Predicting &Visualizing the impact of future weather on traffic flow forecasting

Team 29
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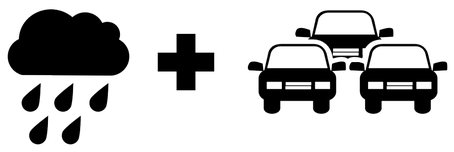
Why

Currently, there exists no tool that could effectively incorporate weather info into traffic forecasting



Weather-Related car accidents are far more deadly than tornadoes, hurricanes, or floods
-- US DOT

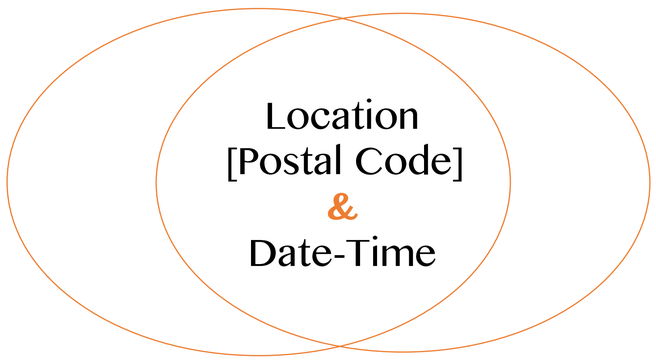
However, the impact of weather on traffic and road conditions are significant and shouldn't be neglected

Therefore, we decide to collect, process and study historical data to develop such tools to ensure safer and more efficient travel on road

Data

Data Processing		
Content	Weather History	Traffic Flow History
Sources	Weather Underground	Georgia Department of Transportation
Method	API (Limit)	Download & Format with Python Script
Size	184,800 Records 14 Variables	1050,000 Records 7 Variables

- We joined the two datasets using SQLite on two variables



- A total of 18 variables after joining of tables

Approach

Polynomial Fit Analysis

Traffic Flow without considering weather influence

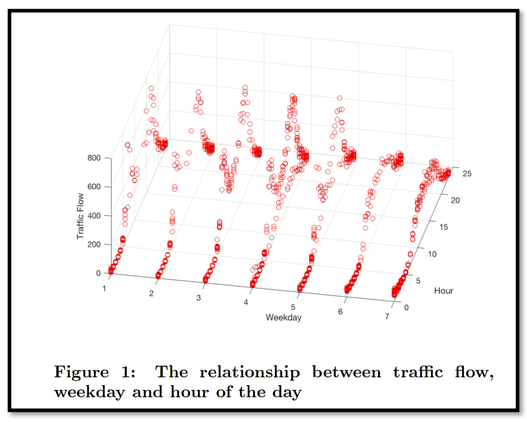


Figure 1: The relationship between traffic flow, weekday and hour of the day

Traffic Flow considering weather influence

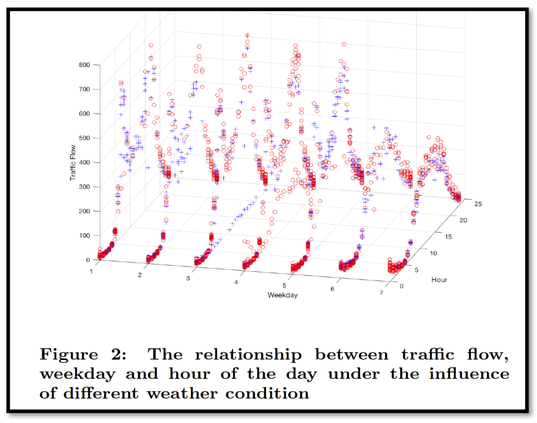
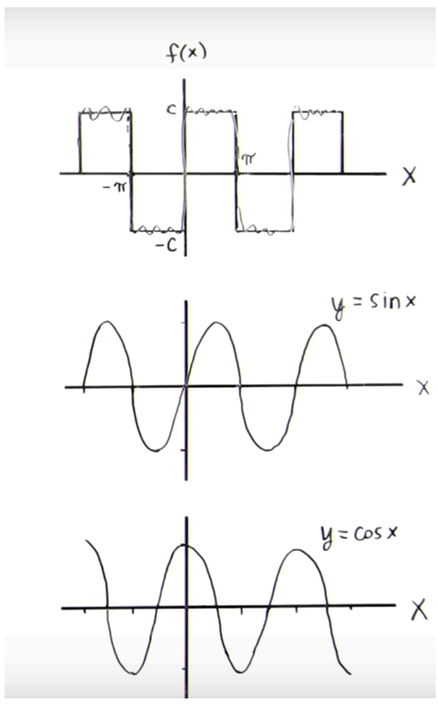


Figure 2: The relationship between traffic flow, weekday and hour of the day under the influence of different weather condition

$y = -3.78x^5 + 35.67x^4 - 197.08x^3 + 599.8x^2 - 899.04x + 531.01$ Where y = traffic flow, x = hour in a weekday

Figure 1: The traffic flow has a strong relationship with the weekday and the hour of the day
Figure 2: By adding the influence of weather, the increment trend of the traffic flow can be predictedin a certain confidential interval

Fourier Curve Fitting



Periodic Time Series
y = f(t)
Degree = 4

1) Site-id
2) Weekday vs Weekend
3) Dec. vs other months
4) Weather (Clean, Rain, Cloudy, Misc)

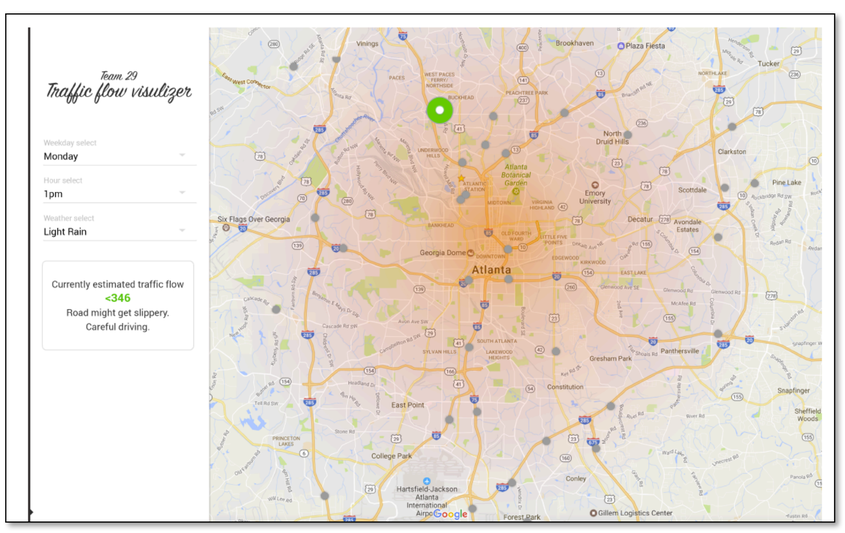
→ y = a1*sin(b1*x+c1) + a2*sin(b2*x+c2) + a3*sin(b3*x+c3) + a4*sin(b4*x+c4)

Where x = hour, y = traffic flow

Experiment & Value

Visualization: d3,JqueryUI

Testing: One experiment has been performed for PO 36416



- Red - traffic flow is getting worse, Yellow - changing too much (under 5 percentages), green - better than under clear weather
- In this experiment, the figure shows the traffic is getting better under rainy weather in this region, this makes sense because this station is on a local road next to I-75; - traffic is slower coming out of I-75 / fewer drivers on the road at 1pm.

Innovation
Comparing to existing models

1. Using hourly data from geologically discrete locations and interpolation methods to reconstruct a traffic flow map over all geological locations Weekdays vs Weekend
2. Animating weather and traffic flow conditions via UI implementation.