433221	0.224306	0.124381	0.053489	0.04825	0.364793	0.190098	0.004584	0.058454	0.01275	0.064116	0.111668	0.025477	0.001507	0.12546	0.121802	0.75368	0.630473
15472	0.475076	0.349887	0.680995	0.233528	0.3385	0.299145	0.254523	0.130831	0.135367	0.106471	0.049236	0.474969	0.493051	0.225864	0.010355	0.001978	0.002459	0.004499	0.004545	0.003255	0.017433	0.033643	0.044846	0.304234
24443	0.131988	0.210538	0.68303	0.268254	0.206259	0.768624	0.321684	0.450734	0.473018	0.557853	0.262152	0.317109	0.375786	0.695344	0.55783	0.155946	0.287971	0.216903	0.22012	0.028867	0.001309	0.033405	0.005977	0.099759
37474	0.708443	0.579644	0.566861	0.199324	0.770216	0.749634	0.256516	0.355791	0.121636	0.057372	0.011002	0.152397	0.035283	0.002513	0.000892	0.019983	0.016692	0.013143	0.001361	0.000625	0.004267	0.102301	0.500709	0.80289
25395	0.354554	0.124745	0.161353	0.214233	0.265673	0.669828	0.601183	0.586342	0.465325	0.296123	0.001693	0.015769	0.012817	0.002365	0.012349	0.024897	0.034918	0.050604	0.004953	0.002342	0.000407	0.008352	0.046058	0.383785
24448	0.333863	0.117343	0.52241	0.384602	0.562695	0.677063	0.291691	0.134428	0.173998	0.015891	0.015939	0.176385	0.084692	0.025912	0.000626	0.001096	0.07369	0.034238	0.040732	0.000114	0.000137	0.000769	0.024771	0.435462

Table A.6: Wilcoxon of p-values from analysis of traffic volume and temperature

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
36764	0.421204	0.164957	0.2158	0.17406	0.250308	0.217716	0.268384	0.179639	0.349603	0.221568	0.211399	0.357813	0.398862	0.780008	0.797841	0.315799	0.345729	0.187501	0.082195	0.090576	0.03418	0.039063	0.054688	0.160156
17696	0.100421	0.066536	0.159985	0.011803	0.006544	0.08976	0.194914	0.048531	0.104041	0.038954	0.030544	0.071786	0.139973	0.266621	0.261893	0.083321	0.765557	0.482591	0.043167	0.092285	0.041992	0.03125	0.0625	0.046875
15180	0.3125	0.3125	0.238955	0.850582	0.205128	0.368096	0.257924	0.258506	0.22471	0.224858	0.353406	0.263228	0.588601	0.693125	0.676964	0.734236	0.808251	0.850098	0.546875	0.4375	0.125	0.25	0.5	0.5
15287	0.195778	0.140275	0.06569	0.21302	0.299304	0.190139	0.187146	0.495009	0.296794	0.19393	0.644499	0.703973	0.806838	0.545319	0.295885	0.83634	0.631811	0.532952	0.081429	0.030151	0.007812	0.007812	0.015625	0.007812
17056	0.078491	0.06707	0.199615	0.053557	0.005715	0.232028	0.501524	0.233818	0.495399	0.386521	0.181786	0.325266	0.562172	0.793901	0.827679	0.461772	0.264874	0.14335	0.01578	0.015764	0.006104	0.007812	0.007813	0.015625
15494	0.193359	0.116669	0.09874	0.009016	0.01787	0.052696	0.091596	0.084	0.112346	0.045264	0.098263	0.099551	0.383408	0.709557	0.400584	0.132571	0.268707	0.104004	0.083008	0.054688	0.125	0.125	0.125	0.125
36776	0.267578	0.174255	0.41004	0.387647	0.022151	0.035637	0.044133	0.176198	0.289473	0.048811	0.312605	0.178796	0.235657	0.461476	0.782925	0.482845	0.264244	0.099335	0.031919	0.015076	0.012207	0.015625	0.015625	0.097656
25248	0.375	0.540555	0.414307	0.088654	0.029151	0.194807	0.066709	0.125384	0.317135	0.102029	0.229982	0.313497	0.660964	0.75306	0.481001	0.34131	0.320457	0.216553	0.092285	0.15625	0.625	0.5	0.5	0.625
24895	0.577148	0.147451	0.571243	0.373887	0.001566	0.057162	0.06516	0.116017	0.110403	0.069646	0.033122	0.019473	0.112382	0.158864	0.181303	0.163037	0.168168	0.028277	0.028992	0.026855	0.019531	0.03125	0.03125	0.109375
25347	0.17627	0.047913	0.054693	0.007452	0.069893	0.389993	0.184708	0.294285	0.5406	0.405931	0.337235	0.774856	0.804801	0.782138	0.574939	0.192328	0.522144	0.123093	0.021545	0.032227	0.054688	0.0625	0.0625	0.0625
36752	0.390991	0.172958	0.559958	0.646856	0.759341	0.575537	0.187467	0.193937	0.473162	0.429759	0.336855	0.336341	0.480802	0.696994	0.798779	0.495904	0.742885	0.531663	0.21568	0.216553	0.100421	0.039063	0.054688	0.054688
24443	0.093564	0.115137	0.492496	0.193551	0.000564	0.10806	0.056363	0.269549	0.240832	0.102787	0.027128	0.053811	0.244412	0.627921	0.636866	0.664005	0.5537	0.33614	0.098411	0.019853	0.003418	0.027344	0.017717	0.019531
37613	0.118896	0.098373	0.112872	0.052696	2.00E-05	0.052914	0.086975	0.104851	0.078966	0.024212	0.008749	0.006497	0.027296	0.153989	0.073034	0.03893	0.302331	0.148516	0.104156	0.123047	0.083008	0.078125	0.09375	0.078125
25395	0.078718	0.098373	0.121904	0.06624	0.052567	0.195957	0.068841	0.151194	0.126573	0.072639	0.07198	0.406396	0.717258	0.753845	0.781959	0.369126	0.346287	0.082195	0.13237	0.077148	0.064453	0.09375	0.046875	0.109375
16622	0.044312	0.011731	0.051188	0.008855	0.022462	0.091495	0.088228	0.139857	0.0142	0.007412	0.052169	0.324114	0.762244	0.793662	0.460826	0.042232	0.048164	0.035724	0.019473	0.004101	0.004028	0.011719	0.015625	0.007812
15472	0.164062	0.094604	0.088654	0.010314	0.090565	0.244903	0.258542	0.191624	0.196371	0.162205	0.244187	0.301322	0.74395	0.744025	0.730056	0.477237	0.730342	0.522614	0.733398	0.556641	0.25	0.25	0.5	0.5
36416	0.624489	0.226994	0.304172	0.419231	0.071166	0.374816	0.268732	0.387609	0.381339	0.102793	0.015937	0.016098	0.005305	0.035911	0.660059	0.455433	0.400053	0.500905	0.129738	0.142091	0.063965	0.078125	0.09375	0.046875
17585	0.04248	0.012264	0.082611	0.054261	0.020902	0.15407	0.083571	0.038606	0.182949	0.142916	0.120348	0.044319	0.058154	0.394996	0.308755	0.191123	0.410464	0.119342	0.055359	0.053711	0.037109	0.046875	0.0625	0.03125
25065	0.296875	0.382813	0.423828	0.495079	0.000955	0.049458	0.06396	0.079207	0.06918	0.019239	0.004623	0.039926	0.160523	0.294915	0.488452	0.179687	0.111058	0.053711	0.064453	0.09375	0.25	0.5	0.25	0.3125
15451	0.082352	0.047504	0.044086	0.416313	0.127064	0.09741	0.272913	0.343573	0.387444	0.19691	0.309125	0.083994	0.283978	0.23933	0.785875	0.772121	0.490893	0.411982	0.088654	0.024536	0.018981	0.009091	0.015625	0.014266
25358	0.25	0.25	0.4375	0.296875	0.011719	0.109863	0.216309	0.241211	0.297852	0.133621	0.026642	0.015583	0.027535	0.036649	0.045123	0.2435	0.083984	0.0625	0.0625	0.125	0.5	0.5	0.5	0.5
15534	0.695312	0.430679	0.261099	0.015973	0.027436	0.014532	0.030764	0.139197	0.604262	0.565982	0.286118	0.236382	0.335222	0.122056	0.14193	0.323103	0.691578	0.474905	0.6698	0.569336	0.21875	0.09375	0.125	0.15625
25113	0.203613	0.159058	0.34881	0.254513	0.00143	0.286582	0.228037	0.287639	0.3557	0.096198	0.064759	0.017264	0.150418	0.269236	0.321471	0.309627	0.392654	0.176192	0.079681	0.020996	0.018555	0.0625	0.0625	0.109375
15157	0.04187	0.021484	0.017873	0.00296	0.044403	0.03747	0.067143	0.219351	0.16456	0.176426	0.138552	0.119337	0.458152	0.501073	0.323271	0.204174	0.232497	0.101096	0.056885	0.015076	0.007812	0.007812	0.015625	0.015625
38747	0.203125	0.129395	0.263321	0.200216	0.000557	0.107569	0.159104	0.214621	0.142965	0.055315	0.018503	0.010254	0.038084	0.034174	0.063947	0.28995	0.03341	0.033539	0.127197	0.148438	0.15625	0.25	0.25	0.21875
25676	0.519531	0.151428	0.275341	0.113961	0.07536	0.177374	0.30165	0.340602	0.367266	0.375993	0.316012	0.167152	0.065259	0.801146	0.83099	0.763416	0.685047	0.411982	0.174255	0.123047	0.013672	0.03125	0.03125	0.054688
37305	0.375	0.460938	0.464844	0.074383	6.70E-05	0.002565	0.00753	0.068399	0.106773	0.029585	0.004624	0.002866	0.009084	0.052718	0.006096	0.021568	0.081429	0.101562	0.074219	0.125	0.25	0.5	0.5	0.5
39446	0.266113	0.090576	0.33766	0.245096	0.124641	0.243212	0.177879	0.246055	0.329575	0.076766	0.225508	0.250891	0.149219	0.232079	0.257692	0.140043	0.803368	0.679428	0.093445	0.101562	0.064453	0.0625	0.125	0.15625
34123	0.041233	0.033974	0.026286	0.072538	0.036643	0.066612	0.160792	0.241495	0.071587	0.009322	0.005444	0.013689	0.147635	0.182407	0.232523	0.353196	0.534871	0.300133	0.14386	0.003438	0.009766	0.011719	0.015625	0.023438
37110	0.024536	0.027283	0.031842	0.002372	0.057267	0.329268	0.090632	0.052819	0.021837	0.302336	0.799049	0.728875	0.745756	0.786086	0.719525	0.680311	0.329795	0.090316	0.079876	0.044501	0.03418	0.011719	0.054688	0.023438
38104	0.21875	0.25	0.240234	0.163987	0.133621	0.189904	0.36036	0.127497	0.216227	0.144936	0.182308	0.14032	0.231395	0.171416	0.276521	0.22543	0.738091	0.42627	0.130859	0.3125	0.5	0.5	0.25	0.5
37788	0.15625	0.195313	0.206055	0.190094	0.025423	0.224087	0.402604	0.365108	0.284307	0.055557	0.02678	0.097265	0.371015	0.38442	0.289434	0.2302	0.312408	0.216553	0.041992	0.15625	0.5	0.5	0.5	0.5
34093	0.309629	0.172561	0.132741	0.149194	0.550005	0.170272	0.182785	0.20569	0.112818	0.033166	0.051343	0.157876	0.122896	0.367318	0.367664	0.598371	0.622345	0.403763	0.248719	0.024414	0.03125	0.0625	0.035522	0.0625
24268	0.460938	0.151428	0.077732	0.0554	0.226959	0.731629	0.312892	0.518116	0.696367	0.429108	0.559215	0.793006	0.822181	0.646253	0.809228	0.785519	0.855336	0.86026	0.454834	0.375	0.148438	0.1875	0.125	0.09375
14938	0.074219	0.047913	0.052596	0.006078	0.004747	0.023753	0.036146	0.200709	0.1114	0.01572	0.009678	0.016607	0.052951	0.091814	0.256452	0.030131	0.050499	0.048279	0.02766	0.013672	0.015625	0.015625	0.015625	0.015625
37997	0.097656	0.130859	0.625732	0.045993	0.073999	0.116927	0.22062	0.083222	0.128623	0.043807	0.027517	0.06814	0.088587	0.19278	0.11346	0.428327	0.683986	0.302795	0.109863	0.21875	0.375	0.375	0.5	0.25
37875	0.118896	0.036068	0.020858	0.006311	0.01184	0.05481	0.069714	0.101431	0.041397	0.019747	0.001567	0.000887	0.004392	0.010607	0.014161	0.026321	0.037427	0.05869	0.050537	0.057373	0.039062	0.039063	0.078125	0.078125
37761	0.035278	0.008308	0.011516	0.002803	0.000819	0.059381	0.118147	0.153647	0.091238	0.010574	2.80E-05	0.000403	0.002346	0.002305	0.006215	0.137978	0.156816	0.069817	0.014069	0.039795	0.027344	0.015625	0.03125	0.023438
36001	0.148438	0.193726	0.038635	0.001171	0.012466	0.026031	0.067585	0.103184	0.073644	0.018121	0.006776	0.011341	0.016426	0.050266	0.012547	0.053429	0.18173	0.14386	0.174805	0.097656	0.125	0.125	0.125	0.125
37390	0.049438	0.031151	0.052641	0.006452	0.003844	0.026625	0.042174	0.038473	0.027777	0.025481	0.015074	0.015324	0.055096	0.036885	0.060583	0.034564	0.039295	0.036649	0.018082	0.035339	0.032227	0.019531	0.015625	0.019531
37933	0.035278	0.00486	0.012295	0.001289	0.058221	0.058275	0.178595	0.212977	0.286308	0.218036	0.234781	0.217377	0.365262	0.332175	0.396048	0.283425	0.244903	0.14335	0.145432	0.047913	0.011719	0.007812	0.015625	0.007812
36490	0.625	0.8125	0.84375	0.845703	0.407369	0.043091	0.02454	0.098183	0.138323	0.230381	0.059943	0.048639	0.062597	0.099431	0.158454	0.226977	0.501587	0.25	0.09375	0.375	0.5	0.5	0.5	0.5
24448	0.233398	0.212143	0.105398	0.095388	0.096064	0.136984	0.280512	0.203604	0.172044	0.128035	0.041717	0.239381	0.686854	0.303992	0.202242	0.430758	0.523918	0.388376	0.174255	0.167725	0.074219	0.046875	0.0625	0.046875
37474	0.105469	0.232422	0.106995	0.054693	0.000668	0.038741	0.088646	0.210497	0.152266	0.031853	0.021681	0.001757	0.008488	0.05155	0.15845	0.012945	0.016407	0.008362	0.01709	0.039063	0.09375	0.0625	0.0625	0.0625
37354	0.164062	0.104004	0.120209	0.01578	0.012605	0.209766	0.335977	0.146819	0.112025	0.215019	0.206951	0.115843	0.442296	0.253272	0.288569	0.170525	0.285002	0.454285	0.233398	0.275391	0.21875	0.125	0.125	0.125
15128	0.04248	0.02549	0.069506	0.031037	0.008638	0.047203	0.047745	0.393168	0.169664	0.001088	0.010562	0.055939	0.063601	0.15138	0.286533	0.356003	0.139252	0.015601	0.018596	0.005371	0.011719	0.007812	0.014147	0.015625
49159	0.092285	0.083252	0.064122	0.056427	0.036881	0.056331	0.213031	0.176795	0.172001	0.073398	0.016512	0.165068	0.265467	0.156973	0.055887	0.142132	0.374079	0.246208	0.167725	0.123047	0.0625	0.0625	0.0625	0.0625
36950	0.3125	0.147461	0.157709	0.053856	0.000417	0.022099	0.100088	0.156336	0.176252	0.007907	0.001776	0.005956	0.032238	0.281411	0.203127	0.23066	0.353498	0.190918	0.041992	0.078125	0.25	0.25	0.25	0.25

Table A.7: Wilcoxon of p-values from analysis of traffic volume and wind speed

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
15534	0.309307	0.185838	0.003337	0.003098	0.613871	0.760479	0.468428	0.566575	0.535575	0.606275	0.004077	0.265961	0.236829	0.139458	0.813158	0.776095	0.786502	0.761333	0.745514	0.70551	0.09402	0.076375	0.149852	0.467017
37761	0.127007	0.009147	0.016072	0.04512	0.020086	0.718866	0.635849	0.821005	0.501537	0.006796	0.011766	0.089764	0.322042	0.008993	0.447963	0.820086	0.306563	0.375325	0.497225	0.838918	0.322916	0.17199	0.502031	0.59037
17585	0.143555	0.016626	0.186825	0.051026	0.182831	0.825461	0.729221	0.812426	0.792622	0.4478	0.725484	0.696523	0.559475	0.568594	0.416619	0.724216	0.544297	0.541518	0.517598	0.745394	0.440134	0.186686	0.673377	0.439462
38747	0.314854	0.15466	0.017922	0.114437	0.011739	0.782825	0.724517	0.659021	0.809584	0.270636	0.157489	0.418268	0.335223	0.563808	0.836095	0.781327	0.7083	0.816082	0.169268	0.753204	0.262524	0.719581	0.632843	0.322653
25358	0.358538	0.056387	0.332066	0.044054	0.781952	0.812355	0.312408	0.728506	0.711899	0.392738	0.719727	0.845703	0.733398	0.791016	0.678772	0.562075	0.082547	0.367938	0.3954	0.529755	0.830818	0.504718	0.680107	0.115278
37110	0.73019	0.333989	0.186462	0.794422	0.801308	0.723136	0.328727	0.484383	0.806283	0.705879	0.718403	0.313547	0.793214	0.758694	0.731764	0.164537	0.145361	0.056408	0.157727	0.616958	0.713489	0.222796	0.750682	0.821251
25065	0.294497	0.100143	0.286673	0.091937	0.007583	0.687413	0.65428	0.817575	0.793921	0.38025	0.275245	0.106389	0.77903	0.658008	0.727209	0.753086	0.779047	0.712295	0.626686	0.77192	0.318015	0.727355	0.721914	0.83697
25395	0.057062	0.006285	0.111581	0.036558	0.157502	0.752896	0.652169	0.224328	0.340087	0.029927	0.012764	0.30259	0.536719	0.433939	0.710411	0.559791	0.781931	0.817523	0.847697	0.323911	0.052987	0.081237	0.004608	0.160554
25113	0.166596	0.009802	0.356351	0.131098	0.001893	0.77598	0.720795	0.685448	0.727388	0.504539	0.410976	0.151306	0.57484	0.558091	0.462553	0.693544	0.178263	0.634889	0.594967	0.841094	0.557458	0.539363	0.808007	0.273304
36490	0.408881	0.15025	0.176599	0.221241	0.107079	0.82785	0.490035	0.650367	0.66684	0.752911	0.735874	0.706101	0.743859	0.783937	0.726078	0.757151	0.697196	0.60217	0.568864	0.686944	0.683381	0.807963	0.815344	0.77103
15180	0.083179	0.231947	0.215074	0.699556	0.597484	0.805436	0.817408	0.399047	0.751643	0.813076	0.803753	0.84333	0.740155	0.817133	0.094828	0.153385	0.094463	0.534121	0.404316	0.512566	0.085924	0.328367	0.740373	0.445126
15287	0.126088	0.069449	0.071542	0.377741	0.719791	0.797295	0.698325	0.519443	0.701082	0.433677	0.266692	0.74026	0.64952	0.573682	0.243965	0.104813	0.238497	0.576661	0.07869	0.78243	0.021723	0.092139	0.34722	0.541238
15157	0.187106	0.026388	0.002103	0.000209	0.645555	0.737523	0.794758	0.69054	0.500785	0.137998	0.096414	0.780856	0.424042	0.589769	0.617875	0.259739	0.363392	0.544098	0.438692	0.809885	0.102704	0.088677	0.172328	0.520267
15494	0.12745	0.493788	0.115219	0.129348	0.794943	0.788937	0.831615	0.76105	0.49647	0.822332	0.34142	0.704712	0.21836	0.102194	0.436879	0.662178	0.829185	0.447483	0.708976	0.249453	0.155713	0.606497	0.861491	0.671042
36752	0.621202	0.462195	0.298383	0.247098	0.06316	0.329099	0.738365	0.76764	0.723589	0.310762	0.205247	0.633413	0.620221	0.687973	0.750319	0.828332	0.779277	0.855822	0.616818	0.778422	0.307739	0.361387	0.766085	0.488959
17696	0.639918	0.054058	0.15347	0.213479	0.304503	0.776211	0.563532	0.836035	0.663282	0.406235	0.483692	0.448884	0.742904	0.779562	0.688798	0.481049	0.753583	0.638973	0.745521	0.795642	0.349507	0.343649	0.600365	0.496713
25676	0.127646	0.017825	0.184951	0.056185	0.06725	0.567555	0.771836	0.783778	0.779849	0.362477	0.185308	0.650656	0.701026	0.705442	0.767916	0.640414	0.449464	0.629382	0.542776	0.610688	0.051059	0.052003	0.455407	0.405065
17056	0.661116	0.103019	0.249895	0.12186	0.033682	0.758184	0.729891	0.753682	0.730441	0.651693	0.756696	0.740589	0.783427	0.608931	0.652967	0.83301	0.640738	0.372372	0.241506	0.596019	0.816765	0.774494	0.771052	0.308735
37997	0.34867	0.022854	0.144122	0.09288	0.2894	0.773118	0.597966	0.741373	0.724793	0.13061	0.311102	0.269417	0.728825	0.792366	0.672773	0.649199	0.405948	0.505031	0.774205	0.731264	0.610722	0.365089	0.54327	0.593901
25347	0.359309	0.061118	0.427283	0.072458	0.722028	0.810983	0.748793	0.799515	0.723296	0.74109	0.697483	0.756585	0.781215	0.318661	0.797387	0.767462	0.173402	0.405552	0.710383	0.770248	0.692083	0.788099	0.760119	0.28048
37788	0.28954	0.042434	0.057277	0.155401	0.002831	0.330948	0.737649	0.812709	0.241185	0.002307	0.009405	0.032935	0.239473	0.061048	0.398497	0.611806	0.435403	0.41206	0.424625	0.747423	0.266548	0.464612	0.834224	0.788901
24895	0.050192	0.057116	0.421863	0.29342	0.387005	0.85173	0.255528	0.441563	0.777396	0.696643	0.6378	0.611374	0.568816	0.63939	0.156084	0.782717	0.169999	0.448016	0.761979	0.843744	0.820412	0.741859	0.60273	0.227119
37474	0.330278	0.01495	0.007863	0.027948	0.016083	0.135078	0.763429	0.63943	0.474418	0.091435	0.102773	0.051854	0.063527	0.035627	0.777795	0.790437	0.179968	0.224547	0.708744	0.350872	0.2681	0.28995	0.094895	0.284735
24443	0.128975	0.085713	0.54668	0.081937	0.536667	0.676245	0.697446	0.785008	0.780674	0.490995	0.323565	0.662895	0.771835	0.657353	0.435138	0.730492	0.309813	0.495302	0.625622	0.797986	0.338137	0.726246	0.022983	0.070484
25248	0.294943	0.216836	0.144784	0.016681	0.327565	0.633771	0.799887	0.772179	0.655723	0.360742	0.735818	0.744486	0.799335	0.854915	0.432109	0.535568	0.623183	0.103597	0.342581	0.560182	0.729378	0.710356	0.498378	0.69742
36764	0.318806	0.340915	0.167589	0.298126	0.142023	0.529472	0.759263	0.804207	0.752723	0.245072	0.303201	0.712996	0.679651	0.776764	0.676409	0.788985	0.546714	0.721492	0.354676	0.824265	0.418769	0.444308	0.739434	0.587187
15472	0.10696	0.094873	0.004399	0.001942	0.592279	0.722324	0.766048	0.748949	0.133865	0.319116	0.057373	0.54373	0.564383	0.552771	0.71393	0.52945	0.752829	0.596581	0.752158	0.54622	0.084266	0.221872	0.527519	0.669763
15451	0.032537	0.143211	0.02703	0.434348	0.747961	0.817589	0.781424	0.757757	0.332553	0.251056	0.370251	0.714619	0.675681	0.826366	0.777473	0.350825	0.440635	0.864176	0.810551	0.765352	0.01166	0.102166	0.419722	0.323473
16622	0.083629	0.04967	0.410933	0.039494	0.745468	0.708321	0.729893	0.565102	0.552659	0.074274	0.16626	0.309675	0.722178	0.759688	0.319548	0.748951	0.718147	0.689996	0.771026	0.78036	0.546985	0.104997	0.442165	0.22795
36776	0.173814	0.270801	0.552699	0.55326	0.424897	0.753628	0.552103	0.651834	0.738327	0.52449	0.659319	0.674867	0.642577	0.751512	0.658289	0.507288	0.262067	0.43021	0.559356	0.821334	0.537759	0.503566	0.328816	0.624318
37305	0.557847	0.109461	0.14662	0.063786	0.000518	0.483022	0.642815	0.764061	0.711249	0.659652	0.300204	0.359426	0.351339	0.732115	0.79087	0.723508	0.680101	0.755871	0.530603	0.826996	0.759535	0.672509	0.786476	0.777403
37613	0.762605	0.247515	0.34565	0.344369	0.011498	0.707982	0.806114	0.640074	0.607346	0.065882	0.045342	0.132893	0.529147	0.736893	0.797831	0.81495	0.752903	0.757683	0.712587	0.834595	0.494467	0.669111	0.828079	0.748313
36416	0.712688	0.479781	0.624425	0.291959	0.437662	0.782112	0.488711	0.220953	0.766148	0.158125	0.08448	0.078679	0.052878	0.311537	0.47278	0.365629	0.714947	0.430152	0.380436	0.53086	0.788479	0.78645	0.400117	0.262805
39446	0.669458	0.4375	0.339106	0.294156	0.436727	0.715763	0.783259	0.613364	0.786177	0.545023	0.533804	0.475496	0.742376	0.748908	0.57788	0.582609	0.753328	0.44705	0.358831	0.763009	0.827922	0.679195	0.833563	0.721561
37875	0.529084	0.282258	0.020188	0.073259	0.581297	0.772201	0.695528	0.717556	0.138222	0.100168	0.000688	0.298294	0.06392	0.089815	0.67275	0.819452	0.704591	0.82778	0.657558	0.568167	0.859416	0.851703	0.542071	0.746506
37933	0.138221	0.011484	0.000396	0.00038	0.679368	0.818005	0.811734	0.764768	0.289014	0.227916	0.032793	0.308156	0.210467	0.098408	0.701185	0.804536	0.787911	0.702801	0.841003	0.764843	0.1527	0.43126	0.369079	0.766851
49159	0.172586	0.02942	0.023781	0.293713	0.634491	0.756137	0.44019	0.747242	0.565238	0.057178	0.258858	0.304769	0.216058	0.291597	0.607486	0.456386	0.76157	0.737738	0.793797	0.375096	0.069274	0.26663	0.350848	0.281474
34093	0.140869	0.442475	0.019748	0.333692	0.578479	0.758282	0.75904	0.780073	0.609057	0.122962	0.299776	0.202497	0.580033	0.447109	0.747262	0.579768	0.36038	0.128526	0.770494	0.487501	0.013719	0.031739	0.116854	0.387966
37390	0.568735	0.174449	0.033186	0.089617	0.251485	0.696057	0.521975	0.626054	0.068739	0.01368	0.005276	0.086449	0.17878	0.015649	0.094668	0.258979	0.784916	0.792289	0.674568	0.682296	0.102611	0.178771	0.096826	0.804947
37354	0.335845	0.105168	0.123546	0.060109	0.096514	0.717433	0.735516	0.701226	0.306221	0.298807	0.018167	0.379739	0.360289	0.150952	0.634738	0.811494	0.713611	0.774723	0.622899	0.551295	0.089604	0.766987	0.334181	0.583975
24268	0.428502	0.132964	0.043946	0.0205	0.388131	0.504481	0.798877	0.375031	0.192958	0.00697	0.065337	0.432174	0.644185	0.59971	0.791195	0.697226	0.744779	0.80513	0.364959	0.810029	0.29343	0.344427	0.716215	0.491293
34123	0.076512	0.020247	0.005355	0.02663	0.074144	0.701278	0.473691	0.743332	0.449226	0.051807	0.007147	0.141812	0.398717	0.468893	0.760866	0.748771	0.580852	0.584975	0.703286	0.283866	0.000803	0.000818	0.035852	0.134578
14938	0.067168	0.103884	0.003099	0.002897	0.215315	0.620599	0.777978	0.729733	0.137092	0.040482	0.021863	0.196091	0.106709	0.094213	0.811459	0.772248	0.792258	0.526417	0.642517	0.844662	0.002605	0.072192	0.178926	0.371979
36950	0.116736	0.025174	0.005414	0.005887	0.000929	0.482904	0.674677	0.821724	0.428427	0.006177	0.00547	0.035209	0.132141	0.035399	0.515617	0.753552	0.759018	0.790921	0.79441	0.20959	0.006986	0.042593	0.157894	0.325913
38104	0.47997	0.207174	0.028133	0.110567	0.641202	0.450448	0.783341	0.809234	0.283546	0.336489	0.22686	0.371065	0.384523	0.45718	0.600203	0.69963	0.488086	0.764222	0.824371	0.473747	0.027021	0.162482	0.525479	0.54902
24448	0.041839	0.026129	0.004806	0.043325	0.681405	0.782237	0.633001	0.716268	0.196829	0.022895	0.036793	0.266567	0.187435	0.097822	0.763065	0.71505	0.814253	0.533333	0.652986	0.485621	0.04888	0.177706	0.112454	0.450263
36001	0.107447	0.078457	0.003091	0.00471	0.466518	0.627474	0.638624	0.674788	0.051502	0.003441	0.00218	0.080876	0.061239	0.110036	0.465332	0.652859	0.746751	0.799164	0.819809	0.287168	0.017006	0.136143	0.215266	0.611132
15128	0.054257	0.182915	0.040299	0.237046	0.035749	0.629455	0.656265	0.513528	0.736116	4.50E-05	0.000809	0.000375	0.000501	0.030584	0.660741	0.274132	0.069694	0.280983	0.53561	0.035139	0.005539	0.009922	0.055331	0.21397

Table A.8: Wilcoxon of p-values from analysis of traffic volume and visibility

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24895	0.527678	0.331639	0.384843	0.66755	0.079438	0.492614	0.761536	0.731389	0.822338	0.778626	0.800704	0.255576	0.095359	0.082554	0.15052	0.384495	0.190008	0.032721	0.062217	0.077048	0.021084	0.071337	0.126648	0.135302
37110	0.116462	0.530126	0.66999	0.609163	0.4209	0.444435	0.695038	0.803607	0.771939	0.144172	0.106664	0.795459	0.718574	0.81594	0.720534	0.768773	0.799513	0.341377	0.097946	0.003111	0.03891	0.006731	0.039339	0.037192
37390	0.189348	0.13489	0.556592	0.241792	0.093322	0.286518	0.410205	0.643713	0.270551	0.487725	0.118597	0.311433	0.353428	0.222997	0.159642	0.069816	0.057044	0.046028	0.012044	0.001862	0.001317	0.001312	0.030711	0.04049
25113	0.106438	0.011803	0.608401	0.20718	0.040983	0.542198	0.704756	0.450683	0.59649	0.789553	0.773663	0.141295	0.296455	0.114507	0.088307	0.133265	0.030549	0.068242	0.03593	0.004693	0.000585	0.000546	0.015648	0.087741
36490	0.6875	0.359375	0.25	0.431641	0.068115	0.366986	0.742188	0.839355	0.878837	0.807739	0.596588	0.587891	0.528168	0.219209	0.155134	0.395711	0.452368	0.42627	0.518555	0.203613	0.064453	0.300781	0.240234	0.092285
15534	0.570597	0.404342	0.125434	0.154208	0.067458	0.192351	0.207528	0.556569	0.717719	0.797388	0.600988	0.383269	0.184737	0.036698	0.035823	0.041457	0.057762	0.102347	0.027063	0.007659	0.012044	0.003004	0.026595	0.079736
38747	0.297852	0.51709	0.352459	0.444041	0.002151	0.142417	0.707934	0.672075	0.696386	0.831357	0.554236	0.244903	0.202515	0.282465	0.326728	0.070172	0.062485	0.011772	0.001371	0.01619	0.011967	0.014722	0.039339	0.078729
17056	0.061309	0.679014	0.747475	0.458572	0.186122	0.786051	0.390991	0.807612	0.678951	0.831373	0.633827	0.593771	0.679372	0.384637	0.218805	0.81297	0.329414	0.633793	0.162163	0.113248	0.14848	0.020812	0.17798	0.011744
36764	0.611221	0.444417	0.386877	0.600834	0.058253	0.130507	0.831726	0.811678	0.767608	0.783534	0.50522	0.602051	0.549543	0.41182	0.49575	0.625101	0.362781	0.201179	0.090598	0.047464	0.009801	0.019588	0.122669	0.234762
15451	0.022788	0.040542	0.044358	0.397303	0.21763	0.396212	0.539187	0.760043	0.590471	0.389524	0.497126	0.225195	0.242973	0.160365	0.071753	0.437807	0.432927	0.669745	0.057131	0.000294	8.30E-05	7.70E-05	0.002246	0.002407
25065	0.164957	0.132727	0.164957	0.133621	0.001694	0.242842	0.798706	0.66168	0.489846	0.737573	0.442918	0.29613	0.411105	0.176438	0.195296	0.066636	0.036338	0.06522	0.016367	0.004752	0.000583	0.000875	0.077226	0.186976
36776	0.46504	0.732281	0.609149	0.423687	0.178474	0.241379	0.746926	0.813923	0.732882	0.780667	0.244992	0.201624	0.326788	0.168236	0.769059	0.720749	0.202544	0.044484	0.03593	0.017662	0.003228	0.001187	0.151659	0.32422
15472	0.2435	0.113774	0.061383	0.034227	0.077897	0.262641	0.24489	0.112614	0.279898	0.173971	0.048338	0.213397	0.35319	0.336584	0.106736	0.006735	0.020319	0.002065	0.000837	0.000412	0.001391	0.009141	0.066665	0.015743
37997	0.03849	0.206894	0.352459	0.050659	0.123093	0.246749	0.432011	0.765542	0.824179	0.77629	0.465834	0.098274	0.369525	0.191317	0.047429	0.144096	0.365043	0.090268	0.038418	0.014803	0.101397	0.002726	0.075149	0.003981
36950	0.113893	0.057678	0.116507	0.109827	0.003126	0.146964	0.70221	0.659182	0.481196	0.236924	0.002308	0.017017	0.345128	0.378434	0.101052	0.007066	0.059879	0.039339	0.004412	0.000622	0.000219	8.30E-05	0.002818	0.008232
37933	0.035056	0.00957	0.103154	0.009978	0.238309	0.354603	0.615592	0.406436	0.635956	0.288921	0.079055	0.115701	0.391503	0.318485	0.068188	0.018147	0.115433	0.078935	0.005884	0.000234	0.000306	2.60E-05	0.003385	0.002275
36001	0.190918	0.04208	0.080196	0.007586	0.181218	0.398947	0.507584	0.30882	0.56645	0.787752	0.055249	0.17072	0.666246	0.229904	0.214443	0.02795	0.132164	0.131075	0.025155	0.005618	0.008298	0.003118	0.07314	0.058752
25248	0.187622	0.060207	0.050659	0.06707	0.392584	0.355416	0.705719	0.548276	0.746926	0.746826	0.567035	0.34285	0.694702	0.247018	0.317257	0.132329	0.062002	0.024334	0.017614	0.004851	0.016407	0.002857	0.009436	0.059507
16622	0.553269	0.6875	0.84375	0.151367	0.375458	0.746658	0.695312	0.570597	0.523511	0.392738	0.088799	0.302795	0.704756	0.774384	0.182808	0.504541	0.101093	0.064649	0.021678	0.029131	0.006577	0.008316	0.19281	0.036234
37875	0.426142	0.258568	0.209186	0.120704	0.27217	0.745419	0.805402	0.494425	0.260469	0.391103	0.408348	0.648994	0.205546	0.104377	0.052203	0.044633	0.029694	0.10563	0.012234	0.001772	0.003341	0.001875	0.064908	0.153418
34093	0.075304	0.1389	0.385962	0.239136	0.375732	0.330417	0.629122	0.817581	0.811678	0.237265	0.553847	0.695939	0.276052	0.43426	0.502187	0.340323	0.627664	0.272583	0.040131	0.00618	0.001942	0.021368	0.172824	0.013105
37305	0.463745	0.181866	0.228752	0.098373	0.028931	0.344877	0.808251	0.564731	0.745092	0.733209	0.768792	0.777331	0.665551	0.1955	0.606309	0.367396	0.143993	0.100397	0.026595	0.120744	0.028018	0.020125	0.190857	0.176853
25347	0.091733	0.155971	0.473334	0.105398	0.395462	0.570597	0.683986	0.542404	0.709014	0.781862	0.715133	0.797889	0.785203	0.224071	0.425535	0.423755	0.372752	0.17752	0.051924	0.009635	0.008008	0.008008	0.066883	0.10482
25676	0.410765	0.391293	0.749414	0.476102	0.380273	0.386395	0.746926	0.76085	0.803368	0.728595	0.66709	0.735287	0.728201	0.783507	0.551838	0.812171	0.360063	0.154494	0.052713	0.006013	0.000123	0.000139	0.010048	0.060624
37354	0.106995	0.062626	0.141436	0.20533	0.104333	0.456112	0.342327	0.329404	0.603222	0.258686	0.037235	0.053208	0.126242	0.113008	0.046808	0.030678	0.058874	0.115845	0.014592	0.006918	0.001583	0.007612	0.060427	0.03341
25395	0.03267	0.085409	0.095512	0.069817	0.56332	0.629528	0.776785	0.798276	0.789126	0.665551	0.488181	0.702932	0.793157	0.291294	0.383735	0.400276	0.055254	0.062184	0.020054	0.014845	0.006217	0.002542	0.013826	0.018745
15128	0.221948	0.11647	0.283751	0.489518	0.106659	0.456067	0.633827	0.8288	0.791344	0.123847	0.119733	0.415648	0.492608	0.654914	0.671177	0.523581	0.492209	0.046128	0.002342	0.000114	0.00011	0.003503	0.015589	0.043936
17585	0.155508	0.719727	0.714844	0.495347	0.145015	0.726485	0.670066	0.737939	0.796562	0.848011	0.749322	0.516518	0.424314	0.434896	0.20805	0.660026	0.34502	0.5665	0.069731	0.122157	0.229707	0.035145	0.294829	0.01746
14938	0.275391	0.043167	0.22497	0.037191	0.172594	0.54459	0.388376	0.508296	0.284213	0.285504	0.065712	0.139595	0.75238	0.610066	0.605671	0.049478	0.169308	0.025834	0.048441	0.000593	0.000496	0.003671	0.00618	0.027535
36752	0.583008	0.711899	0.717336	0.644135	0.171195	0.104156	0.766029	0.731389	0.798276	0.728166	0.754504	0.238641	0.485891	0.276508	0.197957	0.382127	0.328868	0.23123	0.032488	0.018423	0.01233	0.035431	0.165859	0.111426
37613	0.206894	0.56189	0.463745	0.403763	0.018234	0.263321	0.644135	0.726184	0.661805	0.779946	0.131469	0.048026	0.042608	0.052914	0.044269	0.140985	0.069735	0.035819	0.002947	0.001385	0.006131	0.021372	0.04616	0.020275
15494	0.495422	0.454045	0.32595	0.195674	0.128231	0.322552	0.126644	0.144224	0.280364	0.12537	0.09142	0.306079	0.466961	0.15413	0.144031	0.049137	0.017359	0.005293	0.000243	0.001553	0.034404	0.044469	0.122534	0.255576
34123	0.276855	0.19752	0.394207	0.294346	0.639351	0.486927	0.764165	0.793414	0.753861	0.734298	0.056024	0.139859	0.285596	0.491678	0.717117	0.371083	0.825782	0.465176	0.070982	0.005603	0.000382	0.006831	0.011423	0.013443
24268	0.700195	0.769531	0.845703	0.464844	0.365234	0.519531	0.764648	0.6698	0.670525	0.141518	0.066288	0.312333	0.329405	0.327444	0.222522	0.077408	0.094544	0.017873	0.020412	0.00642	0.006281	0.030365	0.066288	0.116669
36416	0.365877	0.824013	0.824098	0.82588	0.390424	0.711942	0.776381	0.859573	0.799034	0.732307	0.524315	0.572008	0.55059	0.083022	0.683834	0.691486	0.398895	0.441837	0.053567	0.069817	0.161484	0.202917	0.239484	0.150559
15287	0.217877	0.108585	0.516804	0.14135	0.371581	0.587797	0.789553	0.787984	0.744193	0.760637	0.604476	0.551716	0.789724	0.777394	0.768718	0.797613	0.754786	0.555205	0.094009	0.000412	0.000449	0.000121	0.00549	0.025436
38104	0.094604	0.066883	0.131469	0.035162	0.10377	0.202311	0.398947	0.476577	0.620312	0.701209	0.276544	0.202553	0.260844	0.21416	0.264853	0.070556	0.242829	0.124716	0.022987	0.005164	0.005442	0.000906	0.011347	0.016407
49159	0.135947	0.359131	0.445874	0.153646	0.585402	0.495422	0.822927	0.643142	0.784649	0.44606	0.077226	0.025331	0.176245	0.256677	0.209747	0.131399	0.405972	0.032111	0.105453	0.047643	0.006516	0.009274	0.073776	0.012691
25358	0.4375	0.3125	0.625	0.496094	0.578125	0.84375	0.4375	0.46875	0.578125	0.5625	0.21875	0.4375	0.695312	0.791016	0.734375	0.695312	0.742188	0.546875	0.382813	0.625	0.4375	0.875	0.625	0.46875
15180	0.038301	0.057681	0.14412	0.819834	0.456105	0.53659	0.694236	0.805727	0.753556	0.605534	0.519476	0.124314	0.16409	0.170214	0.4461	0.73461	0.480441	0.775575	0.307421	0.003304	0.000175	0.000615	0.027479	0.0208
24443	0.053277	0.119801	0.660291	0.753783	0.164859	0.605864	0.774166	0.732425	0.785525	0.607535	0.727719	0.827043	0.768597	0.317061	0.699353	0.740319	0.459398	0.288299	0.210072	0.097425	0.002344	0.005159	0.007779	0.075017
15157	0.105398	0.022787	0.182669	0.102253	0.230375	0.531256	0.491065	0.553193	0.742358	0.20553	0.365208	0.122089	0.538074	0.292596	0.221915	0.10173	0.124456	0.06999	0.008701	4.90E-05	5.60E-05	8.90E-05	0.006568	0.004074
39446	0.156403	0.488708	0.735352	0.306046	0.228752	0.622562	0.781952	0.776785	0.775086	0.811536	0.229071	0.189904	0.029326	0.023534	0.139423	0.218497	0.174708	0.104543	0.042616	0.038418	0.043464	0.016786	0.4452	0.099335
24448	0.075827	0.052688	0.119077	0.09382	0.298957	0.356402	0.749322	0.755642	0.791411	0.664827	0.111261	0.199264	0.414665	0.414418	0.101645	0.114969	0.728835	0.280235	0.020501	0.002639	0.001284	0.001403	0.00664	0.0314
17696	0.021127	0.487381	0.498009	0.092935	0.050182	0.299612	0.705719	0.257823	0.281065	0.536151	0.715133	0.261845	0.11185	0.072396	0.012857	0.19132	0.030328	0.029494	0.001446	0.001833	0.012704	0.00104	0.149366	0.010411
37474	0.569336	0.501587	0.714844	0.430679	0.020813	0.190094	0.596588	0.329983	0.438001	0.427021	0.238259	0.275184	0.232497	0.037439	0.192621	0.022148	0.019	0.014722	0.036206	0.017873	0.029575	0.011347	0.019234	0.048279
37761	0.081429	0.195633	0.587927	0.172959	0.013529	0.234471	0.622068	0.779946	0.655438	0.598773	0.045367	0.05282	0.076927	0.673728	0.272603	0.128903	0.211258	0.034831	0.002221	0.000809	0.001172	0.000668	0.005613	0.016407
37788	0.105443	0.241211	0.644135	0.257927	0.026331	0.216167	0.73347	0.559958	0.645585	0.730989	0.10484	0.380984	0.451014	0.791838	0.275413	0.103362	0.120565	0.044839	0.005133	0.000364	0.002195	0.00166	0.012079	0.030365

Table A.9: Mann-Whitney of p-values from analysis of traffic volume and precipitation

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
17056	0.003493	0.408277	0.273587	0.777183	0.017188	0.649906	0.813276	0.576645	0.505817	0.792861	0.403378	0.071553	0.071733	0.057502	0.049516	0.044314	0.116741	0.026187	0.535533	0.065261	0.137663	0.037069	0.046924	0.36798
15157	0.224325	0.148835	0.178171	0.030733	0.249308	0.059253	0.064557	0.015959	0.202198	0.006022	0.001798	0.198963	0.069969	0.011292	0.000741	0.006077	0.005316	0.002769	0.000136	0	3.10E-05	0.001713	0.002445	0.10329
16622	0.463326	0.559007	0.464954	0.013467	0.682042	0.425905	0.048277	0.008626	0.000128	3.40E-05	0.000194	0.011586	0.004773	0.000163	0.000203	2.00E-06	5.00E-06	8.00E-06	6.40E-05	1.00E-06	0.000323	0.024288	0.05803	0.366064
37613	0.196296	0.582098	0.48322	0.345283	0.666719	0.601788	0.120716	0.008294	0.013719	0.041377	0.012923	0.044916	0.022423	0.00047	5.60E-05	4.50E-05	0.000606	0.01417	0.008454	5.00E-06	0.000452	0.005377	0.040295	0.522263
36416	0.264971	0.177024	0.713545	0.520647	0.574625	0.739242	0.712221	0.353376	0.22854	0.172477	0.009333	0.052818	0.004124	0.001452	0.658196	0.21604	0.014706	0.130784	0.161094	0.015134	0.005047	0.187636	0.08191	0.640364
37788	0.029275	0.10685	0.041177	0.033028	0.027184	0.681005	0.054874	0.008228	0.012471	0.003404	9.20E-05	0.029337	0.025172	0.005585	5.00E-06	4.10E-05	0.000959	0.003505	0.000906	0	7.00E-06	0.000111	0.011489	0.301829
39446	0.071276	0.574468	0.393454	0.273385	0.741505	0.722043	0.238597	0.022291	0.181078	0.185937	0.329943	0.073922	0.210965	0.015595	1.50E-05	0.001548	0.000387	0.019714	0.026312	0.000873	0.002579	0.018638	0.085704	0.356938
36752	0.023147	0.333635	0.518886	0.317474	0.690266	0.537141	0.436977	0.170604	0.532298	0.696025	0.189056	0.092364	0.136682	0.063866	0.003905	0.006163	0.014212	0.053998	0.04043	0.003013	0.000756	0.027256	0.04273	0.110458
25113	0.327014	0.150626	0.287763	0.161343	0.523714	0.580966	0.08229	0.029333	0.024745	0.022308	0.178635	0.251873	0.073728	0.013327	0.001754	0.001615	0.02607	0.032598	0.020699	6.80E-05	2.00E-05	0.001906	0.0016	0.1433
36001	0.87145	0.680683	0.338154	0.137267	0.369004	0.500171	0.259101	0.008181	0.014955	0.003722	0.001596	0.041324	0.093487	0.001642	6.00E-04	0.000682	0.008986	0.010507	0.019879	7.00E-05	0.0031	0.025507	0.028649	0.441217
15494	0.445895	0.465424	0.735217	0.581727	0.523706	0.595286	0.110197	0.030106	0.17434	0.242526	0.217717	0.4888	0.360771	0.105655	0.003776	0.000893	0.000873	0.001542	0.000837	0.00021	0.005003	0.067548	0.010691	0.396928
24895	0.279563	0.350059	0.784468	0.454933	0.44504	0.654959	0.371142	0.525277	0.44902	0.347308	0.149306	0.234486	0.115549	0.034485	0.212156	0.059134	0.189342	0.132208	0.101206	0.044667	0.00665	0.020835	0.057005	0.067051
34123	0.679071	0.513563	0.304908	0.059961	0.624038	0.436985	0.278101	0.225355	0.171695	0.01834	0.000809	0.025447	0.001375	0.000202	0.002	0.003439	0.082495	0.051301	0.065633	0.00055	0.00509	0.079466	0.057122	0.596366
49159	0.850902	0.396257	0.695597	0.517678	0.430954	0.515863	0.159242	0.067283	0.296408	0.133664	0.241427	0.35252	0.145624	0.011542	0.004374	0.002075	0.007163	0.006682	0.02325	0.004563	0.007618	0.159241	0.206321	0.691861
37390	0.840487	0.811395	0.759382	0.511976	0.726368	0.794217	0.387031	0.058727	0.006829	0.025215	0.009968	0.274018	0.377041	0.079366	0.002302	0.003721	0.028881	0.02173	0.005022	0.000256	0.009299	0.086746	0.628812	0.778415
15287	0.34214	0.201874	0.249088	0.325441	0.297256	0.585567	0.20311	0.422228	0.160613	0.043863	0.02701	0.569141	0.635792	0.536176	0.654549	0.801078	0.577638	0.529127	0.126314	0.002791	0.014165	0.017035	0.027164	0.292038
37354	0.117509	0.27059	0.353088	0.052199	0.192375	0.147509	0.057291	0.022623	0.048138	0.006229	0.001864	0.142928	0.091016	0.009448	3.00E-05	0.000164	0.006506	0.00464	0.009307	0.000206	0.018484	0.111699	0.021763	0.083613
17585	0.015976	0.210723	0.100951	0.56603	0.539924	0.780057	0.235313	0.129001	0.064222	0.137662	0.169037	0.078021	0.049422	0.094201	0.038329	0.026606	0.020958	0.027855	0.035354	0.001368	0.001512	0.0203	0.191755	0.256091
25065	0.503396	0.610502	0.650469	0.155509	0.500638	0.287534	0.282184	0.007787	0.022399	0.034093	0.020929	0.111579	0.102039	0.003271	0.000168	0.000106	0.00632	0.02477	0.019844	0.000587	0.00054	0.003912	0.062372	0.583209
25347	0.148803	0.387184	0.482295	0.053519	0.009098	0.093231	0.021673	0.1044	0.048482	0.136215	0.040043	0.143811	0.212148	0.039492	0.110641	0.025737	0.268281	0.072415	0.001112	0.002287	0.002784	0.026972	0.442927	0.741385
24268	0.467824	0.549026	0.71013	0.012916	0.413049	0.229733	0.077578	0.046684	0.002171	0.004908	0.000111	0.064858	0.065184	0.061598	0.000521	0.000191	0.00021	0.001183	1.00E-06	0	0.000247	0.022451	0.33008	0.684854
37933	0.04137	0.034967	0.06782	0.019119	0.253746	0.122331	0.05767	0.001624	0.014982	0.032526	0.003023	0.015654	0.007596	0.001717	6.90E-05	0.000491	0.00436	0.000469	0.002765	0.000681	0.000356	0.0014	0.008575	0.174647
14938	0.264001	0.565234	0.28492	0.174486	0.761554	0.577908	0.221203	0.028492	0.074327	0.00339	0.002883	0.088323	0.032584	0.000565	0.001926	0.007837	0.003846	0.00501	0.004349	5.40E-05	0.00289	0.011312	0.01144	0.35666
37305	0.805945	0.678708	0.630144	0.115439	0.15719	0.800949	0.757353	0.107567	0.085063	0.145524	0.503809	0.244962	0.384704	0.100993	0.041883	0.023562	0.205672	0.239196	0.089061	0.012047	0.004268	0.037159	0.140474	0.63679
36950	0.014954	0.479791	0.092739	0.096492	0.2004	0.712819	0.30776	0.323986	0.797407	0.061754	0.000143	0.000924	0.000613	1.00E-06	0	0.000532	0.015397	0.00992	0.015288	3.30E-05	0.000312	0.002282	0.001155	0.281367
15180	0.190567	0.090005	0.121627	0.697274	0.609246	0.301393	0.301314	0.429276	0.654267	0.057184	0.556188	0.747336	0.458301	0.630356	0.790094	0.787708	0.76559	0.527232	0.709442	0.002953	0.00327	0.011765	0.01554	0.086362
34093	0.384666	0.194103	0.048078	0.128657	0.509455	0.502382	0.152483	0.190347	0.030385	0.003513	0.000401	0.002977	0.000695	0.001163	0.004264	0.002498	0.030294	0.005462	0.005086	0.005063	0.026956	0.007061	0.089926	0.256902
15128	0.468143	0.432429	0.186515	0.524914	0.814999	0.605244	0.15289	0.348159	0.600605	1.00E-04	0.002126	0.001183	6.00E-05	0.000991	0.008981	0.126401	0.035468	0.003013	0.004868	4.00E-06	8.60E-05	0.023596	0.258538	0.707665
25676	0.404443	0.465689	0.529918	0.1867	0.229751	0.275489	0.033524	0.072367	0.299615	0.369414	0.252861	0.588396	0.756641	0.70056	0.514932	0.438905	0.238123	0.146004	0.082079	0.000776	0.000228	0.028059	0.08264	0.513546
36764	0.017721	0.150907	0.334126	0.26052	0.523315	0.727479	0.442388	0.215234	0.55462	0.395224	0.0664	0.269671	0.079547	0.044494	0.011908	0.007522	0.014903	0.01938	0.238512	0.009289	0.002345	0.010533	0.040182	0.194682
36776	0.016271	0.298529	0.746245	0.61243	0.750507	0.700649	0.5344	0.204919	0.405971	0.014504	0.003955	0.064521	0.012199	0.003171	0.025745	0.022646	0.00526	0.017393	0.124773	0.070566	0.0127	0.030182	0.008481	0.071587
38747	0.540911	0.751616	0.329691	0.148678	0.346929	0.463584	0.072357	0.009524	0.018639	0.008085	0.019541	0.063339	0.066763	0.001918	0.00082	0.000393	0.065527	0.041741	0.000873	6.90E-05	0.000368	0.016605	0.066583	0.784998
38104	0.425663	0.377254	0.205489	0.033028	0.367989	0.14578	0.108541	0.030334	0.06076	0.037427	0.084557	0.086639	0.108108	0.000989	0.006305	0.009324	0.035584	0.012743	0.018175	0.000131	0.000132	0.000205	0.005975	0.209825
36490	0.020185	0.041312	0.582363	0.185787	0.139481	0.764472	0.607242	0.61765	0.80823	0.689272	0.753627	0.746718	0.281213	0.099338	0.161632	0.04714	0.212008	0.07344	0.23231	0.067305	0.000543	0.001613	0.000831	0.024712
15534	0.485846	0.209148	0.400067	0.016443	0.113309	0.016083	0.075649	0.010588	0.031157	0.082025	0.058442	0.124139	0.122747	0.000228	0.004706	0.005481	0.11111	0.028875	0.060064	0.000156	0.000125	0.000704	0.001175	0.067888
37110	0.007962	0.132355	0.050043	0.01128	0.592438	0.346563	0.509995	0.190369	0.621576	0.140636	0.059827	0.220621	0.076885	0.055547	0.001056	0.006485	0.037157	0.039869	0.017841	5.00E-06	0.001846	0.000211	0.000657	0.011387
37997	0.009138	0.018863	0.011044	0.055426	0.01978	0.089038	0.033861	0.007091	0.110714	0.046395	0.039972	0.03333	0.005248	0.001315	0.000261	0.000763	0.003868	0.004281	0.001911	8.40E-05	0.000515	0.001154	0.043262	0.066213
17696	0.103408	0.508289	0.190108	0.590776	0.531003	0.518891	0.118855	0.125564	0.038326	0.033144	0.11086	0.048909	0.01908	0.00156	6.70E-05	0.00015	0.000133	0.000273	0.000253	6.00E-05	0.00061	0.00568	0.197372	0.616756
15451	0.200434	0.163994	0.24862	0.665158	0.162148	0.130692	0.076152	0.111314	0.140939	0.001923	0.005908	0.175519	0.070371	0.014745	0.025172	0.036446	0.03796	0.108828	0.125712	0.005344	0.000867	0.028826	0.007826	0.098857
25358	0.65965	0.565681	0.719568	0.593432	0.630529	0.796936	0.747658	0.768812	0.796936	0.796936	0.768812	0.796936	0.578767	0.436281	0.386508	0.685714	0.796174	0.297326	0.095238	0.690476	0.317599	0.547619	0.73044	0.796936
37761	0.032704	0.083317	0.106193	0.058733	0.175172	0.365138	0.051775	0.003662	0.019009	0.004634	2.40E-05	0.008641	0.00792	0.000366	0	0.000147	0.00147	0.000746	0.000114	0	5.00E-06	0.000557	0.002948	0.167883
25248	0.504707	0.027522	0.237338	0.001341	0.122342	0.506208	0.21431	0.180303	0.048167	0.012398	0.020104	0.122462	0.081531	0.030027	0.011701	0.001338	0.005564	0.006544	0.003863	0.000716	0.000466	0.005268	0.130212	0.740596
37875	0.45334	0.419804	0.772458	0.506108	0.745534	0.583654	0.386057	0.175018	0.053875	0.019806	0.031903	0.327469	0.176729	0.005732	0.037968	0.006801	0.058224	0.079961	0.015628	0.001021	0.094193	0.120768	0.849497	0.641937
15472	0.299385	0.351864	0.704337	0.163873	0.254564	0.202546	0.044558	0.01074	0.010756	0.061346	0.026922	0.356485	0.332245	0.221828	0.004046	0.000794	0.001803	0.002054	0.00151	0.000702	0.01009	0.026105	0.036355	0.223549
24443	0.044069	0.325939	0.740594	0.248007	0.233211	0.717089	0.186098	0.307146	0.382142	0.679404	0.156127	0.164377	0.429264	0.751355	0.66304	0.197824	0.328547	0.185866	0.127277	0.030746	0.001258	0.048233	0.004795	0.1691
37474	0.807284	0.761948	0.670404	0.320981	0.76142	0.720604	0.122549	0.052364	0.021346	0.011545	0.004377	0.098873	0.033325	0.001013	0.000119	0.019069	0.010068	0.007611	0.000429	8.60E-05	0.002228	0.087457	0.511857	0.761073
25395	0.217283	0.121789	0.105981	0.209775	0.251482	0.664837	0.326191	0.305129	0.13896	0.065036	4.30E-05	0.002704	0.003056	0.000155	0.001477	0.010243	0.012875	0.013861	0.000387	0.00041	3.50E-05	0.006211	0.03119	0.259798
24448	0.223839	0.098556	0.539577	0.314076	0.317078	0.443581	0.139948	0.012472	0.03853	0.007768	0.015699	0.130797	0.063889	0.023185	8.00E-05	0.001033	0.042373	0.007186	0.018275	7.40E-05	0.000111	0.000962	0.025447	0.466277

Table A.10: Mann-Whitney of p-values from analysis of traffic volume and temperature

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
36764	0.075461	0.11734	0.080657	0.035414	0.300867	0.10453	0.10915	0.210232	0.595952	0.368698	0.307148	0.3251	0.502839	0.835226	0.758475	0.506618	0.452848	0.191185	0.070852	0.032781	0.009067	0.002586	0.009261	0.035312
17696	0.004846	0.019689	0.1073	0.007088	0.004386	0.07212	0.146673	0.003204	0.00738	0.005167	0.018755	0.106629	0.184598	0.386183	0.323699	0.081758	0.815027	0.584377	0.022648	0.024292	0.016128	0.002007	0.002412	0.003406
15180	0.05677	0.310574	0.139865	0.802002	0.136764	0.238481	0.160702	0.130213	0.133363	0.101862	0.290796	0.363816	0.446638	0.798701	0.816917	0.837118	0.844347	0.897222	0.500234	0.230791	0.004575	0.02967	0.076923	0.193939
15287	0.054465	0.118953	0.120287	0.126662	0.226907	0.096493	0.154003	0.507557	0.368051	0.122961	0.600175	0.741235	0.869282	0.391203	0.099225	0.773683	0.79986	0.661051	0.082335	0.007842	0.000133	0.000168	0.000456	0.000445
17056	0.001379	0.005594	0.152013	0.058546	0.001336	0.082558	0.395734	0.230631	0.319381	0.358608	0.110274	0.255688	0.636345	0.665577	0.59172	0.591228	0.247422	0.022575	0.002459	0.001343	0.000268	0.000178	0.000152	0.000604
15494	0.034754	0.056315	0.052328	0.00065	0.003956	0.020724	0.055867	0.033674	0.03122	0.027735	0.083845	0.16879	0.516745	0.83244	0.524177	0.125006	0.275304	0.011572	0.030007	0.008296	0.001337	0.001099	0.00293	0.008081
36776	0.055085	0.026307	0.162098	0.106448	0.013199	0.022239	0.029775	0.1906	0.296	0.019179	0.242604	0.21703	0.234041	0.56007	0.823086	0.730642	0.229806	0.02134	0.010083	0.001453	0.002056	0.000185	0.000223	0.004324
25248	0.088358	0.456627	0.500069	0.051346	0.009917	0.105062	0.047018	0.071439	0.17847	0.075909	0.132784	0.243381	0.686215	0.793459	0.482517	0.419439	0.485013	0.102348	0.042054	0.096701	0.538203	0.232967	0.18022	0.489377
24895	0.202625	0.014407	0.355326	0.150861	0.000581	0.029552	0.035915	0.098194	0.058361	0.051713	0.007017	0.007681	0.125306	0.222511	0.227522	0.140164	0.083514	0.001943	0.006744	0.00551	0.003594	0.000442	0.000147	0.007184
25347	0.045222	0.008782	0.029767	0.002194	0.050339	0.226868	0.094895	0.119195	0.260094	0.244082	0.285049	0.786624	0.746612	0.500838	0.747887	0.19869	0.724186	0.111211	0.005323	0.005695	0.013892	0.004718	0.00474	0.006655
36752	0.079614	0.167679	0.590407	0.688858	0.82497	0.530555	0.120181	0.172974	0.739858	0.645054	0.577555	0.42188	0.683612	0.711622	0.827418	0.692545	0.802953	0.611114	0.31858	0.136135	0.050643	0.002926	0.005752	0.021407
24443	0.012336	0.085277	0.42163	0.163298	0.000223	0.050449	0.025566	0.374855	0.190874	0.063199	0.003643	0.017373	0.316952	0.72268	0.765311	0.84842	0.560076	0.181652	0.052798	0.004677	0.000165	0.00287	0.000631	0.002276
37613	0.009293	0.007294	0.028469	0.014143	1.00E-06	0.029059	0.031807	0.042595	0.015318	0.002111	0.002815	0.002928	0.02055	0.153668	0.084937	0.033746	0.233945	0.15332	0.175778	0.068469	0.035934	0.006796	0.006085	0.003847
25395	0.004131	0.02813	0.113908	0.082963	0.089087	0.17244	0.047179	0.0708	0.052016	0.010678	0.048904	0.446554	0.769905	0.856544	0.790122	0.550773	0.271201	0.013143	0.04715	0.032175	0.010617	0.015773	0.004207	0.035169
16622	0.001228	0.001914	0.035802	0.003412	0.018207	0.063115	0.012118	0.040295	0.000178	0.000493	0.038202	0.497881	0.84404	0.805089	0.774266	0.088645	0.044009	0.014301	0.006346	0.000296	0.000107	0.000153	0.000166	0.000153
15472	0.020682	0.026436	0.056176	0.001581	0.091801	0.24683	0.131839	0.080477	0.080964	0.103297	0.201785	0.344168	0.807856	0.790454	0.789706	0.495875	0.881153	0.782359	0.874772	0.4753	0.081122	0.046405	0.110714	0.160839
36416	0.431179	0.093071	0.199895	0.238886	0.092917	0.270974	0.180281	0.356653	0.453501	0.081968	0.008073	0.021268	0.002593	0.046647	0.716452	0.524104	0.422614	0.437351	0.043538	0.078643	0.016324	0.011744	0.019604	0.004991
17585	0.004398	0.003182	0.024935	0.0394	0.02534	0.087652	0.033192	0.021554	0.121208	0.087774	0.052196	0.020808	0.034352	0.384222	0.240989	0.302152	0.230128	0.012351	0.008566	0.018078	0.004553	0.003067	0.002694	0.00211
25065	0.018813	0.184281	0.163085	0.291136	0.000179	0.031445	0.036014	0.069974	0.03042	0.004097	0.00114	0.020764	0.14246	0.28824	0.599584	0.183489	0.046668	0.006499	0.034386	0.009421	0.021878	0.087912	0.058242	0.159987
15451	0.012427	0.023954	0.02941	0.470402	0.114695	0.048426	0.093661	0.205661	0.264472	0.047869	0.107578	0.017793	0.337209	0.307783	0.846439	0.891801	0.470308	0.20318	0.046953	0.00492	0.001077	0.000157	0.000335	0.000624
25358	0.018182	0.1	0.547619	0.280963	0.002988	0.053444	0.097721	0.208161	0.363191	0.083972	0.010309	0.01013	0.020131	0.01834	0.035645	0.346156	0.035828	0.004795	0.003996	0.009524	0.095238	0.333333	0.333333	0.333333
15534	0.788384	0.387181	0.185143	0.004932	0.024034	0.000642	0.001393	0.038869	0.628046	0.701793	0.324056	0.214753	0.358255	0.163289	0.135594	0.364126	0.59254	0.303601	0.758143	0.516119	0.11829	0.021337	0.014743	0.057718
25113	0.036663	0.039112	0.145399	0.101032	6.70E-05	0.248507	0.183668	0.197372	0.143268	0.030396	0.014334	0.00466	0.127948	0.290521	0.419478	0.397041	0.487752	0.04949	0.027382	0.006076	0.001568	0.001268	0.001716	0.031945
15157	0.001244	0.003405	0.006481	0.000606	0.067482	0.026564	0.028707	0.189979	0.090003	0.059788	0.081528	0.08336	0.596702	0.68144	0.663915	0.337425	0.236993	0.080387	0.026951	0.003392	5.10E-05	3.20E-05	8.80E-05	0.000995
38747	0.012521	0.012249	0.044977	0.025897	0.000107	0.092397	0.080503	0.153088	0.037672	0.016506	0.004987	0.003757	0.012033	0.028905	0.060093	0.298216	0.015599	0.004694	0.089728	0.05191	0.066791	0.049948	0.048504	0.10934
25676	0.216881	0.030167	0.165364	0.23681	0.056175	0.210962	0.236644	0.288228	0.240559	0.318324	0.296585	0.155173	0.046837	0.817874	0.815504	0.801759	0.801161	0.431856	0.155708	0.071087	0.001594	0.000286	0.002731	0.008456
37305	0.107277	0.48146	0.286254	0.00335	1.00E-06	0.000496	0.001039	0.044176	0.190977	0.032085	0.002195	0.003331	0.010425	0.081793	0.009747	0.024603	0.047466	0.038109	0.040067	0.006769	0.005882	0.036364	0.036364	0.372727
39446	0.016016	0.007221	0.117017	0.061986	0.00707	0.080025	0.098405	0.161809	0.142449	0.043923	0.133856	0.118	0.185261	0.288067	0.197741	0.144911	0.796767	0.697969	0.072691	0.03969	0.012857	0.00453	0.010707	0.025645
34123	0.002336	0.009567	0.008319	0.03686	0.045646	0.039459	0.155751	0.142617	0.028089	0.001522	0.001392	0.004032	0.099649	0.161028	0.217732	0.393418	0.541091	0.145636	0.059219	0.000127	0.000582	0.000491	0.000337	0.003976
37110	0.000459	0.005369	0.010876	0.000217	0.074126	0.307856	0.027567	0.017663	0.0072	0.145752	0.797206	0.734618	0.815048	0.849981	0.696303	0.746109	0.222381	0.017948	0.020381	0.011218	0.009908	0.000278	0.010988	0.00147
38104	0.02199	0.140215	0.206214	0.157678	0.079527	0.135325	0.243742	0.124403	0.142447	0.086408	0.104739	0.143924	0.333413	0.213569	0.410419	0.212138	0.764163	0.477992	0.088563	0.227268	0.129902	0.07033	0.07033	0.076923
37788	0.007264	0.041102	0.050087	0.136532	0.008051	0.139284	0.376809	0.300551	0.144295	0.032869	0.012608	0.072383	0.355138	0.407264	0.30077	0.107838	0.450951	0.309365	0.012961	0.073643	0.091176	0.101099	0.087912	0.160839
34093	0.045927	0.046911	0.055381	0.137547	0.461833	0.098146	0.064133	0.062534	0.016287	0.007557	0.009112	0.072264	0.065714	0.327152	0.378906	0.574315	0.640972	0.215489	0.051919	0.003045	0.001018	0.001815	0.001371	0.008367
24268	0.193625	0.049678	0.025697	0.026725	0.184827	0.666314	0.136234	0.289557	0.610481	0.532278	0.577483	0.86717	0.686372	0.506005	0.70842	0.86416	0.839077	0.729322	0.549049	0.252515	0.114091	0.031844	0.011106	0.00872
14938	0.002134	0.023602	0.019142	0.000578	0.001405	0.005486	0.007001	0.08394	0.036675	0.000234	0.002573	0.008843	0.039843	0.075182	0.314407	0.021481	0.031579	0.013931	0.004114	0.001518	1.20E-05	1.70E-05	1.60E-05	0.000206
37997	0.005084	0.069944	0.581669	0.016973	0.060994	0.100708	0.120562	0.0455	0.041515	0.025469	0.012792	0.061936	0.043571	0.118598	0.071127	0.542962	0.883541	0.31244	0.065671	0.161846	0.220846	0.177289	0.126374	0.076775
37875	0.017118	0.008854	0.003433	0.004152	0.003257	0.038983	0.035956	0.028115	0.004731	0.003191	0.000204	7.20E-05	0.001126	0.004857	0.013035	0.017724	0.028499	0.020258	0.025757	0.027342	0.004942	0.005652	0.006449	0.015905
37761	0.000448	0.000427	0.001276	0.000304	0.000194	0.036954	0.093859	0.072764	0.041058	0.002902	1.00E-06	0.000207	0.001623	0.001864	0.005327	0.151699	0.245576	0.083512	0.005514	0.01445	0.003421	0.000216	0.000401	0.000642
36001	0.035807	0.059352	0.009782	2.90E-05	0.006871	0.012858	0.028527	0.022585	0.006347	0.003019	0.001936	0.009419	0.014242	0.039088	0.004567	0.02175	0.108058	0.031382	0.101902	0.032978	0.000903	0.002064	0.004575	0.010256
37390	0.002829	0.008014	0.016725	0.002065	0.003331	0.015122	0.007946	0.00419	0.004742	0.006339	0.003057	0.004651	0.036311	0.034625	0.033565	0.028861	0.033821	0.03621	0.01203	0.010812	0.009454	0.000554	0.000298	0.00123
37933	0.002966	0.001506	0.003232	0.000196	0.086611	0.033639	0.144083	0.117758	0.116792	0.169359	0.145728	0.162523	0.323505	0.309762	0.433226	0.333159	0.464922	0.17084	0.144678	0.031864	0.000188	0.00014	0.000174	0.00017
36490	0.128795	0.42557	0.629796	0.55386	0.213351	0.029109	0.003069	0.043534	0.125606	0.256552	0.042593	0.020051	0.024742	0.031618	0.127957	0.190405	0.412935	0.063494	0.014474	0.105894	0.030303	0.071429	0.055556	0.095238
24448	0.051715	0.210103	0.057886	0.073321	0.06204	0.096527	0.230869	0.108345	0.067104	0.064392	0.026925	0.313311	0.668581	0.375073	0.205087	0.338732	0.569624	0.301144	0.180128	0.143742	0.025639	0.001024	0.001268	0.00819
37474	0.004972	0.018252	0.009214	0.007555	4.50E-05	0.009415	0.037193	0.148919	0.073829	0.002536	0.00748	0.000123	0.002977	0.029518	0.116856	0.003903	0.000436	0.00016	0.00109	0.003204	0.009001	0.000934	0.000934	0.003205
37354	0.012936	0.016394	0.026464	0.003007	0.004334	0.109951	0.261682	0.05299	0.04449	0.191228	0.158144	0.088345	0.488357	0.333732	0.226089	0.188721	0.265932	0.535283	0.330719	0.147035	0.114806	0.005418	0.01032	0.027473
15128	0.000461	0.001999	0.012859	0.00553	0.004936	0.028367	0.021097	0.25141	0.1837	0.000129	0.005635	0.03138	0.054367	0.165277	0.401788	0.435387	0.203017	0.002681	0.004257	0.000272	0.000251	5.70E-05	0.000226	0.00065
49159	0.006599	0.033454	0.009664	0.018847	0.007141	0.011084	0.128272	0.140357	0.063235	0.022211	0.013684	0.166881	0.226093	0.117197	0.036526	0.133043	0.38308	0.097814	0.074725	0.043165	0.004611	0.001106	0.000688	0.001832
36950	0.023017	0.008602	0.021263	0.032543	5.00E-06	0.005067	0.039394	0.097683	0.141114	0.004265	0.000158	0.003462	0.01192	0.267273	0.280773	0.215677	0.487506	0.128118	0.01722	0.011587	0.025701	0.004396	0.005495	0.009091

Table A.11: Mann-Whitney of p-values from analysis of traffic volume and wind speed

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24895	0.01919	0.016746	0.23725	0.080673	0.259584	0.848477	0.40342	0.434389	0.778201	0.659376	0.221013	0.314113	0.344991	0.671153	0.240364	0.804513	0.143325	0.428226	0.871299	0.831224	0.809873	0.762988	0.431921	0.095818
37110	0.711106	0.282408	0.168696	0.770533	0.844825	0.8054	0.371783	0.325255	0.761621	0.430323	0.677615	0.197494	0.756365	0.823454	0.817329	0.166729	0.109878	0.034361	0.115041	0.70065	0.801618	0.105681	0.85641	0.789846
37390	0.523263	0.107715	0.022301	0.065135	0.306574	0.487832	0.226825	0.360259	0.010493	0.001186	0.00055	0.085475	0.093136	0.008666	0.096078	0.149683	0.804343	0.779089	0.824191	0.513214	0.056845	0.107673	0.060942	0.817181
25113	0.073704	0.002306	0.199571	0.057488	0.000367	0.778379	0.721999	0.589737	0.702816	0.35781	0.252523	0.05738	0.47199	0.457397	0.492336	0.691976	0.083057	0.640393	0.432052	0.766829	0.365422	0.585642	0.776566	0.210541
36490	0.157281	0.089471	0.245592	0.200659	0.134372	0.783847	0.555004	0.432587	0.650822	0.827455	0.757949	0.662807	0.656913	0.80201	0.790603	0.785854	0.599371	0.585357	0.656739	0.628901	0.605098	0.818034	0.602641	0.765604
15534	0.18609	0.117987	0.002199	0.002753	0.714553	0.345023	0.155105	0.394358	0.46857	0.576827	0.001447	0.160905	0.164219	0.123575	0.746137	0.763421	0.825916	0.819115	0.713179	0.557785	0.045069	0.058026	0.103963	0.407681
38747	0.206561	0.053979	0.008601	0.037134	0.002622	0.722055	0.76938	0.780591	0.692803	0.216002	0.037328	0.21345	0.166356	0.353127	0.770122	0.793634	0.759214	0.846474	0.111942	0.682089	0.291223	0.823647	0.568978	0.194215
17056	0.326813	0.041356	0.244452	0.090849	0.010988	0.758426	0.758136	0.811618	0.712194	0.598251	0.811608	0.741355	0.819171	0.742415	0.531068	0.844098	0.469444	0.343915	0.213598	0.774371	0.712681	0.661364	0.630248	0.287283
36764	0.247912	0.181637	0.17786	0.144495	0.120548	0.451725	0.823576	0.787763	0.794968	0.139746	0.151016	0.77726	0.419799	0.814493	0.727942	0.750985	0.439492	0.83703	0.262377	0.82384	0.277003	0.360809	0.484756	0.408398
15451	0.019374	0.09787	0.033602	0.431073	0.652693	0.764779	0.678394	0.765503	0.35329	0.125904	0.232763	0.789667	0.506918	0.755674	0.781183	0.172343	0.297141	0.842524	0.833971	0.759426	0.005436	0.052691	0.351413	0.207015
25065	0.126472	0.036161	0.199952	0.042036	0.004352	0.445758	0.790805	0.823958	0.761116	0.232315	0.099626	0.045433	0.68912	0.601731	0.761605	0.802877	0.747441	0.772417	0.64214	0.701619	0.138027	0.682717	0.794739	0.825116
36776	0.093062	0.184872	0.577296	0.402806	0.31073	0.81029	0.530081	0.7303	0.668975	0.505872	0.568543	0.569697	0.37616	0.819174	0.766184	0.36706	0.268019	0.407547	0.646783	0.823806	0.366835	0.38862	0.289055	0.487173
15472	0.06327	0.064017	0.001983	0.000888	0.661203	0.808681	0.580044	0.800814	0.038926	0.152085	0.022635	0.397435	0.42461	0.485953	0.634877	0.441952	0.600834	0.515603	0.820944	0.38724	0.080867	0.191932	0.443692	0.607053
37997	0.210153	0.018436	0.222438	0.080822	0.256032	0.722098	0.79625	0.631425	0.604236	0.014896	0.250345	0.160833	0.525301	0.826726	0.734507	0.517857	0.180188	0.504149	0.854536	0.774403	0.516398	0.263214	0.535307	0.615119
36950	0.060281	0.011288	0.000998	0.00211	0.000387	0.414361	0.766731	0.820291	0.346577	0.000583	0.002052	0.019327	0.079317	0.010082	0.374031	0.759859	0.684957	0.691766	0.795926	0.173199	0.003451	0.028546	0.099258	0.180564
37933	0.043875	0.005733	0.000196	0.000203	0.757718	0.823871	0.823336	0.763014	0.103873	0.053032	0.008545	0.179867	0.087653	0.065476	0.50997	0.798033	0.888626	0.837989	0.844151	0.800551	0.064738	0.299682	0.297933	0.825843
36001	0.079147	0.044262	0.001891	0.005183	0.623755	0.543165	0.45177	0.659265	0.01971	7.40E-05	0.000814	0.045668	0.016974	0.066666	0.238649	0.477405	0.814012	0.82374	0.828951	0.162958	0.011141	0.098146	0.218978	0.63859
25248	0.193076	0.105229	0.110727	0.007168	0.270731	0.529464	0.791942	0.715685	0.354289	0.228896	0.538221	0.645657	0.788333	0.818859	0.489672	0.468203	0.412453	0.048582	0.35138	0.521982	0.741678	0.694327	0.456501	0.690553
16622	0.021216	0.028953	0.275987	0.015231	0.654178	0.688071	0.519207	0.076318	0.072039	0.004897	0.051266	0.174983	0.741124	0.756595	0.220168	0.711193	0.584385	0.806627	0.795811	0.830781	0.331577	0.056316	0.389296	0.113662
37875	0.474226	0.299841	0.008628	0.036915	0.646005	0.742704	0.585889	0.613312	0.079367	0.036868	0.000152	0.228989	0.046506	0.049202	0.57058	0.844044	0.454526	0.828425	0.658773	0.437258	0.854559	0.840779	0.537606	0.793882
34093	0.080996	0.350084	0.005191	0.275093	0.544247	0.739473	0.652373	0.78221	0.412927	0.046663	0.086756	0.039483	0.546653	0.382461	0.762874	0.448829	0.288609	0.051086	0.836077	0.32204	0.002119	0.009038	0.095779	0.283832
37305	0.391016	0.086167	0.112219	0.018951	4.00E-05	0.41071	0.74931	0.815026	0.606831	0.354129	0.149384	0.349575	0.214895	0.782054	0.773433	0.776491	0.545946	0.655316	0.53134	0.85314	0.752083	0.641526	0.821006	0.779096
25347	0.205097	0.07283	0.415577	0.032226	0.61343	0.786973	0.694172	0.798165	0.709515	0.756548	0.802367	0.796671	0.861884	0.337308	0.821066	0.802214	0.157829	0.316502	0.797456	0.62915	0.823817	0.814187	0.78795	0.201034
25676	0.016671	0.004206	0.066424	0.025475	0.056054	0.623953	0.804292	0.730917	0.76639	0.289113	0.178855	0.558357	0.773326	0.707696	0.81883	0.542759	0.363944	0.632641	0.641158	0.51618	0.010491	0.022856	0.31599	0.289608
37354	0.245146	0.039965	0.058831	0.032627	0.055257	0.562579	0.759159	0.708432	0.251611	0.17052	0.0051	0.265191	0.288745	0.1312	0.602022	0.861202	0.489891	0.787128	0.649887	0.493142	0.035781	0.825644	0.273157	0.436798
25395	0.011419	0.001767	0.067578	0.026031	0.135953	0.802382	0.664628	0.236652	0.205333	0.010348	0.002356	0.291024	0.394799	0.31779	0.812324	0.703943	0.722123	0.807121	0.815101	0.167462	0.015965	0.074993	0.0032	0.079831
15128	0.011144	0.04268	0.020451	0.095965	0.024804	0.672629	0.691771	0.582551	0.755658	2.00E-06	0.000299	1.20E-05	3.80E-05	0.011043	0.567014	0.202671	0.025809	0.140199	0.507051	0.016288	0.001115	0.004608	0.041638	0.104997
17585	0.017134	0.007721	0.106114	0.044065	0.281206	0.754154	0.490848	0.551327	0.606316	0.260125	0.606503	0.831525	0.508217	0.750368	0.252659	0.655009	0.403926	0.581089	0.625714	0.745264	0.21052	0.080203	0.506381	0.260506
14938	0.011567	0.039249	0.000968	0.002236	0.209604	0.685392	0.776584	0.785292	0.029266	0.004184	0.004435	0.07216	0.024171	0.035687	0.751344	0.806701	0.692068	0.297516	0.591643	0.784418	0.00078	0.046852	0.150214	0.163896
36752	0.276009	0.388605	0.292067	0.141794	0.01871	0.287842	0.77892	0.771472	0.763547	0.150554	0.074246	0.59826	0.49969	0.768941	0.809457	0.792706	0.780782	0.877265	0.650353	0.757145	0.206942	0.242923	0.712973	0.3897
37613	0.780183	0.169745	0.329768	0.254387	0.006489	0.484874	0.743505	0.427065	0.432975	0.023974	0.01016	0.045637	0.400965	0.822172	0.823651	0.836876	0.807645	0.849643	0.709275	0.825823	0.238731	0.624267	0.7299	0.794818
15494	0.081483	0.439537	0.056978	0.079437	0.806873	0.802216	0.753237	0.789441	0.316401	0.794329	0.29267	0.680727	0.175905	0.102222	0.40856	0.580973	0.743901	0.518738	0.785612	0.325	0.104209	0.425486	0.884579	0.775995
34123	0.016367	0.002527	0.002253	0.014765	0.099438	0.759117	0.634268	0.774709	0.325645	0.029544	0.002561	0.103389	0.254646	0.359228	0.743169	0.724604	0.286743	0.358188	0.740896	0.185287	7.20E-05	0.000139	0.022925	0.099683
24268	0.225399	0.048006	0.035164	0.015694	0.313004	0.385069	0.634169	0.081786	0.04256	0.000312	0.020968	0.173422	0.425789	0.309698	0.798003	0.707105	0.796521	0.764652	0.295378	0.802131	0.11403	0.229834	0.603295	0.316007
36416	0.574742	0.512418	0.705877	0.160819	0.459065	0.762912	0.544312	0.134915	0.787549	0.085126	0.025042	0.032732	0.017031	0.167197	0.319771	0.185366	0.561362	0.186958	0.284266	0.483235	0.827484	0.797861	0.187885	0.107933
15287	0.03792	0.047944	0.061997	0.253203	0.619814	0.815428	0.590352	0.440159	0.778926	0.390182	0.19436	0.700929	0.520511	0.445934	0.211719	0.044751	0.086251	0.351525	0.045106	0.750334	0.00796	0.063884	0.215375	0.335192
38104	0.279573	0.165352	0.016614	0.070671	0.506228	0.298229	0.765688	0.83189	0.146045	0.199101	0.049967	0.240485	0.166384	0.180926	0.31976	0.516164	0.588303	0.808116	0.833398	0.235776	0.013737	0.130531	0.40913	0.589993
49159	0.107118	0.012362	0.008117	0.194957	0.561123	0.726446	0.650423	0.728802	0.173517	0.018087	0.237401	0.169698	0.093566	0.148113	0.493798	0.434972	0.82276	0.745511	0.831022	0.231025	0.017081	0.112568	0.227443	0.228427
25358	0.166387	0.041948	0.188786	0.018052	0.828715	0.859958	0.350138	0.692228	0.706004	0.324864	0.658831	0.784444	0.614072	0.804693	0.631618	0.554381	0.036099	0.346189	0.436455	0.387628	0.805459	0.386164	0.634502	0.073737
15180	0.027888	0.138452	0.316621	0.695546	0.594019	0.795348	0.755879	0.289817	0.51927	0.801072	0.745316	0.828062	0.790636	0.739254	0.082495	0.166261	0.04086	0.509428	0.268493	0.53337	0.045076	0.161686	0.620895	0.334343
24443	0.05839	0.101339	0.524943	0.021192	0.447528	0.762711	0.745322	0.793764	0.829723	0.275726	0.092138	0.437952	0.827122	0.748879	0.547008	0.656953	0.170677	0.373862	0.522357	0.779576	0.210784	0.836892	0.021263	0.04305
15157	0.068248	0.005366	0.000549	0.000152	0.639485	0.738876	0.743046	0.713865	0.660753	0.048943	0.037457	0.73849	0.358124	0.683589	0.588702	0.077292	0.134734	0.321431	0.238499	0.697977	0.070558	0.071618	0.094727	0.328557
39446	0.533705	0.32124	0.275434	0.239233	0.277173	0.56535	0.740409	0.576366	0.7044	0.638115	0.581936	0.371188	0.786305	0.810392	0.687851	0.600139	0.791401	0.392773	0.246937	0.651029	0.770248	0.566324	0.861985	0.709005
24448	0.019564	0.016299	0.001736	0.032351	0.666802	0.78913	0.810805	0.731845	0.028266	0.005282	0.018122	0.185681	0.068136	0.030499	0.634903	0.664494	0.841871	0.378589	0.606054	0.325007	0.010469	0.125878	0.081717	0.284154
17696	0.291363	0.04874	0.086272	0.175539	0.238536	0.771532	0.22943	0.590297	0.426898	0.069617	0.316958	0.266759	0.72178	0.80132	0.770409	0.391659	0.845581	0.506109	0.778612	0.828326	0.236569	0.178809	0.457477	0.46592
37474	0.154858	0.003712	0.004559	0.011798	0.010206	0.070568	0.652908	0.483766	0.419994	0.035835	0.074573	0.026956	0.018888	0.013249	0.841006	0.745315	0.141309	0.245589	0.74366	0.301072	0.156588	0.215303	0.092794	0.176858
37761	0.022267	0.001205	0.002577	0.011152	0.017565	0.391506	0.78648	0.871524	0.289141	0.000886	0.00522	0.056783	0.19022	0.000962	0.374743	0.773642	0.157458	0.310884	0.462603	0.844089	0.249716	0.108763	0.34263	0.448746
37788	0.069518	0.009676	0.01367	0.065488	0.000802	0.173384	0.710757	0.832829	0.084121	0.000447	0.007499	0.009304	0.108827	0.016923	0.349544	0.788036	0.280096	0.339861	0.254353	0.830163	0.227762	0.52871	0.699601	0.841583

Table A.12: Mann-Whitney of p-values from analysis of traffic volume and visibility

Station ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
24895	0.124967	0.172334	0.138772	0.620024	0.045437	0.518412	0.871317	0.709035	0.873671	0.859276	0.654749	0.128037	0.082022	0.06508	0.079905	0.22406	0.037921	0.00128	0.013316	0.04192	0.005088	0.042485	0.033482	0.029021
37110	0.009219	0.337654	0.747574	0.383362	0.247398	0.111971	0.623868	0.79673	0.637767	0.005483	0.013049	0.749777	0.622191	0.736502	0.662587	0.700619	0.820826	0.149377	0.022964	0.000182	0.007479	0.000585	0.011468	0.014957
37390	0.042572	0.046331	0.167641	0.113022	0.058953	0.187822	0.327944	0.286441	0.072222	0.190398	0.03638	0.25662	0.293934	0.192206	0.141624	0.025393	0.005914	0.005914	0.002616	0.000162	0.000136	0.00021	0.010363	0.013242
25113	0.013854	0.001748	0.220183	0.043608	0.02023	0.5319	0.661786	0.410005	0.730629	0.64769	0.848035	0.077176	0.181551	0.067234	0.045593	0.03863	0.001433	0.018608	0.004581	0.000672	6.80E-05	0.000154	0.005234	0.015684
36490	0.395364	0.107252	0.04029	0.090593	0.034224	0.270453	0.684812	0.764363	0.865498	0.536585	0.42068	0.459513	0.254406	0.124403	0.102704	0.217285	0.396072	0.436688	0.572375	0.160278	0.019	0.11316	0.070648	0.037393
15534	0.553128	0.336871	0.099143	0.066371	0.041607	0.033637	0.073638	0.516633	0.789164	0.812405	0.515931	0.33791	0.113601	0.011359	0.016365	0.027612	0.013241	0.038292	0.007461	0.001902	0.006351	0.001225	0.021575	0.056496
38747	0.049951	0.136891	0.019083	0.111502	0.000156	0.039165	0.50882	0.295777	0.627948	0.844267	0.540399	0.190333	0.105116	0.151162	0.189019	0.010092	0.00761	0.000377	2.70E-05	0.003853	0.00196	0.001549	0.011575	0.009343
17056	0.00254	0.633057	0.787016	0.183328	0.133699	0.81232	0.321164	0.836774	0.759694	0.528494	0.390285	0.313777	0.676595	0.198075	0.231626	0.860277	0.177231	0.286638	0.093551	0.02555	0.051186	0.012426	0.062374	0.001032
36764	0.101372	0.110114	0.051511	0.120637	0.006077	0.036294	0.768903	0.815295	0.72517	0.852281	0.284367	0.375081	0.2971	0.219329	0.356372	0.451942	0.21428	0.148334	0.02657	0.008383	0.001291	0.005131	0.021801	0.052206
15451	0.002465	0.034921	0.022624	0.367938	0.1641	0.385258	0.550911	0.811048	0.708492	0.218823	0.314661	0.140634	0.132228	0.084966	0.027477	0.533905	0.455619	0.662177	0.018404	2.00E-05	2.00E-06	3.00E-06	0.000347	0.00037
25065	0.017394	0.017186	0.005216	0.00711	0.000218	0.096686	0.860924	0.580999	0.300126	0.5941	0.310493	0.102393	0.375053	0.097398	0.12021	0.013322	0.00294	0.011267	0.003496	0.001005	2.20E-05	2.10E-05	0.027518	0.03768
36776	0.12691	0.394795	0.241859	0.111423	0.118373	0.202991	0.844201	0.844531	0.764709	0.785172	0.127231	0.098429	0.121498	0.077575	0.55316	0.860167	0.126272	0.003118	0.010557	0.006027	0.000638	0.000116	0.112328	0.080526
15472	0.036387	0.079791	0.011728	0.015157	0.048623	0.238089	0.076294	0.031892	0.118196	0.102088	0.027315	0.171083	0.187043	0.204497	0.060714	0.001171	0.000948	2.10E-05	1.40E-05	2.70E-05	0.000106	0.001109	0.034853	0.003382
37997	0.002156	0.181314	0.234931	0.018036	0.028574	0.041048	0.14786	0.568787	0.894884	0.709101	0.271714	0.034762	0.247422	0.275868	0.031311	0.094669	0.153214	0.008435	0.005558	0.002719	0.064869	0.000298	0.067415	0.000568
36950	0.003203	0.011161	0.003871	0.015686	4.70E-05	0.053938	0.559823	0.415684	0.271572	0.053758	5.40E-05	0.003853	0.189983	0.339787	0.048389	0.000815	0.004287	0.002668	0.000154	1.10E-05	2.00E-06	1.00E-06	0.000151	0.000823
37933	0.004955	0.005763	0.041341	0.001636	0.1359	0.275431	0.406076	0.223926	0.358491	0.116373	0.044989	0.076275	0.319098	0.216549	0.060991	0.007582	0.042045	0.006875	0.000645	3.20E-05	3.40E-05	5.00E-06	0.000847	0.000715
36001	0.021854	0.008414	0.041325	0.000161	0.097435	0.282597	0.416222	0.120526	0.519491	0.516694	0.017277	0.123065	0.531858	0.152615	0.140017	0.005254	0.018094	0.006152	0.004572	0.000628	0.000444	0.000262	0.032092	0.020087
25248	0.01746	0.015997	0.003377	0.015604	0.195644	0.174314	0.608941	0.36615	0.832444	0.756562	0.386036	0.216764	0.632254	0.103104	0.258571	0.043763	0.020654	0.001594	0.002799	0.000456	0.000905	0.00022	0.001475	0.017828
16622	0.144417	0.577364	0.867078	0.039671	0.183516	0.575325	0.438587	0.12727	0.107021	0.08387	0.012605	0.16346	0.594483	0.884597	0.132107	0.294323	0.011114	0.000927	0.001156	0.003116	0.000498	0.001178	0.073304	0.001386
37875	0.260338	0.217352	0.081163	0.079659	0.120556	0.581112	0.866353	0.473052	0.118267	0.181823	0.365283	0.58177	0.167434	0.063622	0.018509	0.01171	0.002368	0.010642	0.001478	0.000214	0.000115	0.000333	0.037616	0.156371
34093	0.004896	0.06032	0.187041	0.162115	0.193557	0.116226	0.55951	0.856334	0.874676	0.05157	0.189336	0.488006	0.180737	0.333652	0.407864	0.115258	0.225784	0.047244	0.005609	0.000581	4.20E-05	0.003002	0.086416	0.001639
37305	0.18156	0.063295	0.016579	0.003513	0.009506	0.134826	0.777928	0.368534	0.745152	0.440894	0.840905	0.821043	0.681281	0.181488	0.686356	0.329112	0.039328	0.035237	0.006909	0.075161	0.008086	0.004114	0.13519	0.060885
25347	0.011921	0.07847	0.26251	0.03145	0.295721	0.497676	0.465138	0.174374	0.495299	0.832641	0.774685	0.789742	0.698153	0.139759	0.35456	0.285144	0.250962	0.030737	0.019262	0.000924	0.001986	0.001607	0.045806	0.028693
25676	0.118815	0.236599	0.679214	0.366934	0.299845	0.296252	0.758675	0.668228	0.876288	0.813772	0.537836	0.697922	0.772223	0.678374	0.379389	0.789624	0.196646	0.055862	0.015782	0.004744	8.00E-06	1.60E-05	0.008007	0.008521
37354	0.01404	0.025041	0.016295	0.088801	0.073723	0.413631	0.161706	0.275776	0.585608	0.117593	0.015626	0.038299	0.039591	0.082997	0.02323	0.007748	0.0145	0.023874	0.002655	0.000528	0.000207	0.001103	0.041807	0.010559
25395	0.001228	0.0242	0.005473	0.023822	0.503263	0.676621	0.691805	0.461277	0.797152	0.714411	0.243026	0.484567	0.825125	0.137843	0.212878	0.153059	0.00619	0.001963	0.001599	0.001645	0.000319	0.000111	0.003522	0.003657
15128	0.079089	0.044815	0.231887	0.325957	0.067624	0.285768	0.538894	0.881322	0.856332	0.057583	0.023898	0.256158	0.34955	0.347132	0.56392	0.432796	0.318865	0.00509	7.00E-05	0	0	4.00E-04	0.003746	0.013664
17585	0.009192	0.719568	0.684839	0.230969	0.12236	0.747827	0.504342	0.786354	0.716421	0.883385	0.772832	0.294715	0.214803	0.265525	0.100967	0.610175	0.184788	0.281546	0.021305	0.068571	0.126761	0.010878	0.203845	0.002415
14938	0.031266	0.010736	0.089372	0.00566	0.117695	0.310834	0.165769	0.267329	0.047468	0.037541	0.008027	0.054017	0.709951	0.494587	0.575481	0.010863	0.038387	0.001227	0.005907	1.10E-05	2.40E-05	0.00025	0.000621	0.009084
36752	0.074065	0.213573	0.105243	0.1864	0.01079	0.035452	0.648646	0.804487	0.780029	0.850207	0.812249	0.091754	0.383021	0.12703	0.07933	0.355978	0.244268	0.142314	0.013661	0.008482	0.002495	0.012099	0.028709	0.005622
37613	0.039181	0.139903	0.068484	0.04477	0.002655	0.089811	0.297393	0.692443	0.295175	0.713667	0.106759	0.010964	0.005748	0.025084	0.010482	0.037505	0.017012	0.00196	0.00037	4.30E-05	0.000368	0.006125	0.012175	0.000827
15494	0.220439	0.336207	0.197421	0.102726	0.079399	0.212764	0.043644	0.026534	0.098274	0.016179	0.031374	0.227605	0.229281	0.106909	0.083127	0.011671	0.00129	9.00E-05	5.00E-06	0.000211	0.00891	0.015612	0.083828	0.114457
34123	0.092981	0.11484	0.356529	0.197279	0.702735	0.333192	0.826367	0.704249	0.775596	0.795243	0.014201	0.057459	0.114109	0.502206	0.789806	0.465032	0.875299	0.20149	0.017606	0.000455	1.10E-05	0.000584	0.002155	0.004769
24268	0.284814	0.709809	0.885702	0.272803	0.08917	0.31366	0.882201	0.267252	0.366899	0.017665	0.008998	0.141735	0.137848	0.253572	0.118795	0.01532	0.017433	0.002169	0.001565	0.000485	0.000552	0.013938	0.020934	0.020138
36416	0.027438	0.782367	0.641253	0.855387	0.15791	0.715651	0.873565	0.880798	0.890205	0.565242	0.614869	0.481682	0.492218	0.028671	0.645344	0.688358	0.139046	0.212394	0.016148	0.032466	0.085222	0.162012	0.06069	0.028268
15287	0.036038	0.081071	0.488479	0.098335	0.427106	0.545607	0.795997	0.73513	0.689018	0.767232	0.7873	0.5687	0.795905	0.780346	0.716494	0.821747	0.75772	0.69624	0.058691	2.30E-05	4.00E-05	1.10E-05	0.001368	0.018425
38104	0.004362	0.02292	0.063585	0.00784	0.041137	0.08849	0.148417	0.282636	0.580953	0.731783	0.257611	0.142453	0.191595	0.136102	0.225875	0.060171	0.099649	0.023217	0.002901	0.000263	0.00064	2.40E-05	0.001731	0.004207
49159	0.05523	0.269712	0.284531	0.040087	0.422211	0.297393	0.836539	0.61466	0.769318	0.126642	0.013337	0.005198	0.062395	0.14984	0.101112	0.059959	0.127985	0.001621	0.026569	0.013411	0.000598	0.000748	0.047235	0.0052
25358	0.249623	0.222222	0.428571	0.326975	0.620047	0.730769	0.393939	0.335664	0.53582	0.455944	0.199589	0.420635	0.704504	0.768887	0.60378	0.428384	0.590956	0.383742	0.210261	0.523699	0.267677	0.485714	0.412698	0.259324
15180	0.004688	0.046052	0.101158	0.795826	0.457222	0.475871	0.620745	0.875658	0.830584	0.424422	0.459718	0.118918	0.088334	0.235306	0.498867	0.815286	0.494703	0.857654	0.176774	0.000438	3.00E-06	2.90E-05	0.015475	0.020223
24443	0.010117	0.060134	0.434868	0.705163	0.146702	0.437808	0.812858	0.790853	0.84375	0.431825	0.833688	0.839778	0.730602	0.175113	0.695854	0.826946	0.390793	0.104774	0.092199	0.069097	0.000824	0.002973	0.002446	0.037329
15157	0.010973	0.002509	0.041147	0.051599	0.204487	0.503101	0.480516	0.440497	0.836388	0.01736	0.307403	0.084539	0.524	0.291344	0.239702	0.108718	0.043363	0.005164	0.001816	1.00E-06	5.00E-06	6.00E-06	0.002039	0.000806
39446	0.010231	0.098165	0.282282	0.069103	0.066424	0.325699	0.626967	0.8328	0.847835	0.866001	0.107832	0.094085	0.009548	0.007027	0.049491	0.132652	0.026133	0.015599	0.018376	0.013402	0.010695	0.007442	0.268814	0.027268
24448	0.007691	0.024137	0.095639	0.03065	0.17589	0.152106	0.89407	0.855204	0.812734	0.41583	0.065142	0.115324	0.293405	0.299018	0.052843	0.068422	0.768926	0.117137	0.004288	0.000725	0.000162	0.000173	0.003666	0.017097
17696	0.000529	0.196044	0.255472	0.020017	0.024182	0.247834	0.533734	0.063594	0.087876	0.399688	0.738127	0.172146	0.042296	0.043213	0.006041	0.080421	0.00376	0.003154	4.40E-05	0.000925	0.003293	0.000248	0.098836	0.001451
37474	0.209195	0.150558	0.208226	0.121776	0.002192	0.05021	0.214299	0.174126	0.305234	0.07573	0.072223	0.066006	0.120018	0.013608	0.061061	0.001984	0.000454	0.000747	0.001674	0.000975	0.004714	0.002579	0.005592	0.004483
37761	0.003789	0.027698	0.214668	0.090575	0.002742	0.06311	0.569283	0.847696	0.312555	0.451088	0.007635	0.017557	0.052812	0.652158	0.085898	0.040957	0.050279	0.000896	0.000103	1.20E-05	5.70E-05	4.70E-05	0.000477	0.000567
37788	0.004408	0.030176	0.191335	0.04674	0.003942	0.131684	0.759895	0.431487	0.584917	0.62621	0.058848	0.18165	0.343983	0.750881	0.270629	0.039343	0.032471	0.007509	0.000462	3.00E-06	7.30E-05	0.000166	0.001012	0.001612

Vita

Thana-On Punkasem grew up in Bangkok, Thailand for most of her life. One of her major interests have been studying dynamic human interactions with the built environment. This was one of the major reasons for choosing Geography as a major. After being awarded a Bachelor of Arts in Geography from Chulalongkorn University in 2012, she earned the opportunity to attend Louisiana State University (LSU) for graduate studies. At LSU, she held a Graduate Assistantship at the NOAA Southern Regional Climate Center under the supervision of Dr. David Sathiaraj. During this assistantship tenure, she was introduced to the world of programming, data mining and data visualization. Her main research interests are at the intersection of software technology and urban planning. After graduating from LSU, she will pursue another MS degree focusing on human computer interaction and urban planning at the University of Washington.