IIT Bombay FOSSEE Mapathon 2023

Team Name: Bhumint   *   **Mapathon Theme:** Transport   *   **Problem statement:** Traffic Hotspot
District and State: Jodhpur, Rajasthan **Selected City:** Jodhpur

Dataset Used:

1. **Jodhpur City Shapefile:** Extracted from [Survey of India](#) Products -> Digital Products -> Administrative Boundary Database -> State Upto Taluk level
2. **Road Network and Traffic Data:**
   1. Extracted from [TomTom](#) - Mapping and Location Technology.
   2. We have used the historical data of January 2021 with different time divisions to get the road network of about 18991.5 km covering about 2471.8 km^2 consisting of Motorway Road, International Road, Major Road, Secondary Road, Connecting Road, and Major and Minor Local Road.
   3. The TomTom API provides parameters like average speed, harmonic speed, percentile speed, the standard deviation of speed, the average time taken, and the number of samples considered for these parameters calculation on each road segment considering every type of vehicle. We have used the average speed as a metric for checking traffic congestion.

Major Steps in GIS:

1. Add the Jodhpur city boundary and Road Network shape file. The downloaded traffic data file is in .dbf format. Therefore first needs to be converted into .csv. Additionally, we added a new Id column in the traffic.csv as the existing Id datatype is of a different type which will cause an issue in Join, explained in the next step.
2. Next, we join the road network and traffic details using Processing -> Toolbox -> Vector General -> Join Attribute by field value. We selected only avg speed as a layer 2 field to copy option and plotted the speed attribute in gradient colors.
3. For hotspot creation, we filter out traffic speeds < 12, which indicate the vehicle is either stopped at a traffic light or moving slowly, which is the case of traffic jams, and named this as weight. At last, joined the road network and traffic.csv and copied only the weight column for the joined layer. Lastly, plot hotspots using the weight column.

Complexities Involved:

First, we tried extracting traffic information through [Google Map Developer API](#), as Google Maps are used widely in India for route navigation. However, it charges heavily (200 $) for route information. Next, we checked with [Bing Map API](#), which provides some free trials, but the traffic services are unavailable for India. At last, we found Tomtom, a navigation map company that provides initial 20 reports for testing their services. Next, in Tomtom, also in the free trial, the Jodhpur district data cannot be retrieved as it has a 20k KM limit. Therefore, we end up with Jodhpur City only. Another issue we encountered was the area selection, as Tomtom requires a GeoJson file, and we retrieved the .shp file from Administrative Boundary Database. At last, we converted the .shp -> geojson from QGIS software after trying several online tools.

Applications:

Transport planning (Alternate routes identification), Environment sensing (congested roads emits more pollution), Infrastructure building (new roads/ highway), Resource Management (Traffic police allotment)etc.