

# AI Driven Strategies in Food Delivery

Yashodhan Deshmukh<sup>1</sup>, Mayura Rangdal<sup>2</sup>, Sakshi Sonawane<sup>3</sup> and Priyanka Deshpande<sup>4</sup>

<sup>1,2,3</sup>Student, Dept. of Artificial Intelligence and Data Science, PES's Modern College Of Engineering, Pune, Maharashtra, India

<sup>4</sup>Assistant Professor, Dept. of Artificial Intelligence and Data Science, PES's Modern College Of Engineering, Pune, Maharashtra, India

**Abstract**—Artificial Intelligence(AI) is transforming and re-shaping industries across the globe. With its ability to analyze massive data, make predictions, provide assistance, and automate complex tasks, AI has become a driving force in the food delivery industry. This comprehensive survey paper explores the significant role played by AI in the food delivery sector. As we dive deeper into understanding AI's significance in food delivery, we uncover its diverse applications and profound impacts. AI is not just making food delivery faster; it's also transforming how apps cater to your preferences and help you, creating a new era of personalized and responsive service. From predicting your favorite dishes, and assisting in offering tailored recommendations, AI is reshaping the food delivery experience offering greater convenience, personalization, and efficiency for consumers and businesses. Through this survey paper, we uncover the ongoing scientific innovations in AI within the realm of food delivery, shedding light on its capacity to revolutionize the sector.

**Index Terms**—Artificial Intelligence, food delivery, sentiment analysis, assistance, chatbot, machine learning, accuracy, model, prediction

## I. INTRODUCTION

The food delivery industry, a crucial part of the hospitality sector, has undergone significant changes with the introduction of Artificial Intelligence (AI). AI has brought about fundamental shifts in how food is ordered, prepared, and delivered to customers. This paper explores the impact of AI on food delivery, looking at how it's changing the way we order, receive, and enjoy our meals. From predicting our favorite dishes to making the entire process more efficient, AI is reshaping the food delivery experience.

## II. AI ENABLED FEATURES

### A. Recommendations and Personalization

Recommendations in AI-powered food delivery apps are like friendly suggestions for what to order. Instead of just showing you a long list of restaurants and menus, these apps use smart technology to suggest options they think you'll like. Recommendations in

AI-powered food delivery apps are aimed at enhancing user satisfaction and engagement by

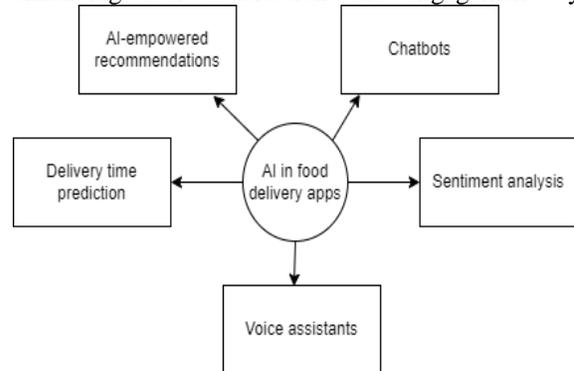


Fig. 1. Overview of AI-powered services providing personalized food suggestions, simplifying the re-ordering process, and strategically promoting additional items to enhance the overall dining experience. Here's how they work:

- **Recommendation-** Recommendations in AI-powered food delivery apps are designed to provide users with personalized food options. These recommendations take into account various factors, including user preferences, user location, and order history. By analyzing this information, the apps suggest dishes and restaurants that are likely to appeal to the user's taste buds.
- **Upselling and Cross-Selling-** AI-powered food delivery apps use upselling to encourage customers to spend more by suggesting higher-priced items or attractive combos that enhance the order's value. Additionally, cross-selling complements the primary order by recommending sides, drinks, or desserts that go well with the chosen meal, improving the overall dining experience and potentially increasing the total order cost. These methods not only boost the apps' earnings but also improve the customer's food delivery experience by offering appealing choices tailored to their tastes.

### *B. Assistance for customers*

- **Voice Assistant:** Some food delivery apps now incorporate voice assistants that allow users to interact with the app using voice commands. Customers can inquire about menu options, track their orders, and make modifications to their orders simply by speaking to the voice assistant, providing a hands-free and user-friendly experience.
- **Chatbot Support:** Chatbots are available 24/7 to address customer queries and concerns in real time through text-based chat interfaces. Customers can seek assistance with various tasks, including, menu recommendations, and issue resolution. Chatbots are designed to provide quick and accurate responses, enhancing the overall customer experience.
- **Real-Time Order Tracking:** Numerous food delivery apps provide real time order tracking features, enabling customers to track the progress of their deliveries on a map. This functionality offers customers an estimated delivery time, thereby reducing uncertainty and enhancing the overall convenience of the food delivery experience. Customers can monitor the status of their orders and receive updates as they are prepared and delivered.

### *C. Sentiment Analysis*

Sentiment analysis in food delivery apps is all about understanding how customers feel based on their feedback. It's a practical tool that helps these apps determine what's working well and what needs improvement. By analyzing customer comments and reviews, food delivery services can spot trends, like which dishes people love, and use that information to make personalized recommendations. It also helps them address issues like late deliveries or order mistakes promptly, ensuring a better overall experience.

### *D. Operational Efficiency*

Operational efficiency is a top priority for food delivery apps, and AI plays a vital role in simplifying various aspects of their operations.

- **Optimized Route Planning:** AI algorithms can calculate the most efficient routes for delivery drivers, considering real-time traffic conditions and delivery time windows. This guarantees prompt

order delivery while simultaneously minimizing fuel costs and reducing delivery times.

- **Demand Forecasting:** AI analyzes historical order data, seasonal trends, and external factors such as weather and holidays to make precise predictions about future demand. This empowers restaurants and delivery services to plan staffing, food preparation, and inventory management more effectively, leading to waste reduction and enhanced resource allocation.
- **Dynamic Pricing:** AI-powered pricing models can adjust menu prices based on demand and supply during peak hours.

## III. CHALLENGES

### *A. Data Quality and Quantity*

AI relies heavily on data and ensuring high-quality, relevant, and sufficient data can be a challenge. Food delivery apps need a vast amount of data on user preferences, restaurant menus, delivery routes, and more to train AI models effectively.

### *B. Integration with Existing Systems*

Integrating AI seamlessly with existing app infrastructure and workflows can be a tough task. There can be issues in making sure AI systems work well with what's already in place, which might lead to compatibility problems and disruptions in the system during the implementation process.

### *C. Costs*

Implementing AI requires a significant investment in technology, personnel, and infrastructure. Smaller food delivery businesses may find it challenging to justify these costs.

### *D. Scalability*

As food delivery apps grow, scaling AI systems to handle increased data and user demand can be a challenge. Ensuring that AI infrastructure can adapt to growth is crucial.

## IV. RELATED WORK

Prior research has explored how AI is used to improve customer assistance, and food delivery efficiency, enhance customer service, and analyze

customer sentiment through language analysis techniques. A. Gaud et al[1] proposed a system that acts as a digital virtual assistant. It uses speech recognition to convert the user's voice input to text and the user's queries are handled using control statements. To handle a variety of user queries they have performed intent classification using the Multinomial Naive Bayes algorithm with an accuracy of 75.43% and the Logistic Regression Model gives 54.22% of accuracy. J. Biswas et al[2] analyzed a total of 5680 user's comments from Facebook pages for online food delivery services. An evaluation conducted of the Bidirectional Encoder Representations from Transformers (BERT model) model with four other applied models is presented: Character-level Convolutional Neural Network, Graph Convolutional Neural Network, Long Short-Term Memory, and Bidirectional Long Short-Term Memory. The BERT model achieved a high accuracy rate of 92.86% and demonstrated superior performance compared to other models, making it a highly effective choice for sentiment analysis in this specific domain. Y. Kovalchuk et al[3] have proposed eight different neural network models to predict customer order prices specifically in dynamic electronic environments like supply chain management (SCM). The Differential Transformation Ten model (DTT model) demonstrated exceptional accuracy, with a minimal Average Relative Error (ARE) of 0.0059 and a relatively high Hit Percentage (HIT) of 0.898. The Rational Transformation Five Fixed (RTFF) and Rational Transformation Ten (RTT) models also performed well, with ARE values of 0.0060 and 0.0061, respectively, and HIT values of 0.901 and 0.895, respectively. Z. Singla et al[4] performed sentiment analysis on a dataset of mobile reviews using the Support Vector Machine (SVM) model, and the classification of the data proved highly efficient, achieving an accuracy after cross-validation of 84.87%. Buyiyan et al[5] proposed a solution for sentiment analysis using a deep neural network. They have mentioned the utilization of TensorFlow 2.2.0 for training and evaluating the model. Three different deep learning models are introduced: Convolutional Neural Network (CNN), CNN with Attention Mechanism, and Long Short Term Memory (LSTM), each designed for text

classification. The results show that the CNN with Attention Mechanism achieved the highest accuracy of 98.45%, outperforming the baseline CNN (96.34%) and LSTM (97.23%). S. du Preez et al[6] have proposed AI chatbot development, which processes voice input as SOAP messages converted to text via a black box approach. The chatbot generates responses using the ALICE system, which demands a heap size exceeding 256 MB and offers seamless integration into various applications. T. Raibagi et al[7] have implemented a digital food ordering system for a college campus, integrating AI technology. The technology stack employed consists of Flutter for the user interface, and backend by NodeJS and PostgreSQL, selected for their development speed and robust performance. Security takes precedence, with JWT token-based authentication in place to safeguard user data. Y. Chen et al[8] have emphasized the role of data mining in optimizing dynamic pricing strategies for e-commerce. To illustrate this concept, they have introduced a dynamic pricing model specifically designed for Taobao, China's top online shopping platform. This model addresses the limitations of Taobao's existing fixed-price auction mechanism, which lacks comprehensive customer insights and competitive information. The dynamic pricing model comprises three essential layers: the data layer, where information is collected, the analysis layer, where data is processed, and the decision layer, where dynamic pricing decisions are made. This approach aims to enhance and refine the decision-making process for dynamic pricing on the platform.

## V. CONCLUSION

In this survey, we have conducted a comprehensive examination of the role of artificial intelligence (AI) in the food delivery sector. Our research has encompassed various aspects of AI-driven strategies within this industry. We started by exploring how AI is utilized to enhance the efficiency of food delivery operations. This involved investigating AI's role in optimizing delivery routes, predicting demand, and dynamically adjusting pricing. These advancements have aimed to streamline the delivery process, reduce wastage, and ensure timely deliveries. Next, we delved into how AI is transforming the customer experience in food delivery. AI-powered

recommendation systems have been a focal point, as they offer personalized food suggestions based on user preferences and real-time data. We also discussed the use of chatbots for customer support, providing round-the-clock assistance for order tracking, menu recommendations, and issue resolution.

Throughout our survey, we acknowledged the challenges associated with AI implementation in food delivery, such as data quality and quantity, integration with existing systems, costs, and scalability concerns. Additionally, we reviewed related work in the field, highlighting prior research that has explored the application of AI to improve customer assistance, enhance operational efficiency, refine customer service, and analyze customer sentiment in the food delivery context. In summary, our survey paper provides an in-depth exploration of how AI-driven strategies are reshaping the food delivery industry, enhancing operational efficiency, and improving the overall customer experience. We have also identified the challenges and opportunities in this evolving landscape.

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