NYC Traffic Motor Collisions vs. Weather Conditions

By
Team 3:
Ibrahim Abdulrahmon
Chris Hart
Ugochi Akaluso
Hunter Cash

Overview:

In the United States, there are approximately 40,000 people killed by traffic collisions and hundreds of thousands more injured every year. In an effort to eliminate traffic related deaths and severe injuries, the Vision Zero Network created the Vision Zero plan, which aims to increase "safe, healthy equitable mobility for all" by analyzing city data and discovering trends in motor vehicle traffic collisions. Through data explorations, cities can enact and enable changes in infrastructure, road systems, and policies that can prevent and lessen the number of severity of crashes.

Problem:

Our goal is to determine if there are any other contributing factors to the number of traffic collision in NYC. We will explore the weather conditions in NYC and establish a relationship between the weather conditions and motor vehicle traffic collisions in NYC by examining collision occurrences and trends throughout the year as the seasons and weather changes to answer the question: Do the weather conditions have an effect on motor traffic collision in NYC? Our null hypothesis is *There is no statistical significance between the weather and the amount of collisions, and collision related injuries.*

The Question:

Do weather conditions have an effect on traffic collisions in New York City? Furthermore; which type of weather has the highest occurrence of collisions?

Partly cloudy days and nights had the highest occurrence of collisions out of all weather detail types
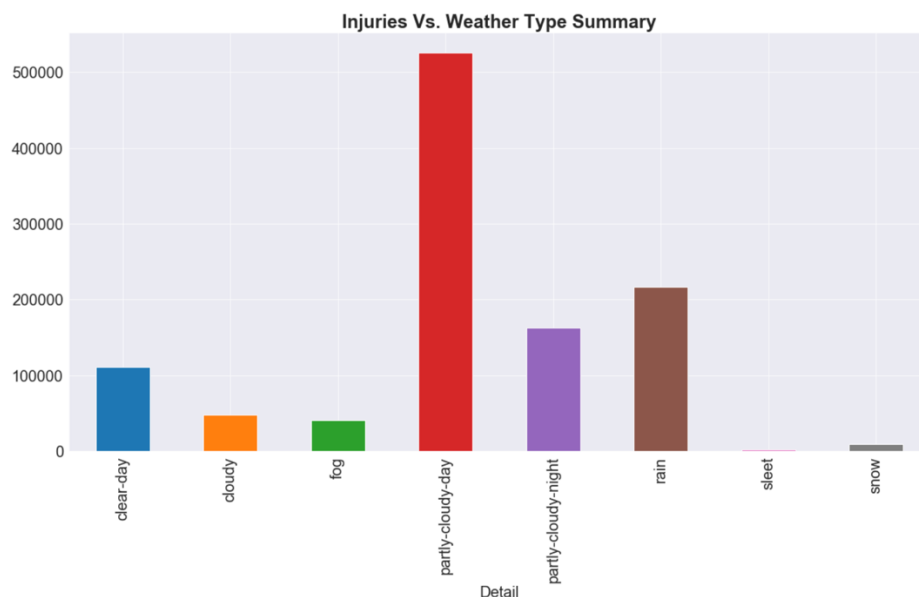

FIGURE 1: INJURIES VS WEATHER DETAIL SUMMARY

Does the cloudiness have a significant effect on the number of Collisions or Injuries?
There is no statistical significance or correlation between cloudiness and the amount of collisions or injuries in NYC and can accept the null hypothesis. Cloud coverage or cloudiness shows a low r squared value that explains 3% of the variability in both injuries and collisions with an increase in the standard deviation for collisions.
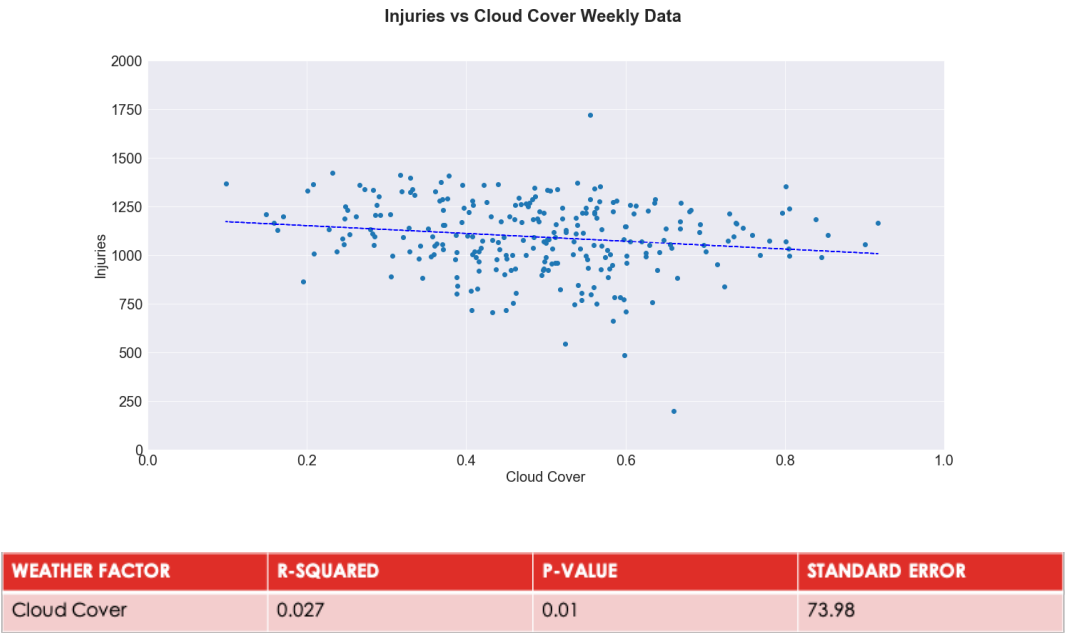

WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR
Cloud Cover	0.027	0.01	73.98

FIGURE 2: INJURIES VS WEEKLY CLOUD COVER PLOT AND STATISCAL DATA

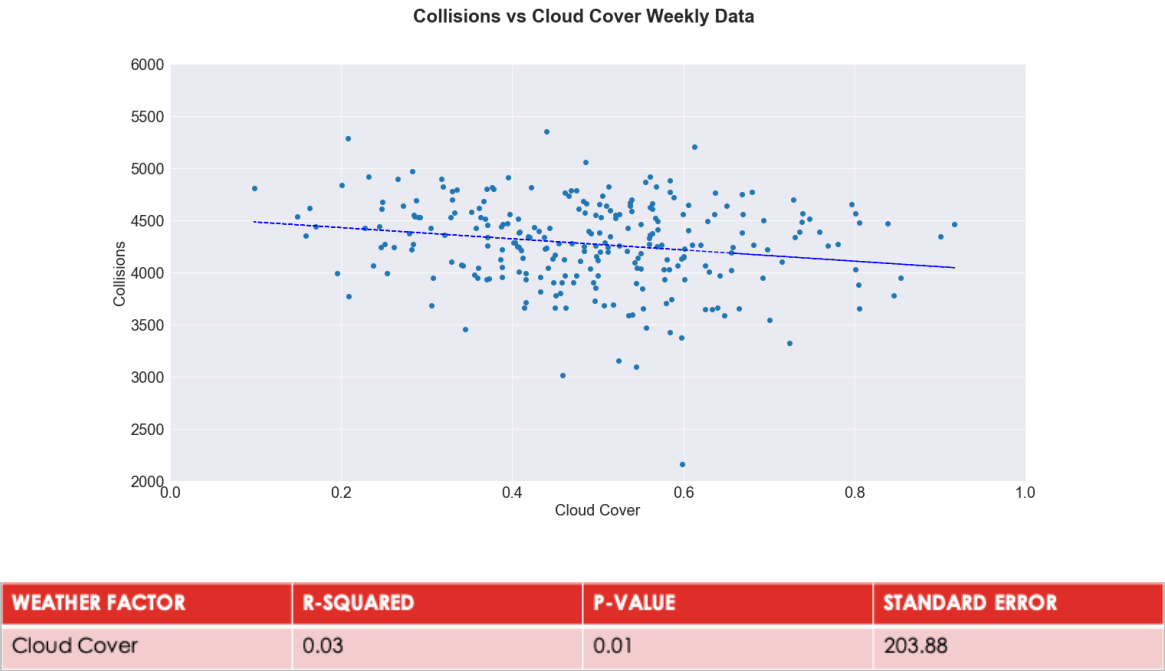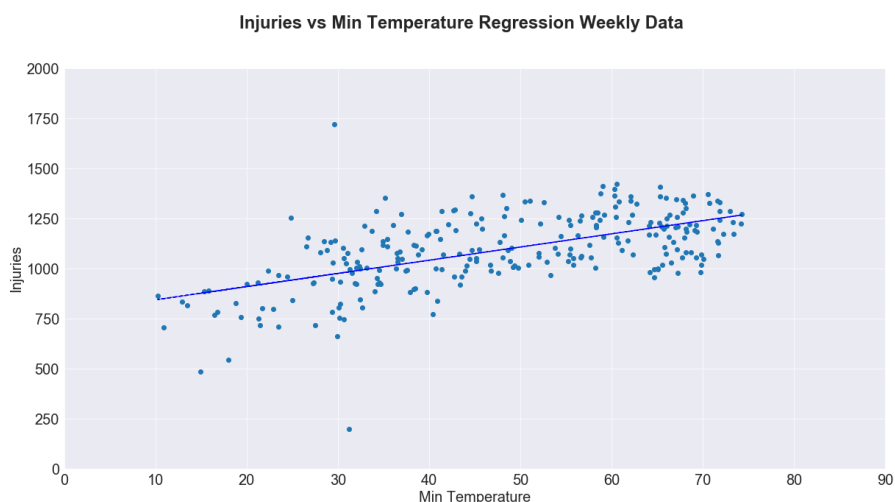| WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR
Cloud Cover	0.03	0.01	203.88

FIGURE 3: COLLISIONS VS WEEKLY CLOUD COVER PLOT AND STATISCAL DATA

Does the minimum temperature have a significant effect on the number of Collisions or Injuries?

There is statistical significance and correlation between the temperature in NYC and the amount of collisions or injuries. Temperature shows a r squared value that explains 35% of the variability in both injuries and collisions, low standard deviation, and a significantly low p value so we are able to reject the null hypothesis on the basis of temperature.

WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR
Avg. Min Temperature	0.35	8.07e-26	0.56

FIGURE 4: INJURIES VS AVG MINIMUM TEMPERATURE COVER PLOT AND STATISCAL DATA
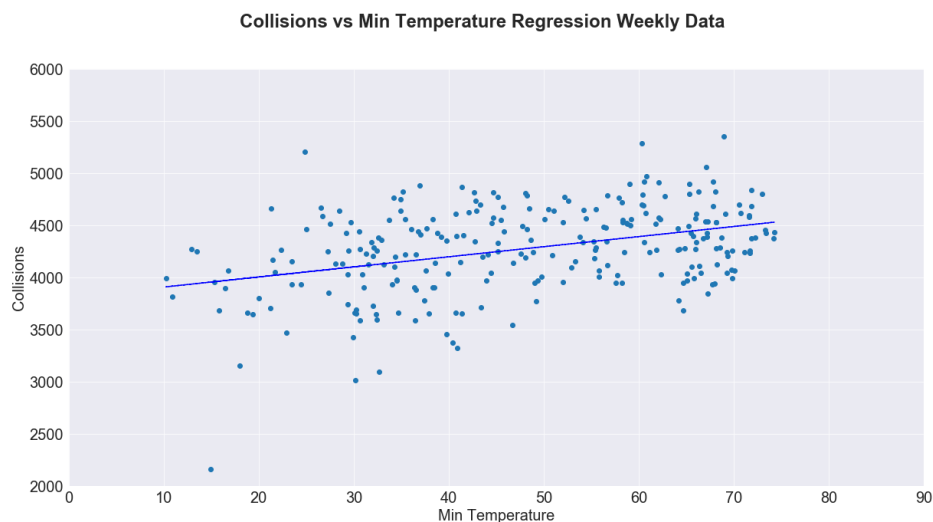
WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR
Avg. Min Temperature	0.10	2.09e-7	1.82

FIGURE 5: COLLISIONS VS AVG MINIMUM TEMPERATURE COVER PLOT AND STATISCAL DATA

	COLLISONS				INJURIES		
WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR	WEATHER FACTOR	R-SQUARED	P-VALUE	STANDARD ERROR
Avg. Min Temperature	0.10	2.09e-7	1.82	Avg. Min Temperature	0.35	8.07e-26	0.56
Cloud Cover	0.03	0.01	203.88	Cloud Cover	0.03	0.01	73.98
Visibility	0.05	0.00	46.42	Visibility	0.10	2.15e-07	16.41
Humidity	0.00	0.59	41.02	Humidity	0.03	0.00	143.41
Precipitation	0.02	0.02	7709.26	Precipitation	0.00	0.32	2822.31
Wind Speed	3.01e-5	0.93	27.22	Wind Speed	0.01	0.12	9.84
Moon Phase	0.00	0.45	141.23	Moon Phase	0.00	0.57	51.31

FIGURE 6: STATISCAL DATA FOR ALL WEATHER TYPES

Conclusion:

Our analysis shows we can accept the null hypothesis for all weather conditions and reject the null hypothesis on the basis of temperature. There is no statistical significance between cloudiness, visibility, humidity, precipitation, wind speed, and moon phase and the amount of traffic collisions and traffic related injuries in NYC. However, there is a correlation between the temperature and number of collisions and related injuries. In further research, we will explore other factors that may have contributed to this correlation such as: the increase in miles driven per person in the summer, role of tourism and night time activities. We will analyze possible interdependencies within the weather types and explore whether multiple concurrent weather conditions have an effect on the amount of collisions and traffic injuries.