Lane Changer

An intelligent traffic management recommender system

The Problem

Traffic congestion leads to the following problems in large metropolitans.

- Increased commutation time

- Higher emissions

- Reduced average speed

- Poor mileage

- Hampered productivity

- Extra expenditure to manage congestion

The Problem

The following statistics summarise the severity of traffic congestion in Delhi in 2017

- The average time taken to complete a 40 km journey is about 3 hours & 45 minutes, which is 2.5 times the time taken in 2011
- The average speed has come down from 40 kmph in 2011 to 20 kmph
- The mileage for an average car at 20 kmph is about 10-11 km/L, which is half the highest mileage of the car (at maximum fuel efficiency)
- Costs due to traffic congestion are estimated to be around $10 billion
- Delhi is one of the 10 most polluted cities in the world

The Solution

Lane Changer
An Intelligent Traffic Management System

Lane Changer aims to improve the traffic flow by intelligent recommendations for changing lanes to reduce overall traffic congestion. The system will recommend changing lanes based on the vehicle's maximum fuel efficiency speed and optimum travel times. Vehicles with similar fuel efficiencies and similar routes will gradually end up in the same lane. The suggestions will also take turnings, exits etc. into account. The system will record the fuel and time saved over time which will be available for the users via interactive dashboards.

The Solution
Motivation

GPS based data from taxi and bus services in Delhi have shown a sharp increase in traffic congestion in the last decade. This has led to dangerous levels of pollution and ever increasing productivity and fuel losses. The idea for a lane driving recommender system is supported by the following:

- Studies suggest that vehicles moving at speeds close to the max fuel efficiency level can result in huge savings in fuel costs.
- Vehicles with similar fuel efficiencies moving in a single lane naturally improves the flow.

The Solution
Motivation

These are also the main reasons for the development of separate lanes for different vehicles.

However, this method is not extremely accurate or economical as the related infrastructure costs are quite high. Thus, a software based recommender system with minimal hardware can be used for improved lane driving and better traffic flow.
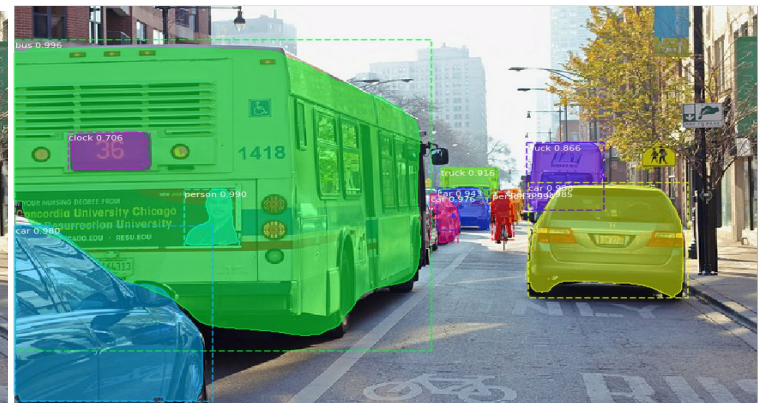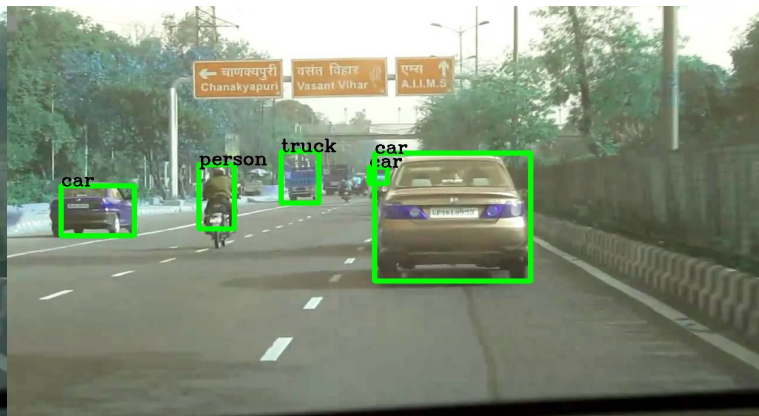
The Solution

The feed from the cameras will have objects segmented and identified in real time. State of the art object identification systems like the You Only Look Once (YOLO) and masked Regional Convolutional Neural Networks (R-CNNs) are used. More detailed labels (non-geared & geared, sports and general vehicles) can be used for better segregation based on mileages. For example, different types of cars have different mileages.

Based on the lane length being monitored by the camera and the time spent by a vehicle in its frame, the speed is calculated. After comparing with the mileage of the vehicle's category stored in a large database, the optimum lanes and routes can be calculated using existing routing algorithms based on Dijkstra's original algorithm.
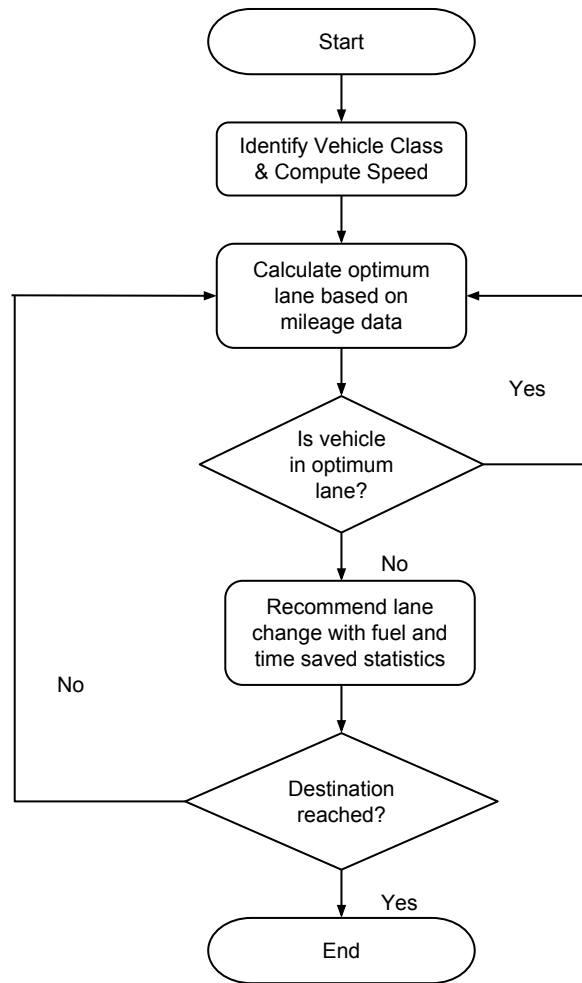
System Flow

Vehicle detection samples

Product Prototype

https://3gyll3.axshare.com