International Journal of Advanced Research and Review

OPTIMIZING THE DELIVERY ROUTES IN ONLINE FOOD DELIVERY PLATFORMS

[1]Mr N.Lakshmi Narayana, [2]Jerripothu Shiny, [3]Daggumalli Victor Joshua, [4]Himmani Kurmeswri, Devi, [5]Srinivas Doma Manikanta Reddy

[1]Assistant, Professor, Dept COMPUTER SCIENCE AND ENGINEERING, Stann's College of Engineering and Technology, Nayunipalli(V), Vetapalem(M), Chirala, Bapatla Dist., Andhra Pradesh – 523187, India
[2,3,4,5]U. G Students, Dept COMPUTER SCIENCE AND ENGINEERING, Stann's College of Engineering and Technology, Nayunipalli(V), Vetapalem(M), Chirala, Bapatla Dist., Andhra Pradesh – 523187, India

ABSTRACT

The emergence of internet meal delivery services has completely changed how people eat. However, optimal supply channels are crucial to these platforms' effectiveness. With an emphasis on Angular as the frontend framework, this research investigates the complex task of delivery route optimization in online meal delivery systems. The study improves the effectiveness of food delivery operations by assessing current approaches, utilizing cutting-edge algorithms, and incorporating real-time data. In order to improve online meal delivery services, the project carefully investigates route optimization techniques with an emphasis on user experience, delivery time reduction, and cost effectiveness. Although consumers have benefited greatly from the quick expansion of online meal delivery services, there are now difficulties in optimizing delivery routes to guarantee effectiveness and customer happiness. In order to enhance the delivery process on online meal delivery platforms, this study investigates a number of optimization strategies and algorithms.

KEYWORDS

Online Food Delivery, Route Optimization, Real-Time Data, Logistics Algorithms, Angular Framework, Delivery Efficiency.

INTRODUCTION

In the current digital era, online food delivery services have drastically changed how individuals order and receive food. These platforms' quick growth has raised the demand for dependable and effective

delivery services. The optimization of delivery routes is one of these systems' most important features. Effective route planning contributes to on-time delivery while preserving food quality. Additionally, it is crucial in lowering operational expenses like personnel and fuel. Delivery route optimization is a complicated procedure because of changing consumer locations, traffic patterns, and weather. Customer preferences and delivery time windows also present additional difficulties. Food delivery services use sophisticated technologies and clever algorithms to get around these problems. Heuristic and metaheuristic optimization methods are among them. Real-time data analytics and machine learning models are also frequently employed. These technologies aid in route selection and traffic pattern prediction. Platforms can reduce delivery delays by putting efficient routing algorithms into practice. Customers are more satisfied and trusting as a result. Overall service quality is also improved by effective delivery processes. In the end, route optimization helps online meal delivery services remain successful and sustainable.

LITERATURE REVIEW:

Several studies have addressed the challenge of optimizing delivery routes in online food delivery platforms. Ulmer et al. (2021) examined dynamic vehicle routing problems and proposed heuristic-based solutions to handle real-time order arrivals and delivery time constraints. Zhou, Ye, and Hu (2022) introduced a multi-stage heuristic algorithm for large-scale food delivery systems that efficiently bundles orders and optimizes courier routes. Their approach significantly reduced travel distance and improved delivery performance. Bi et al. (2023) developed a multi-objective optimization model using metaheuristic algorithms to balance delivery cost and customer satisfaction. The study incorporated real-world factors such as traffic conditions and delivery priorities. Results showed improved efficiency and service quality. These studies demonstrate the effectiveness of intelligent algorithms in managing complex delivery operations. Together, they provide a strong foundation for further research in delivery route optimization.

RELATED WORK:

The related work in delivery route optimization focuses on improving the efficiency of online food delivery platforms through advanced computational techniques. Previous studies highlight the importance of intelligent route planning to reduce delivery time and operational costs. Many researchers have explored heuristic and metaheuristic algorithms to solve

complex routing problems under dynamic conditions. Machine learning models have also been widely used to predict traffic patterns and customer demand. Real-time data analytics plays a crucial role in adapting delivery routes based on traffic congestion and order updates. Several systems integrate GPS and mapping technologies to enhance route accuracy. Web-based platforms commonly use modern frontend frameworks to improve user interaction and monitoring. Angular is often employed for building responsive and interactive delivery management interfaces. Backend services process routing algorithms and real-time data efficiently. These technologies together form the foundation for optimized and scalable food delivery systems.

EXISTING SYSTEM

The existing method for delivery route optimization, as discussed in the related literature, mainly relies on heuristic and metaheuristic algorithms proposed in earlier research such as the work by Zhou et al. and Ulmer et al. While these approaches effectively reduce delivery time and travel distance, they often struggle to adapt fully to highly dynamic real-world conditions. Many existing models assume partially static traffic data, which limits their accuracy during sudden congestion or unexpected route disruptions. Additionally, heuristic-based methods may produce near-optimal solutions but do not always guarantee global optimality. Some approaches require high computational resources when scaling to large numbers of orders and delivery agents. Machine

learning models used in earlier systems often depend on large historical datasets, making them less effective in new or rapidly changing environments. Real-time responsiveness is sometimes limited due to delayed data updates. Integration with modern user interfaces is also minimal in many traditional systems.

PROPOSED SYSTEM

The proposed method enhances existing delivery route optimization techniques by integrating advanced technologies with traditional heuristic approaches. Unlike earlier systems that rely on static or semi-dynamic data, the proposed system incorporates real-time traffic and order data for adaptive routing. Machine learning models are used to predict delivery demand and traffic congestion more accurately. Metaheuristic algorithms are combined with real-time analytics to generate near-optimal routes efficiently. The system leverages cloud-based backend services for scalability and faster computation. Angular is used as the frontend framework to provide a responsive and interactive user

interface for monitoring deliveries. GPS and live map APIs enable real-time route tracking and updates. This integrated approach improves delivery efficiency, reduces delays, and enhances overall service quality.

SYSTEMARCHITECTURE

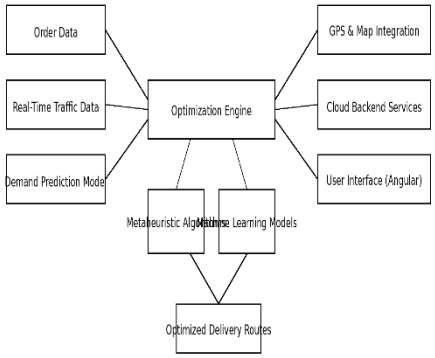

Fig 1:Block Diagram

METHODOLOGY DESCRIPTION

The methodology of the proposed system follows the structured flow depicted in the system architecture. Initially, customer orders are collected through the user interface and stored as order data, including restaurant location, delivery address, and time constraints. Simultaneously, real-time traffic data is gathered using GPS and map integration services. A demand prediction model analyzes historical and current order patterns to forecast delivery workload. All these inputs are sent to the optimization engine, which acts as the core processing unit of the system. The optimization engine applies metaheuristic algorithms to explore optimal routing solutions efficiently. Machine learning models further enhance route selection by predicting traffic congestion and delivery delays. Cloud backend services support scalable computation and real-time data processing. Based on the combined analysis, the system generates optimized delivery routes. These routes are continuously updated in response to real-time changes. The optimized routes are then communicated to delivery personnel through the user interface. Angular-based frontend ensures responsive monitoring and interaction. GPS tracking enables live route visualization and status updates. This integrated methodology ensures reduced delivery time and operational cost. It also improves accuracy in route planning. The system enhances customer satisfaction through timely deliveries. Overall, the methodology enables an adaptive and efficient food delivery routing system.

RESULTS AND DISCUSSION:

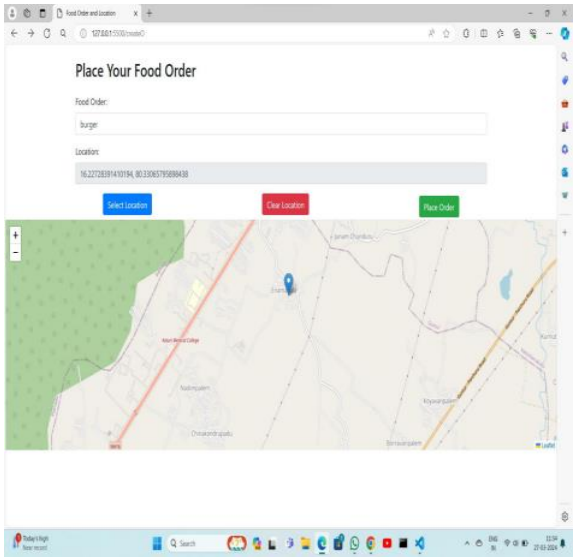

Fig 2:Placing Order Page

It is mainly used to place the order and to see the location and time in the map.

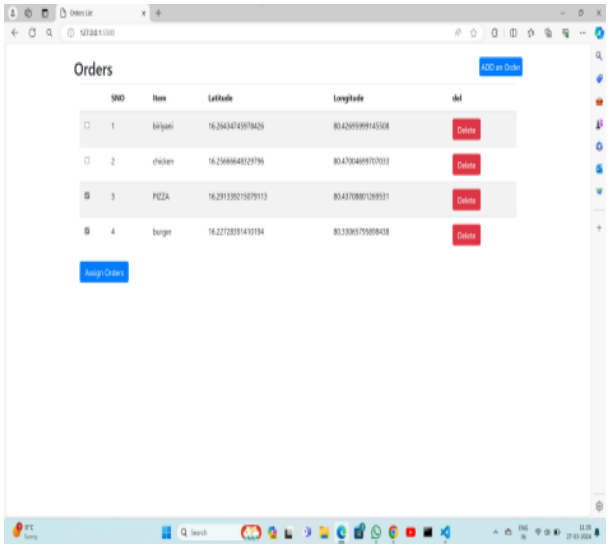

Fig 3: Orders Page

To see the how many orders are placed and to see the delivery status.

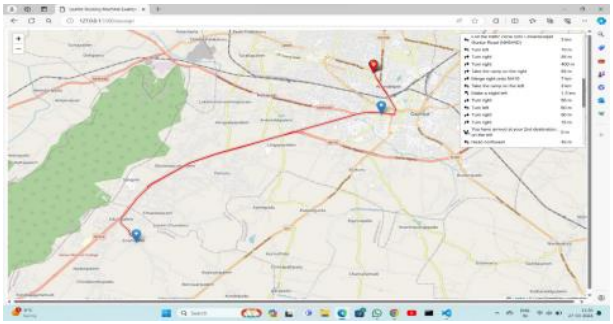

Fig 4:Tracking Page

To see the delivery of the order and track through the map.

CONCLUSION AND FUTURE ENHANCEMENT:

This project focused on optimizing delivery routes in online food delivery platforms using advanced algorithms and modern technologies. By integrating real-time traffic data, machine learning models, and metaheuristic optimization techniques, the system improves delivery efficiency and service reliability. The proposed architecture ensures adaptive and scalable route planning.Future Enhancement:Future improvements can include the use of AI-driven predictive analytics and deep learning models for more accurate demand forecasting. Integration of IoT-enabled smart vehicles and real-time weather analytics can further enhance route adaptability. Additionally, upgrading the system with blockchain for secure transactions and advanced cloud-native technologies can improve scalability,

transparency, and overall system performance.

REFERENCE

1. Harini, D. P. (2020a). Machine Learning Algorithms Are Applied in Nanomaterial Properties for Nanosecurity. *Journal of Nanomaterials, 2022*(1), 5450826.
2. Chu, H., Zhang, W., Bai, P., & Chen, Y. Data-driven optimization for last-mile delivery. Complex & Intelligent Systems (2021).
3. Zhou, L., Ye, A., & Hu, S. A four-stage heuristic algorithm for solving on-demand meal delivery routing problem. arXiv (2022).
4. Singh, D. D., Kumar, A., & Chakraborty, A. Towards fairness in online service with k servers & application to food delivery. arXiv (2023).
5. Yang, D., Hyland, M. F., & Jayakrishnan, R. Tackling the crowdsourced shared-trip delivery problem at scale. arXiv (2022).
6. Haddad, M. N., et al. Large neighborhood-based metaheuristic for pickup and delivery with split loads. arXiv (2018).
7. Xu, H., Qian, W., Guo, K., & Wang, X. Research on takeaway delivery route optimization considering merchant priority. Sustainability (2024).
8. Optimisation of takeaway delivery routes considering mutual satisfaction of merchants and customers. Computers & Industrial Engineering (2021).
9. Verbytskyi, Y. Delivery routes optimization using machine learning algorithms. Eastern Europe Economy & Business Management (2023).
10. A systematic review on delivery optimization in food delivery. Contemporary Transport (2025).
11. Zhao, Y., Alfandari, L., & Archetti, C. Stochastic scheduling and routing decisions in online meal delivery platforms. Eur. J. Oper. Res. (2024).
12. Rashidi, H., Nourinejad, M., & Roorda, M. Generating practical last-mile delivery routes using a data-informed insertion heuristic. Transportation Research Part C (2025).
13. Kancharla, S. R., Van Woensel, T., & Ukkusuri, S. V. Meal Delivery Routing with stochastic preparation times and customer locations. Networks and Spatial Economics (2024).
14. A review of last-mile delivery optimization. MDPI Drones (2024).
15. Meal delivery routing optimization with order allocation strategy. IET Intelligent Transport Systems (2021).

16. Reyes, D., Erera, A., Savelsbergh, M., et al. The meal delivery routing problem. Optimization Online (2018).
17. Beatrici, P., Birolini, S., Maggioni, F., & Malighetti, P. Stochastic fleet size and mix consistent vehicle routing problem for last mile delivery. arXiv (2025).
18. Malik, S., Khonji, M., Elbassioni, K., & Dias, J. Collaborative last-mile delivery with en-route charging. arXiv (2025).
19. The last-mile vehicle routing problem with delivery options. Springer (2021).
20. Vehicle Routing Problem (VRP). Wikipedia overview of VRP fundamentals.
21. Li, X., & Yang, Z. Two-echelon vehicle routing for urban deliveries. MDPI studies on VRP.
22. Martinez-Sykora, J., et al. Multi-objective meal delivery routing in large-scale problems. MDPI Processes.
23. Wang, H., & Gao, L. Hybrid adaptive genetic & neighborhood search for dynamic meal delivery. MDPI studies.
24. Kim, D., & Chung, H. Tabu search for order assignment & routing. MDPI Routing studies.
25. Xie, Y., et al. Receding Horizon Control for dynamic route optimization. MDPI research.
26. Simulation study on optimization of delivery path for group buying. Frontiers in Future Transportation (2025).
27. Time-dependent vehicle routing with memetic algorithm. Computational Intelligence and Neuroscience (2022).
28. Meal delivery routing with crowd-sourced vehicles. LIACS thesis (2022).
29. Vehicle routing for last-mile logistics problems. arXiv (2019)
30. Multiple preference VRP in last mile delivery. Technical Gazette (2024).
31. A multi-objective last-mile VRP model for fresh food e-commerce. World Scientific (2024).