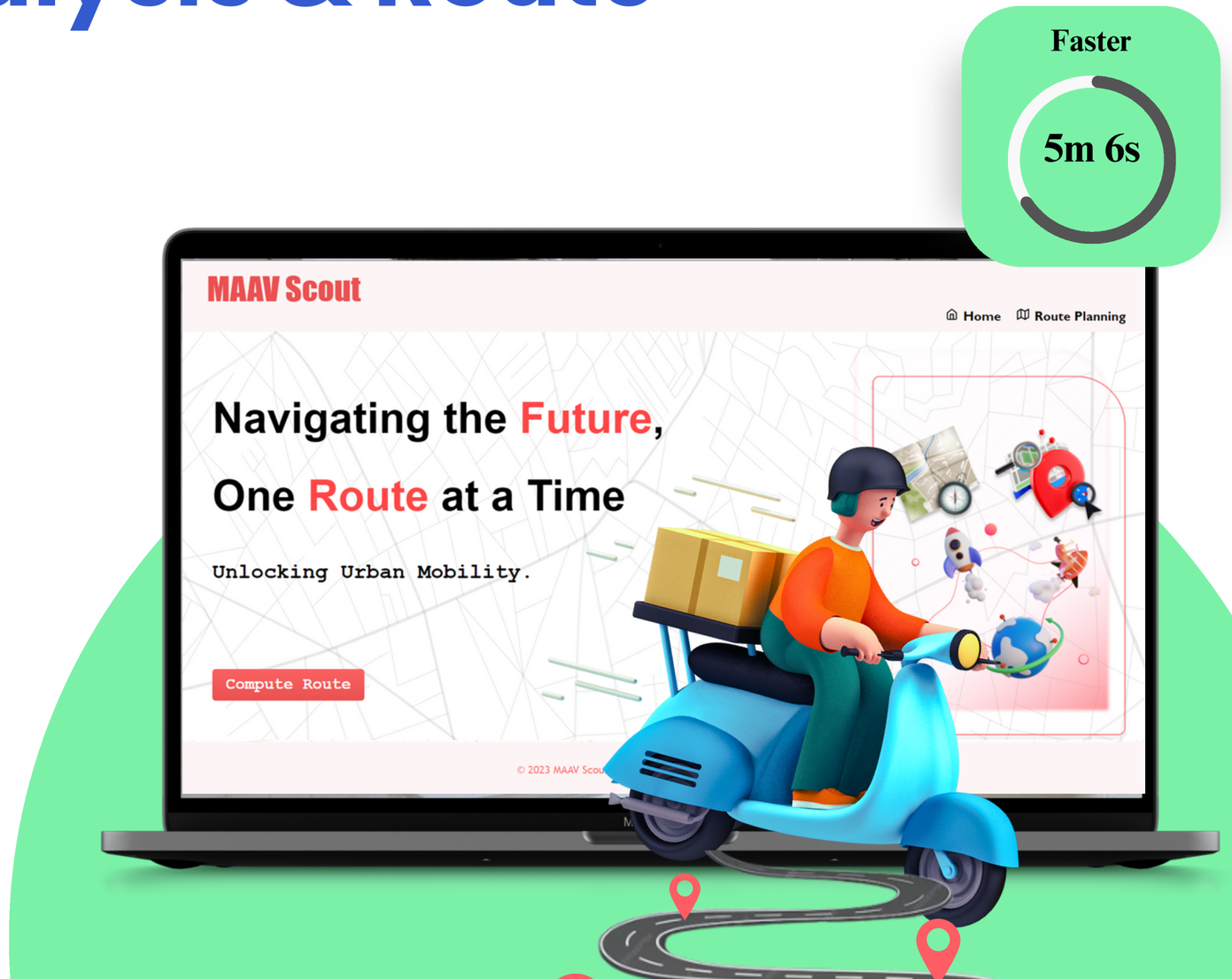
MAAV Scout

Urban Traffic Analysis & Route Optimization



TEAM MEMBERS:

- Agrima Kumar
- T R Aakash Raj
- Mariam Thomas
- Varad Tambe

Abstract

- Urban areas globally experience chronic **traffic congestion**, leading to frustration, **economic losses**, and **environmental impacts**.
- **Traditional solutions** are **inadequate** for the increasing challenges posed by growing populations and urbanization.
- Our app aims to **optimize** urban traffic navigation, addressing the **limitations** of popular navigation apps like **Google Maps**, which has a user base exceeding one billion monthly active users. which is multipoint route optimization, which our app aims to fill.
- By considering both **real-time traffic information** and historical data, the application ensures that journeys are conducted with **maximum efficiency** in terms of distance and time.
- The app actively suggests **alternative routes**, promoting a more **equitable distribution** of **traffic load** and reducing congestion in specific areas.

NOVEMBER 2023

1 Billion+

MONTHLY ACTIVE USERS

NOVEMBER 2023

GoogleMaps

MOST USED NAVIGATION APP

Introduction

- **74% of the global population** is projected to reside in **urban areas by 2050**.
- TomTom Traffic Index 2023 reports **increased congestion in 387 out of 416** cities worldwide. **Mumbai, Manila, and Jakarta** are among the **top three most congested cities.**
- India, with its extensive road network, grapples with significant traffic issues. As of 2023, India has approximately **4.7 million kilometers of roads**, making efficient traffic management a critical concern.
- **Smartphones, GPS devices, and real-time data** offer an opportunity to **transform** urban traffic planning.
- An application designed to **optimize urban traffic navigation** aims to address congestion challenges.
- **Core strategies include**: Traffic analysis for predictive modeling, Efficient route recommendations based on congestion levels and Proactive traffic load distribution through alternate route suggestions and multipoint routing.

2050

74%

RESIDING IN URBAN AREAS

SEPTEMBER 2023

Mumbai

TOP 3 MOST CONGESTED CITY

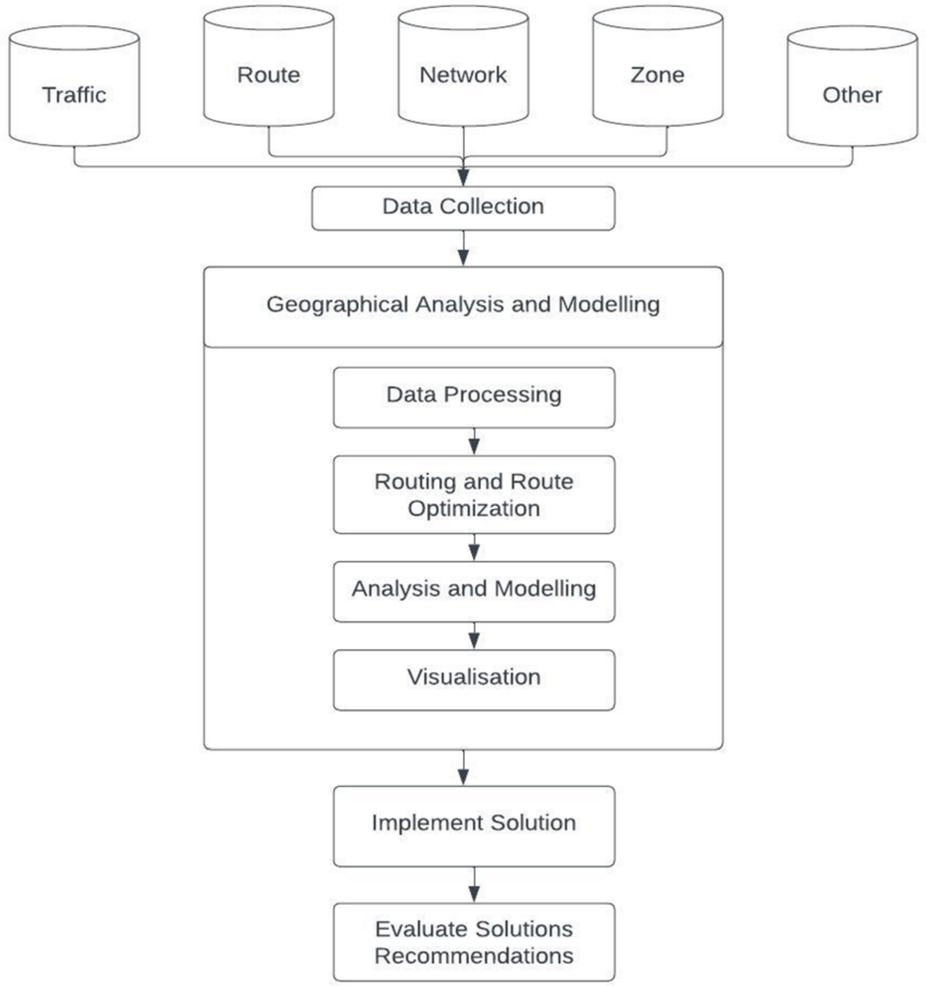
Working of the System

Tech Stack

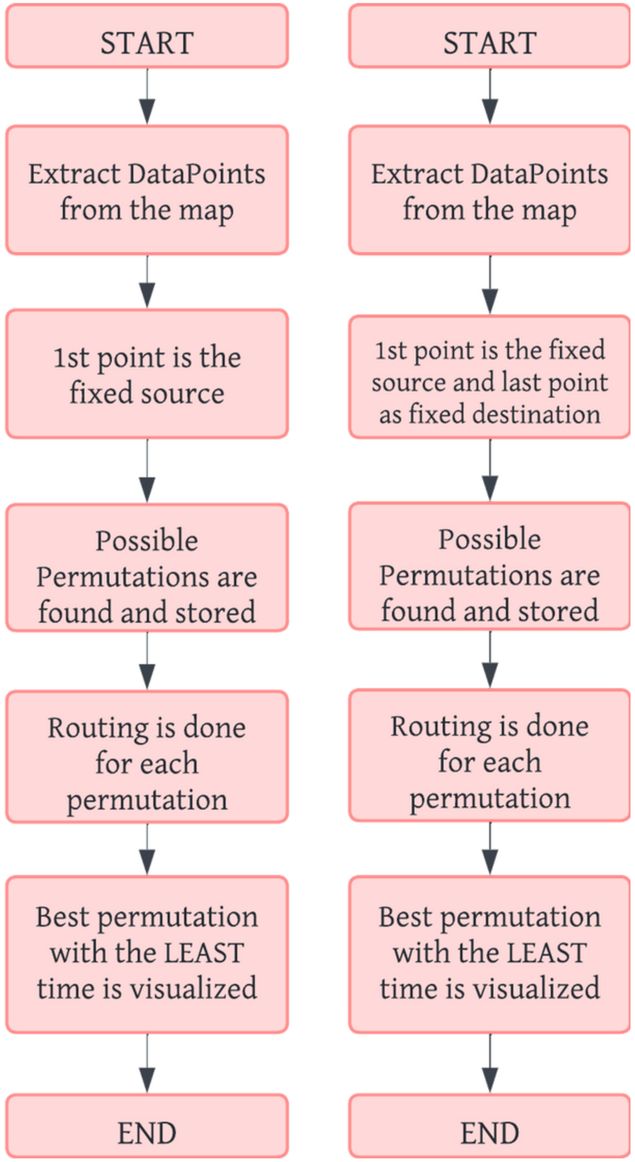
Dependencies

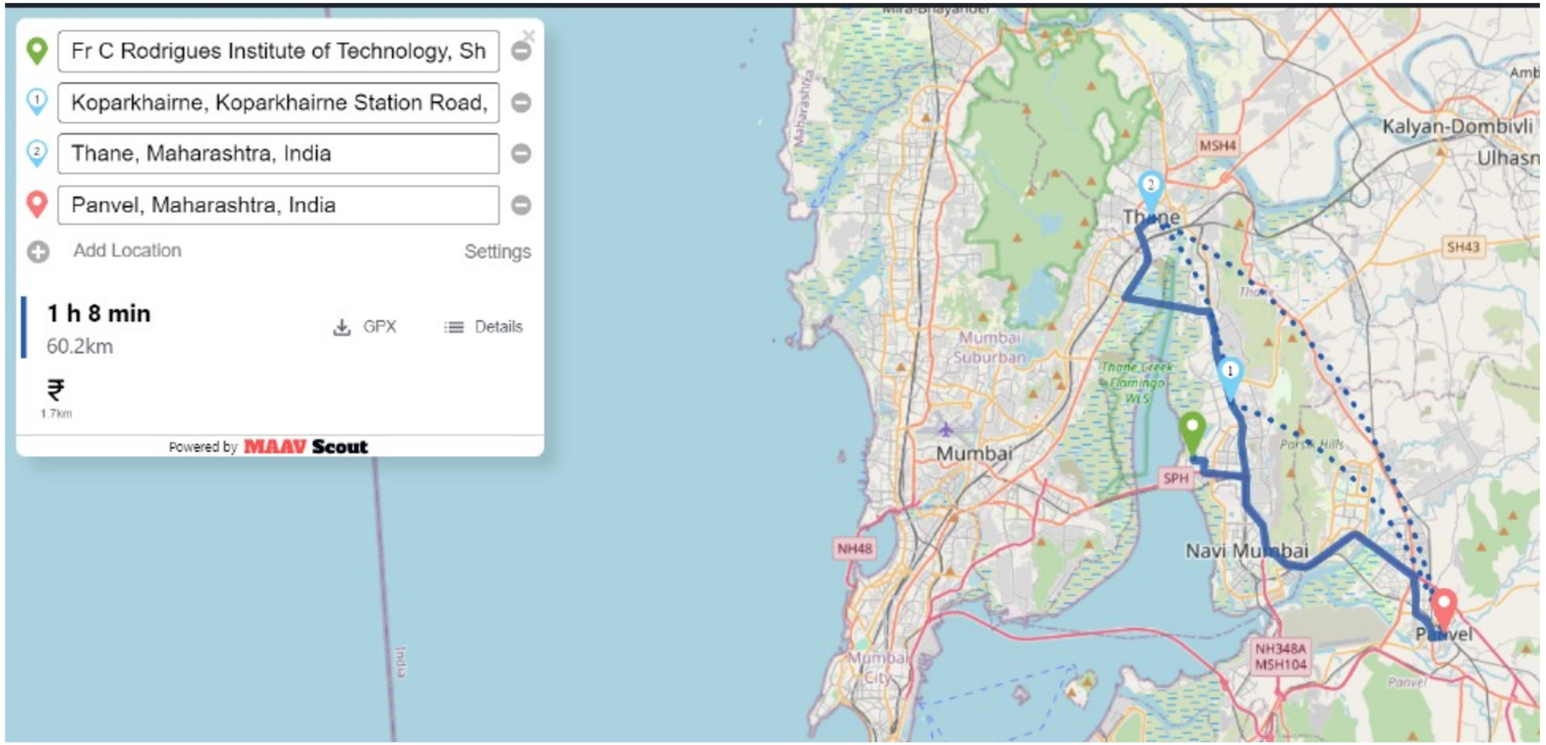
GraphHopper API

Internet Connectivity



Implementation





As depicted in the figure, our application intelligently identifies the optimal route for traversing multiple destinations in a single journey. Specifically, the visual representation highlights a path connecting three distinct locations based on the processed data, a comprehensive model is developed which captures the nuances of the terrain, road networks, and other significant parameters and creating a routing model.

Result and Conclusion

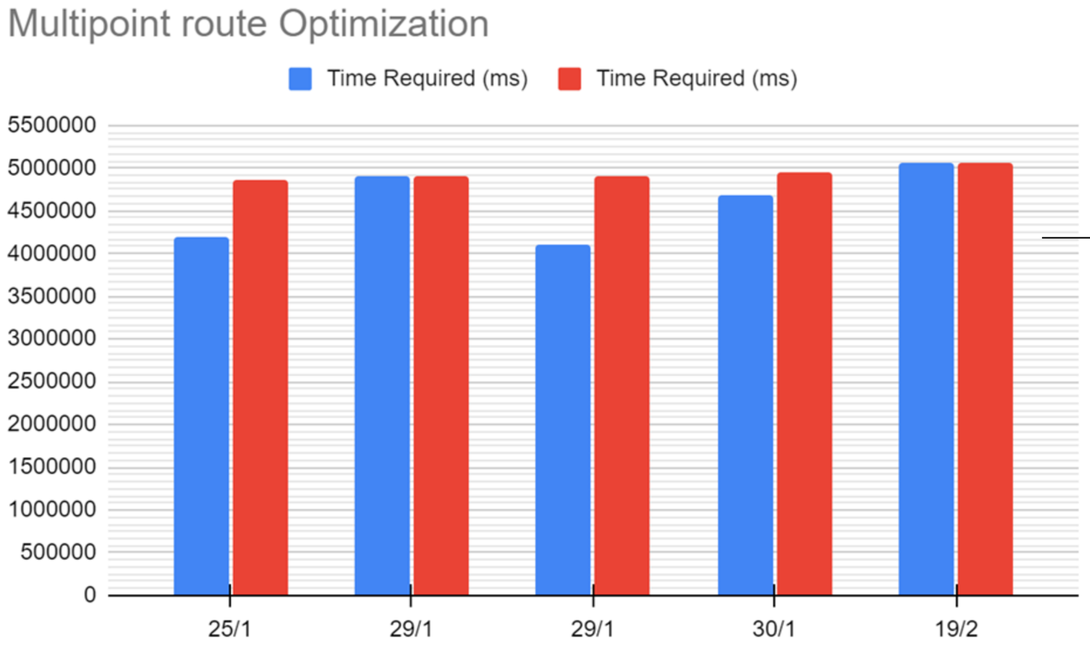
The visual representation of the conclusion, depicted in the graph below, encapsulates the findings from five days of the 30-day observation period. It clearly illustrates the comparative performance of our system and Google Maps along the optimized path.

This research, therefore, concludes that time-based optimization provides more efficient results in route planning and navigation. It opens up new avenues for further exploration and improvement in the field of route optimization algorithms. Future work could focus on refining the time-based optimization technique and expanding the scope of its application. This could potentially revolutionize the way we navigate, making our journeys more efficient and less time-consuming.

Date	25/1		29/1		29/1		30/1		19/2		19/2	
Time	21:25		16:30		21:10		7:30		11:00		16:00	
	Distance	Time	Distance	Time	Distance	Time	Distance	Time	Distance	Time	Distance	Time
Google Maps	70345.7	4861017	70345.7	4901551	70345.7	4905980	70345.7	4938947	97987.4	5063235	70345.7	4201256
MAAV Scout	60234.6	4201037	60234.6	4901050	60234.6	4101056	60234.6	4681050	69410	5063221	60234.6	4101037

Result and Conclusion

In conclusion, this research has conducted a comprehensive comparison between the proposed system and the widely used Google Maps. The fundamental difference lies in the optimization parameter: while Google Maps prioritizes the order of the stops, our model focuses on providing a more optimized path to reach all the points in the least amount of time possible.
The results of this comparison are illuminating. When considering the optimized path provided by our system, the average time difference is approximately 5 minutes and 6 seconds. However, if the comparison is made by considering the order in which the stops are entered, the difference escalates to 35 minutes and 11 seconds. This significant discrepancy underscores the superiority of time-based optimization over Stop-order optimization.



Features

- No Signup required
- Efficient
- Free of Cost
- Fast Route Planning (Multi-point)
- Global coverage
- Multi-point Route Optimization

References

[1] R. Panko, The Popularity of Google Maps: Trends in Navigation Apps in 2018, Jul. 10, 2018. https://themanifest.com/app-development/trendsnavigation-apps (accessed Feb. 25, 2023).

[2] Bharti, A. H., Hasnani, R., Priyadarshan, M., Kanu, K. S., and Savitha, P. B. (2022). Urban Traffic Management using Machine Learning. IEEE. https://doi.org/10.1109/nkcon56289.2022.10126962.

[3] Srivastava, A., Aryan, and Khurana, M. (2023). A survey paper on traffic Prediction using Machine learning. International Journal for Research in Applied Science and Engineering Technology, 11(5), 44–48. https://doi.org/10.22214/ijraset.2023.51390

[4] Erol, M. H., and Bulut, F. (2017). Real-time application of travelling salesman problem using Google Maps API. IEEE. https://doi.org/10.1109/ebbt.2017.7956764

[5] Gmira, M., Gendreau, M., Lodi, A., and Potvin, J. (2021). Managing in real-time a vehicle routing plan with time-dependent travel times on a road network. Transportation Research Part C: Emerging Technologies, 132, 103379. https://doi.org/10.1016/j.trc.2021.103379

[6] Abdul-Hak, M., Al-Holou, N., Bazzi, Y. A., and Tamer, M. A. (2019). Predictive vehicle route optimization in intelligent transportation sys tems. International Journal on Data Science and Technology, 5(1), 14. https://doi.org/10.11648/j.ijdst.20190501.13

[7] Trianggoro Wiradinata Catharina Adinda Mega Cahyani. Traveling salesman problem multi-destination route recommendation system using genetic algorithm and google maps api. International Journal of Computer Applications, 185(18):35–43, Jun 2023