Reducing Traffic and It's Rippling effects

GreenLight: The Team

Prince Kowser

Software Engineering (embedded systems)

McMaster University

Harsh Patel

Software Engineering

McMaster University

Qadeer Assan

Computer Science

Wilfrid Laurier University

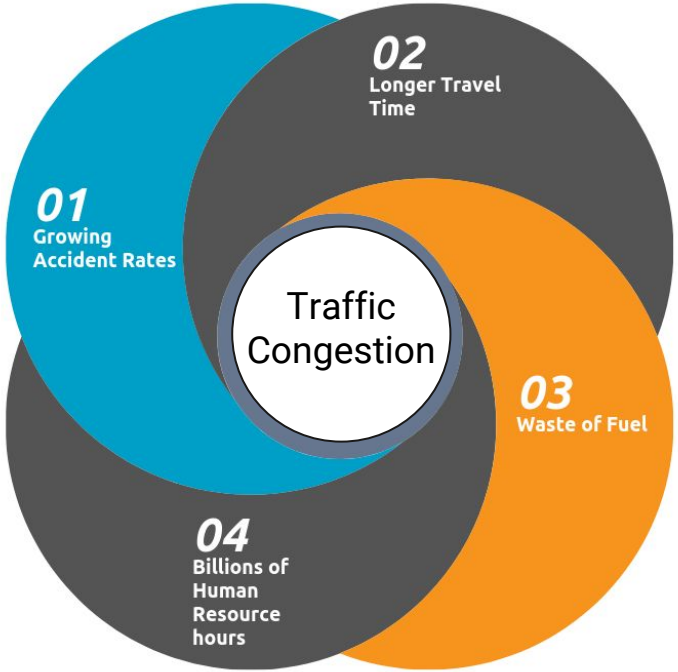
Vrushesh Patel

Software Engineering and Management IV

McMaster University

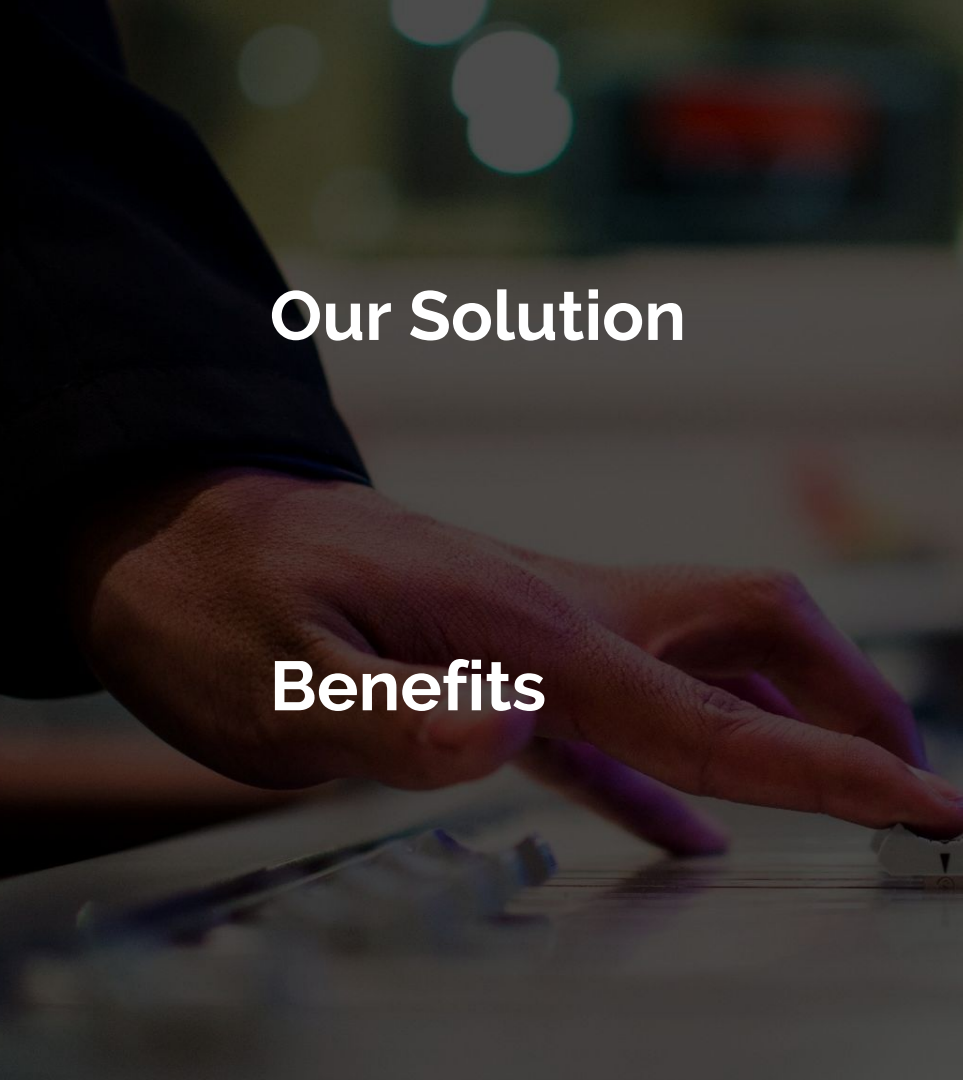
The problem: Traffic Congestion

Exponentially growing traffic with limited land resources leads to many problems in metropolitan cities.



Existing Solution

- **TransSuite Traffic Control system:** relies on second-by-second communication to monitor signal operations which commands each intersection controller to follow a timing plan
- **Split Cycle Offset Optimization Technique:** determines its traffic timing plans based on real-time information received from vehicle detectors located on the road
- **Urban Traffic Control:** provides predetermined signal timing plans and is used as a stop gap measure if SCOOT is not available



Our Solution

Implement machine learning algorithm on traffic congestion data to effectively spread government resources and use live speed tracking to predict traffic and compute ideal traffic light timings.

Benefits

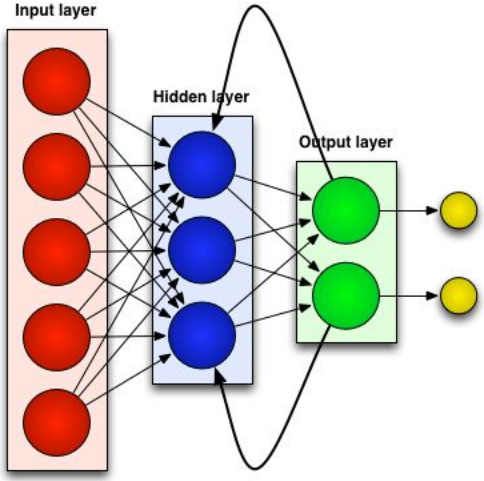
Reduces potential accidents by improving traffic flow

Improves response times of government services

Cuts the cost involved with the deployment of the equipments, network and data collection

Strategies

- Supervised Learning to determine number of cars expected
- Use of live average speed data using TomTom API

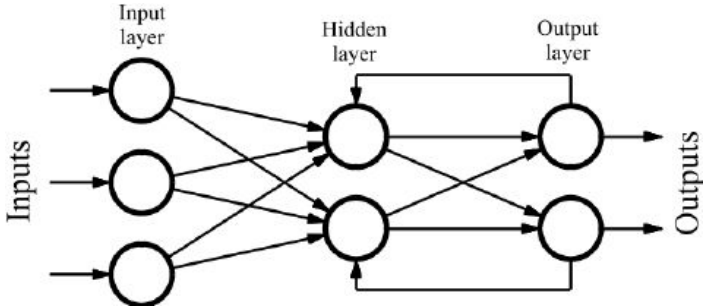


TOMTOM
FOR DEVELOPERS

Supervised Learning:

Graph Recurrent Neural Networks

- Treat traffic prediction as a time series problem by utilizing common time series analysis and statistical learning
- GRNN is sequence-to-sequence model is able to simultaneously predict traffic flow for all road segments based on the whole graph provided as done for Shanghai's Smart City
- Computational cost for such a network is high, but provides high-accuracy traffic prediction and city traffic control



How we solve this

Step 1

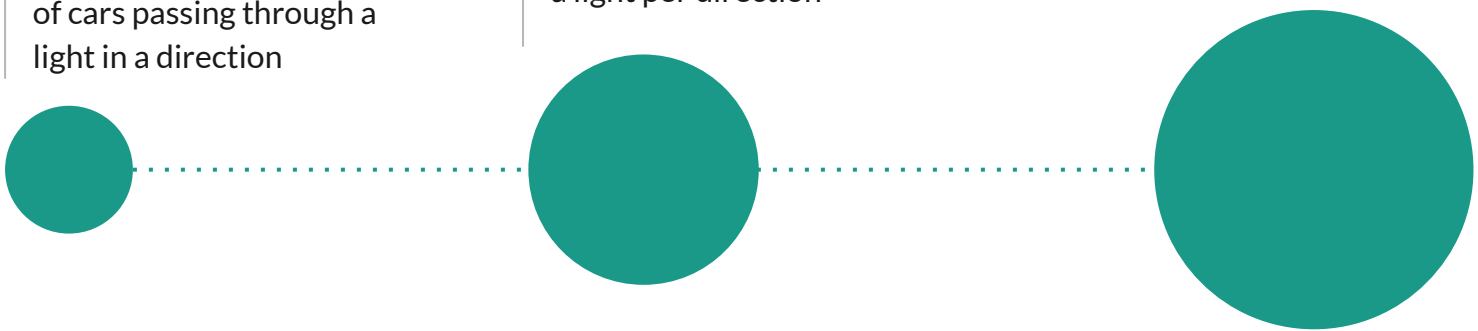
Use recurrent neural network to predict number of cars passing through a light in a direction

Step 2

Calculate a numerical index value for traffic at a light per direction

Step 3

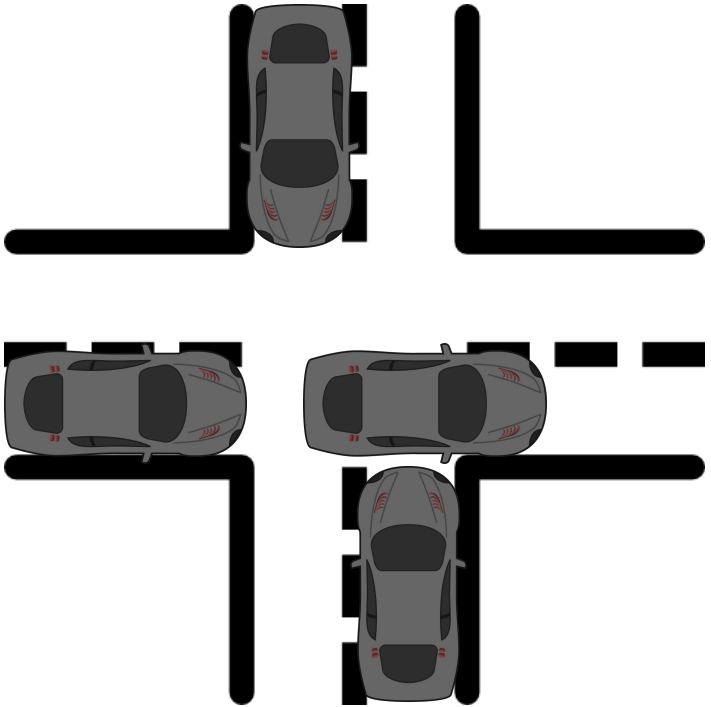
Use predictions to appropriately spread out government support for efficient response times



How our signals work

- Average speed E/W 40km/h on a 60km/h road
- Average speed N/S 70km/h on a 60km/h road
- Index (E/W) = 60 / 40
- Index (N/S) = 60 / 70

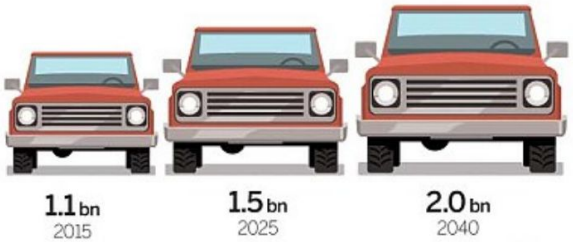
1. Index (E/W) > Index (N/S), E/W direction is congested
2. Index multiplies with the regular green light timing to allow more time for overcrowded directions in order to improve the flow of traffic

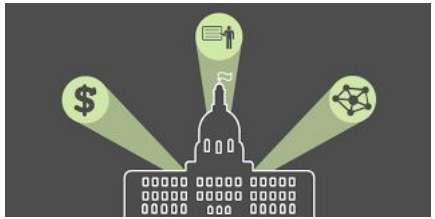


What about the predicted car counts?

The predicted car counts will be added together and weighted intersection by intersection against one other. For intersections with the highest predicted congestions, we will have government support stay within a close radius in the case that an accident would occur, response times would be as low as possible for the most dangerous areas.

This will reduce the ripple effect caused by accidents in the economy.





$125 / Year

The amount lost due to traffic congestion **per household** - *The Star*

$19.8 B

Lost in Canada’s economy due to accidents - *The Globe and Mail*


Our solution is Data Driven
And will lead to consistency, longevity, responsiveness and raise awareness