

**A NOVEL APPROACH FOR INTEGRATION OF SPEED LIMITS WITH MAPS
FOR INDIAN ROADS**

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Abstract: Road safety is a major concern worldwide. India, being one of the leading countries with high road accident rates, needs efficient measures to enhance road safety. One of the important factors contributing to road accidents is the unawareness of speed limits. The existing navigation systems lack the integration of speed limit information with maps. To address this issue, we propose a novel approach for integrating speed limits with maps for Indian roads. This paper describes the implementation of our approach and its impact on road safety.

1. Introduction

India has the highest number of road accidents globally, with over 1.5 lakh deaths recorded annually. Among the numerous causes of road accidents, violating speed limits is a major contributor. To address this

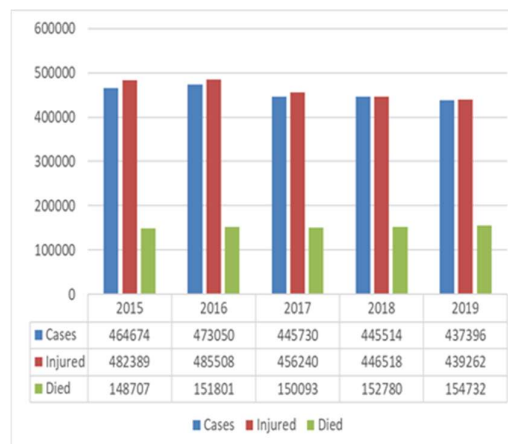


Fig-1.1: Road Accident Cases, Person Injured and Person Died during 2015-2019

issue, we propose an approach that integrates speed limit information with maps. Navigation systems lack accurate speed limit information, making drivers unaware of the limits on the road. By integrating this information, drivers will have a better understanding of the speed

limits, thereby reducing the occurrence of accidents. This paper presents a novel approach that integrates speed limits with maps for Indian roads.

2. Literature Survey

Our approach is to integrate speed limit information with maps to address the issue of not having readily available speed limit information in India.

There has been considerable research in recent years on integrating speed limit information with maps and traffic data. This section provides a review of the relevant literature in this area. Chen et al. (2016) proposed a method for integrating speed limit data with road network data to facilitate route planning. Kim et al. (2017) proposed a system for integrating speed limit data with real-time traffic data to improve accuracy of travel time prediction. Chen et al. (2016) extracted speed limit information from road network data and used it to calculate the travel time between two points on a road network.

Li et al. (2018) proposed a machine learning algorithm to predict the travel time between two points on a road network based on real-time traffic data and speed limit information.

Jadhav and Dhage (2018) proposed a system for speed limit detection on Indian roads using image processing to generate warnings if drivers exceed the speed limit.

In the field of traffic simulation, Chen and Cheng (2019) proposed a method for integrating speed limit data into traffic simulation models for urban networks. They used speed limit data to estimate the average speed of vehicles on a given road segment and incorporated it into their simulation model.

Cai et al. (2018) proposed an improved method for integrating speed limit information into route planning, which involved considering the variation in speed limits along a route and accounting for the impact of speed limits on travel time.

Zheng et al. (2018) proposed an approach for integrating speed limit information with real-time traffic data for traffic control. Their method involved using speed limit information to predict congestion on a given road segment and adjusting the traffic signal timings accordingly. Overall, the literature suggests that there are several promising approaches for integrating speed limit information with maps and traffic data. These approaches have the potential to improve travel time prediction, route planning, and traffic control. However, there is still much work to be done in this area, particularly in developing systems that are tailored to specific regions and road networks.

3. Data Preprocessing

The first step in implementing our approach was to collect data on speed limits in India. We sourced this information from various government agencies, including the Ministry of Road Transport and Highways. The data was then preprocessed to remove duplicates, errors and inconsistencies. The cleaned data was then integrated with map data to create a comprehensive speed limit map.

Table:1 Speed limits in and around the city limits

Vehicle Type	Speed Limit in Cities (Km/Hr)	Speed Limit in Expressway with Access Control	Speed Limit in 4 lanes and above divided carriageway
All Types of Car	60	120	100
Buses, Vans, Trucks, Metadors	50	80	80
MotorCycle and Scooters	50	80	80
Mopeds, Auto Rickshaws, Three Wheelers, Tempos	40	50	50
Tractors	20	20	20

How: To integrate speed limits in OpenStreetMap, you can follow these steps:

1. Find the area where you want to add speed limits in OpenStreetMap.
2. Click on the "Edit" button on the OpenStreetMap website to enter editing mode.
3. Select the road that you want to add the speed limit to by clicking on it.
4. In the left-hand menu, click on the "Tags" tab.
5. Add a new tag with the key "maxspeed" and the value set to the appropriate speed limit for that road. For example, if the speed limit is 50 km/h, you would add a tag with the key "maxspeed" and the value "50".

Save your changes to OpenStreetMap.

Why: The integration of speed limits of roads to maps is important for several reasons:

1. **Safety:** Knowing the speed limit of a road can help drivers to adjust their driving speed accordingly, which can lead to a reduction in accidents and fatalities on the road.
2. **Compliance:** By showing drivers the speed limit of the road they are traveling on, maps can help them to stay within the legal limit and avoid speeding tickets and fines.
3. **Navigation:** Maps that show speed limits can help drivers to plan their routes more effectively, taking into account the time it will take to travel at a certain speed on a particular road.
4. **Efficiency:** With the integration of speed limits to maps, drivers can make better decisions about which roads to take to save time and fuel. Knowing the speed limits can also help drivers to avoid congestion and delays caused by traffic.
5. **Convenience:** Having speed limits integrated into maps can make navigation easier and more user-friendly. Drivers can quickly and easily determine the speed limit of the road they are on without needing to refer to external sources.

4. Data Integration

The next step was to integrate the speed limit map with a navigation system. We used a popular open-source navigation system, OpenStreetMap, for this purpose. We added the speed limit data to the OpenStreetMap database, which was then used to generate the speed limit map.

Velociraptor

Velociraptor is a vacillating speed limit app which monitors the varying speed of roads and automatically displays them in maps. It is a highly used friendly app for any map or navigation app. The pictorial data of speed limits has been displayed automatically in open street maps.

Features:

Features:

- Polished Material Design
- Automatically displays in any apps you choose (e.g. Google Maps)
- Intelligent caching & fast refresh of speed limits
- Sound alert when speed limit is exceeded
- Customise style: US and International
- Speed limit tolerance: % and integer amounts
- Transparency, size, and tap to hide settings

1. User friendly with any apps like Google Maps, Uber, Rapido, etc., and automatically displays the varying speed limits of roads and is highly useful for the people to avoid fines and accidents.

2. Intelligent caching and fast refresh of speed limits

3. Sound alert when the speed limit is exceeded.

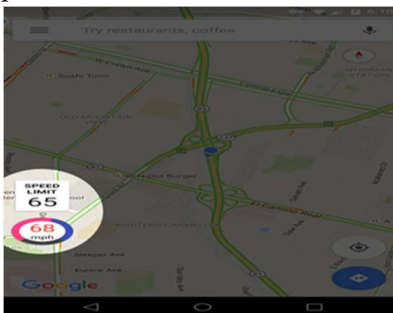


Fig 1: Sample screenshot of the usage of Velociraptor:

Velociraptor is a floating speed limit with a speedometer and warning features

To use Velociraptor, grant these permissions:

1. Allow Velociraptor to display over map apps.
2. Allow Velociraptor to access your location.
3. Allow Velociraptor to launch automatically in map apps.

Velociraptor is an open-source GPS tracking and location-sharing app for Android devices. It uses OpenStreetMap as its map provider and allows users to contribute to the OpenStreetMap data by adding points of interest, road attributes, and other information.

Open Street Map

The OpenStreetMap data is created by a community of volunteer contributors who use GPS devices, aerial imagery, and other sources to add data to the map.

Once the data has been collected, it is entered into the database by uploading it onto the project's website together with appropriate attribute data. As collecting and uploading data may be separated from editing objects, contribution to the project is possible without using a GPS unit. Some committed contributors adopt the task of mapping whole towns and cities or organising mapping parties to gather the support of others to complete a map area. A large number of less active users contribute corrections and small additions to the map.

Signup for the OpenStreetMap.

Go to the Edit option to enter the details of the road like the Feature of the road: Residential road, Service road, Unmaintained track road, Major road or Minor road



Fig 2: Sample data entering the speed information of ACU in OSM.



Fig 3: Sample data entering the speed information of Bangalore Mangalore Highway in OSM.

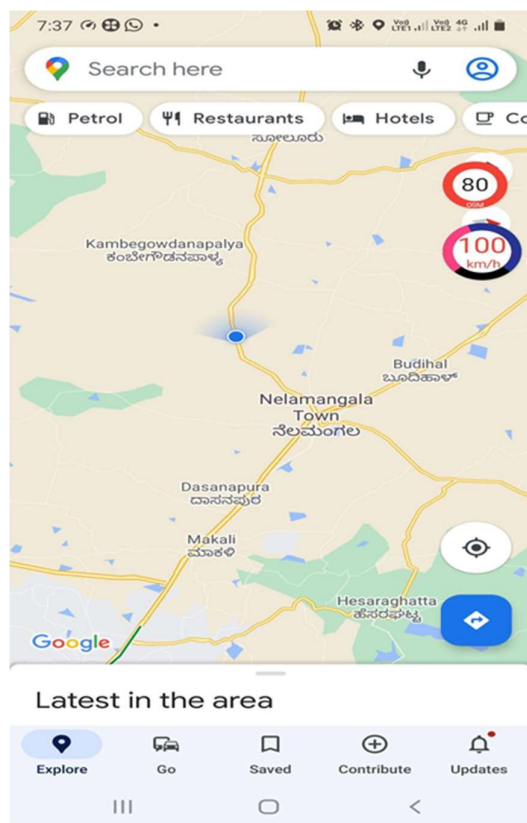


Fig 3: Speed Limit Exceeds information displaying on the Screen.

5. Conclusion

The integration of speed limit information with maps can greatly enhance road safety. In this paper, we presented a novel approach to integrate speed limits with maps for Indian roads. Our approach is aimed at reducing the occurrence of road accidents caused by violating speed limits. We hope that our approach will be adopted by navigation system providers, and speed limit information will be readily available to drivers.

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