**Domain Knowledge**

Traffic on roads means all the vehicles and pedestrian. Traffic rules are those rules which govern traffic and regulate vehicles. Traffic is formally organized in many jurisdictions, with marked lanes, junctions, intersections, traffic signals or signs. As the number of vehicles on road increased, need for the traffic rules was realized due to recurring accidents which could be prevented by following simple rules. In 1865, first traffic rule was introduced in Britain. Later as the number of vehicles grew rules were added to increase safety and make traffic efficient. In Kathmandu valley though the number of vehicles grew the road, technology used are still the same. Many people do not know all the rules and many of those who know does not follow the rules. To prevent accidents many traffic rules are enforced. These rules must be followed by all the motorists.

Traffic violation occurs when driver fails to follow the traffic rules that regulates vehicle operation on the road. If any motorists fails to follow the traffic rules traffic ticket is issued to the driver. The main duty of the traffic police is to make motorists and two wheel drivers follow the rules and if they do not follow the rules traffic ticket is issued. A traffic ticket is a notice issued by a law enforcement official to a driver, indicating that the user has violated traffic laws. Traffic tickets generally come in two forms a moving violation such as exceeding the speed limit or non-moving violation such as a parking violation with the ticket also being known as parking ticket.

Any person caught violating traffic rules is slapped a fine between Rs 500 and Rs 1,500. As many as 378,927 rule violators were booked in the fiscal 2017-18. Out of them 5,060 motorists and two-wheeler riders were caught with the help of Closed Circuit Television (CCTV) cameras installed at more than 200 locations in the valley. Less than 2% of violators were caught using the CCTV cameras.

Violation of lane discipline is driving recklessly on the road without using turn signals and not following the lane discipline. Violation of lane discipline tops the traffic offence chart with 33,377 violations though many violators of lane discipline are not fined.

Speeding is excessive speed (driving above the speed limit) or inappropriate speed (driving too fast for the prevailing conditions) recognized as a major contributory factor in both the number and severity of traffic crashes. Very few speeding tickets are issued in Kathmandu valley as speed monitoring is only enforced randomly on very few occasions with limited resources.

Some of the traffic rules violation that our system can detect are:

* Violation of lane discipline
* Drive over permitted speed limits

Detection system is a software that is used to monitor the traffic violation. Traffic violation detection system is the software that uses real time object detection to detect the violation committed by the driver. Real-time object detection is the task of doing object detection in real-time with fast inference while maintaining a base level of accuracy. Video footage from the CCTV is used as the data input for the system. Opencv can be used for real time object detection with the help of frameworks like You Only Look Once (YOLO).

Speed of the YOLO framework is 45 frames per second which is better than realtime. Network understands generalized object representation which allowed them to train the network on real world images and predictions on artwork was still fairly accurate. It is also open source.

YOLO is like FCNN(fully convolutional neural network) and passes the image once through the FCNN and output is (m\*m) prediction. This the architecture is splitting the input image in m\*m grid and for each grid generation 2 bounding boxes and class probabilities for those bounding boxes. Note that bounding box is more likely to be larger than the grid itself. From paper:

Citations:

The Himalayan times

Paperswithcode.com

Towardsdatascience.com