BRAINWAVE '16 – D.I.P.

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Road space rationing, also known as alternate-day travel, driving restriction, no-drive days, is a travel demand management strategy aimed to reduce the negative externalities generated by urban air pollution or peak urban travel demand in excess of available supply or road capacity, through artificially restricting demand (vehicle travel) by rationing the scarce common good road capacity, especially during the peak periods or during peak pollution events. This objective is achieved by restricting traffic access into an urban cordon area, city centre (CBD), or district based upon the last digits of the license number on pre-established days and during certain periods, usually, the peak hours.

All motorised road vehicles in India are tagged with a registration or licence number. The licence plate (commonly known as number plate) number is issued by the district-level Regional Transport Office (RTO) of respective states, which has the main authority on all road matters. The licence plates are situated on the front and back of a vehicle. By law, all plates are required to be in modern Arabic numerals with Latin letters. Other guidelines include the restriction of the fonts that could be used. Also, the plate must be lit up at night.

Task

You are required to design a system that takes an image of a vehicle's position and its number plate as the input and determine the **category of the vehicle, the state and whether the car belongs to a civilian or is a taxi/cab.**

The task is divided into three rounds.

1. **Round 1:** Determination of the type of car and its state.
2. **Round 2:** Test for violation of rules is to be performed.
3. **Round 3:** Calculation of total fine, pertaining to the number of rules being violated in Round 2.

Round 1 and 2 are divided into two phases, the details of which are given below.

For Round 1: -

1. **Phase 1:** Detection of category of the vehicle.
2. **Phase 2:** Detection of the state or Union Territory to which the vehicle is registered.

For Round 2: -

1. **Phase 1:** Detection of Crossing Stop Line or violation of "Stopping at Pedestrian Crossing" rule.
2. **Phase 2:** Detection of Number Plate Offence, which is violation of Odd-Even rule (to be put in effect from January 2016).

For Round 3: -

Calculation of total fine pertaining to the number of rules being violated based on Round 2. The penalties for the respective offences are depicted in the following table:

Offences	MVA	Penalty
Number Plate Offences (Odd-Even)	177	Offence Fine: Rs. 2000
Stopping at Pedestrian Crossing or Crossing Stop Line	177	Offence Fine: Rs. 300

In case of a tie, detection of valid number plate being used by the vehicles needs to be done. A list of valid registration indexes will be provided.

The image and list of valid number plates for vehicles will be provided on the spot. The teams will have an approximate time of 30 minutes to process the image and show the results.

The given image will have number plates of the following format:

DL 11 CAA 1111

The current format of the registration index consists of 4 parts; they are:

- The first two letters indicate the state or Union Territory to which the vehicle is registered.
- The next two digit numbers are the sequential number of a district. The numbers are given to the RTO offices of registration as well.
- The third part is a 4-digit number unique to each plate. A letter(s) is prefixed when the 4-digit number runs out and then two letters and so on.

Details of each Round

Round 1:

Phase 1: -

The given image will consist of number plates of the following format:

1. Plates for private car and motorized two-wheeler owners have black lettering on a white background (e.g. TS 09 MD 7987).
2. Commercial vehicles such as taxis and trucks have a yellow background and black text (e.g. TS 09 TV 2544).
3. Commercial vehicles available on rent for self-drive have yellow lettering on a black background (e.g. TS 01 AF 8192).
4. Vehicles belonging to foreign consulates have white lettering on a light blue background (e.g. 22 UN 14).
5. The President of India and state governors travel in official cars without license plates. Instead they have the Emblem of India in gold embossed on a red plate.

Phase 2: -

The given image will consist of number plates, each one being from among the following states:

AN (Andaman and Nicobar Islands), LD (Lakshadweep), CH (Chandigarh), DD (Daman and Diu), DL (Delhi), PB (Punjab), RJ (Rajasthan), GJ (Gujarat), HR (Haryana), HP (Himachal Pradesh), TR (Tripura), JK (Jammu and Kashmir), UK (Uttarakhand), WB (West Bengal), KA (Karnataka).

Round 2:

The given image will feature the pedestrian crossing. The vehicles which are ahead of the pedestrian crossing and hence violating the Crossing Stop Line rule must be fined Rs.300 and the vehicles behind the pedestrian crossing must be fined Rs.2000 only, if they violate the Odd-Even number plate rule. The day, whether odd or even, shall be decided based on the date on which the competition is being held.

The image will be provided on the spot and will be similar to the one given below.

Marking Scheme

The marking will depend on the working, accuracy, concepts used and the robustness of the system. The detail of marks to be awarded in each round is given below.

1. 30 points will be awarded for the synopsis which will include algorithms and main features of your implementation.
2. **For Round 1:** 80 points will be awarded for successfully detecting the category of the vehicle. 80 points will be awarded for detection of the state or Union Territory.
3. **For Round 2:** 80 points will be given for successful detection of violation of stopping at pedestrian crossing rule. 80 points will be given for successful detection of violation of Odd-Even number plate rule.
4. **For Round 3:** 50 points will be awarded if you calculate the total fine, pertaining to the number of rules being violated by each vehicle in the image correctly.

Judgement Criteria

The teams will be judged on the following points: -

1. The working and accuracy of the system.
2. Accuracy of the logic implemented.
3. Finesse in coding and optimization.

General Rules

1. Each team can have a maximum of three participants. Students from different colleges can be a part of the same team.
2. Judges decision will be final and binding.
3. Participants should bring their own laptops or computers.
4. If any other material is required, the participants may ask for the same through e-mail or phone at least 10 days prior to the competition.

Competition Structure

Stage 1-

Each Team has to mail a soft copy of the synopsis of their program to **brainwave.troika@dcetech.com** by **31st January 2016**. It should include the algorithm and main features of your implementation.

Stage 2-

Teams selected in the first stage will appear on the competition day with their fully working program for the final show down. The teams will be rated as per marking criteria and judge's discretion.

Please regularly check the website for further updates on the competition and the change in rules and regulations, if any.

All the Best!

#HappyTroika ☺