Team name: Crackers

Theme: Road Safety

Where the problem lies:

On the streets of India, Different type of vehicles, people and even animals get together. Moreover, road infrastructure is not adequately maintained. Plus, quite a few vehicles violate the basic rules of traffic and make the roads unsafe to use. This whole situation makes the roads very unsafe in India.

With more people dying because of road accidents each year, it's a lingering issue that needs to be solved at the earliest. Prominent causes of road accidents are over speeding, drunk driving, hard braking, road conditions, and unskilled driving

A few numbers and case studies to further validate the problem:

1) Case Study-1
2) Case Study-2
3) Case-Study-3

Most of the accidents, as cited in the case studies above, are due to overspeeding of vehicles. Thus we plan to keep a check on vehicle speeds with the help of auto-rickshaws.

Our Idea:

We plan to mount cameras on auto-rickshaw to capture a vehicle's moments. The speed and shape of the vehicles will be detected with the help of machine learning and correspondingly the vehicle will be checked for speed limits.

Plan of Action:

- The prototype is all software based for now.
- It takes any camera feed in input and returns the speed and type of vehicle(with help of ML).
- Speed limits are then set and an image of vehicles breaching that limit is captured.
- Multiple images are captured to ensure the best possible view of the vehicle's number plate.
- Through OCR, the number plate can be read.
- Date, time and location can easily be found with the help of image saved in computer and location of the auto rickshaw (use of GPS).
- The time, location and vehicle's number are then mailed to concerned authorities with the help of a python script

How the things will work?

- Input video is read frame by frame with OpenCV.
- Object is the detected using TenserFlow object detection API.
- Speed and direction are predicted using Pixel locations.
- Vehicle size is predicted with the help of image area.

What's the benefit of using it on Autos?

Although the speed cameras are mounted on highways, but according to stats major speed breaches happen in the narrow roads. This is where the use of autos comes into play. Autos usually have to travel in the narrow roads dropping customers at their door steps.

Speed violations can the be detected which will help reduce the number of accidents to a significant low.

Modification to be made on Auto-Rickshaw:

1) **Mounting of camera:** The only modification that needs to be done to the auto-rickshaw is that it should have cameras mounted on it, which can easily capture the images of the vehicle.

Other advantages of our solution:

1) **It will help cover a wide area:** Autos travel to every part of an area. This will be a boon as a large number of people can be caught breaking the laws rather than those who overspeed only on highways.
2) **A double advantage:** While autos can do their usual duties of transferring the commutators from one area to another, they will at the same time be helpful to the traffic police. Two things would be done in the same time.

Limitations we might face:

1) **Cameras might get damaged:** Usually, the cameras are fixed but our in our solution the cameras will be travelling around with the autos and there is a risk that they might get damaged in the process.

2) **Space constraints:** Some roads are so narrow that they can't even accommodate two vehicles going side by side. In this case, it might be a little tough for cameras to catch the speed of the vehicles.

An explanation through Flowchart