Artificial Intelligence in Online Food Delivery: Exploring Advantages, Opportunities, and Challenges Ahead

Dr. Rashmi Shekhar

Associate Professor and Assistant Director,

Amity Institute of Information Technology,

Amity University, Patna.

Email: rshekhar@ptn.amity.edu

Mobile No.: 9430485001

Ms. Vartika

Master of Computer Application

Amity Institute of Information Technology,

Amity University, Patna.

Email: vartika285@gmail.com

Mobile No.:8544003624

Conference Track : 2

Abstract:

Since the outbreak of COVID-19 Pandemic and the following lockdown, online food delivery services have been evolving like never before. Although technology is not the first thing that comes to mind when we think of food delivery, technology indeed is becoming an integral part of the online food delivery industry. One of the technologies which has revolutionized the food delivery industry is Artificial Intelligence (AI). AI in simplest terms, is the ability of computers and machines to learn, think, and decide just as humans do. AI not only lets food delivery companies estimate user choices and preferences, it also allows them to function more efficiently and accurately. This paper explores how online food delivery platforms are continuously leveraging AI to enhance customer satisfaction by keeping up with the rapidly-changing consumer behaviour. This paper also attempts to identify the facets of AI, the benefits and opportunities AI offers, and the challenges associated with its use. The research is limited to the Indian context and secondary sources of data have been used for the purpose.

Artificial Intelligence in Online Food Delivery: Exploring Advantages, Opportunities, and Challenges Ahead

Introduction:

Artificial intelligence (AI), in simple terms, refers to the ability of computers that makes them able to think, learn and decide like humans. It basically involves development of computers which are able to perform human tasks such as voice recognition, speech recognition, decision making and translation of languages. While the concept of AI came as early as in the first half of the 20th century, it was in 1956 at the ***Dartmouth Summer Research Project on Artificial Intelligence*** (DSRPAI), hosted by John McCarthy and Marvin Minsky, that McCarthy coined the term 'Artificial Intelligence' and talked how humans could use machines for problem-solving and decision-making (Anyoha, 2017). Since then, the concept of AI has been ever-evolving and so have been the various sectors which are benefitting from AI-powered decision making and problem-solving skills.

AI is one of the evolving technologies that have revolutionized the online food delivery industry, especially during the lockdown phase in the COVID-19 pandemic. Whether in India or around the world, AI in food delivery industry has significantly improved food delivery services as well as customer satisfaction.

Objective:

The study at hand has two objectives. The first objective is to identify the benefits and opportunities offered by Artificial Intelligence in the online food delivery industry. The second objective is to identify the challenges in successful implementation of AI in the online food delivery industry.

Literature Review:

Ever since the inception of AI, the discipline is growing rapidly and it can very well be argued that AI is set to affect almost every aspect of life. Martinez -Plumed et al. (2018) argued that while AI is "no different from what computer science has already been doing" (p. 5180), AI has indeed introduced "new adjectives such as 'intelligent', 'smart' and 'cognitive' to almost every process or gadget, from medical diagnosis to personal assistants" (p. 5180). The authors conducted a faceted analysis of the evolution of AI and identified nine facets of AI namely *the functionality facet* which analyses the functionality of the AI systems, *the referent facet* which distinguishes conceptions of AI systems "that go from an anthropocentric view to a more universal perspective" (Martinez -Plumed et al., 2018, p. 5183), *the generality facet* which considers whether AI is concerned with the creation of specific systems or the development of systems that solve a range of tasks, *the location facet*

which depicts "where a system starts and ends" (Martinez -Plumed et al., 2018, p. 5184), *the embodiment facet* which distinguishes whether the AI system is linked to a body or physical equipment or is basically of algorithmic character, *the paradigm facet* which distinguishes the underlying approaches behind many principles and tools of AI, *the actor facet* which identifies the driving forces behind AI as a discipline, *the character facet* which determines whether AI is guided by experiments or whether it is of a more theoretical nature., and *the nature facet* which describes AI according to what kind of discipline it is.

Sinur (2019) studied the facets of AI from the application perspective and identified top five facets. He argued that Machine Learning (ML) is the brightest facet of AI. Following ML, are other facets namely Artificial Neural Nets, Fuzzy Logic, Bayesian Belief Networks, and AI Reverse Chaining (Sinur, 2019). While facets are many, it is well-established that with AI, computers/ machines can help humans perform a lot many tasks with ease, efficacy, and accuracy. Reis, Amorim, Cohen, & Rodrigues (2020) argued that AI technologies are driving the service industry and have greatly helped in reducing service lead time while being both cost-effective as well as error-free.

The use of AI in online food delivery industry has been a remarkable success. Food delivery industry is an extremely dynamic industry which keeps evolving with the development of newer technologies. Digitalization was surely a breakthrough for this industry but AI and ML took it to the next level. It has been argued that terabytes of data for delivery efficiency has led food delivery platforms like Swiggy and Zomato to invest a significant amount in AI and ML (Livemint, 2019). Several authors have explored the possibilities of using AI in the food industry. Kumar, Rawat, Mohd, & Husain (2021) argued that artificial intelligence combined with data science "can improve the quality of restaurants, cafes, online delivery food chains, hotels, and food outlets by increasing production utilizing different fitting algorithms for sales prediction" (p. 1).

Online food delivery companies are implementing artificial intelligence to ensure greater customer satisfaction and improve customer experience. Sinha (2019) argued that with the use of natural language processing (NLP) Swiggy is able to serve to a wider geographic area without considering any linguistic barriers. AI also facilitates use of smart voice assistants for ordering food. In addition to smart voice assistants, AI is helping food delivery systems in classifying vegetarian and non-vegetarian foods based on technologies like image classification. This helps consumers in placing customized orders. AI is helping companies to collect data about the real-time routes, weather, areas, and also in finding the quickest way for earliest food delivery of orders to the customers. Research reveals that food delivery platforms like Swiggy and Zomato are observing significant growth in their user base at an exponential rate and that "95% of restaurant owners said that the implementation of AI technology is improving the business efficiency" (Inference Labs, 2021). Khan (2022) argued that with the use of advance algorithms of Machine Learning, home delivery orders were recorded and analyzed within less time. In addition, ML helped delivery persons learn the shortest route for quick delivery of food to the required customers.

The following section discusses the benefits and opportunities of AI implementation in the online food delivery industry.

Benefits and Opportunities of using Artificial Intelligence:

1) Faster Delivery of Food :
   AI enables faster and efficient planning of delivery of food items by applying different AI algorithms and estimating the average time for reaching different routes. This helps companies deliver fresh foods faster to customers in a very efficient way. Moreover, the AI technology, today, records the previous orders placed by customers and the locations, and lists the eligible delivery persons for an end user. These algorithms consider other factors such as stages of food processing, distance of the location, previous orders etc., and together they help in ensuring improved services to the customer.

2) Recommendations on Food :
   AI is being widely used to recommend foods to users based on various factors such as their previous food orders, their choices of food, their likes and dislikes of various dishes, and the availability of foods based on their interests. This has resulted in a far better approach than previous algorithms, in which, the same static page containing a list of dishes was made available.

3) Chatbots :
   This is also one of the most widely used technologies of AI where users can place their food orders using Chatbots. This chatbot facility can also be customized based on users requirements.

4) Voice ordering and searches:
   Natural Language Processing (NLP) has been a breakthrough development in AI as well as food delivery industry (Infolks, 2021). With NLP, customers can search for food items using voice request and can also place their food orders through voice request. While one may wonder whether voice requests have an edge over typed requests, a study revealed that "phone ordering and online ordering were both better than chatbot ordering in terms of satisfaction and behavioral outcomes" (Leung & Wen, 2020). This suggests that people prefer to place an order through voice/phone than typing and since AI can use NLP, food delivery companies using AI may benefit by drawing more customers.

AI in food industry can provide plethora of opportunities such as improved food packaging, increasing the shelf life, as well as ensuring food safety by making a transparent supply chain management system (Kumar et al., 2021). Robotic delivery and drones can also be some of the major opportunities provided by AI in online food delivery systems. AI enables demand

forecasting as well as quick analysis of data (Chen & Biswas, 2021). Demand forecasting can be done by recording the history of previous orders placed by customers at different locations.

AI in food technologies can also help in identifying food items that are expired, have become outdated or damaged by using different visual recognition techniques and algorithms. It can also help in identifying food items that have gone out of stock, hence assisting the restaurants and hotels to update their food menu quickly and accurately.

Challenges in Implementing Artificial Intelligence in Online Food Delivery:

Some of the challenges of implementing AI in online food delivery are as follows:

1) Expensive :
   The AI models and the implementation of different algorithms in them are very expensive and not every restaurant and hotel can afford them.

2) Difficult implementation:
   In the initial phases, the restaurants and hotels find it difficult to identify and feed relevant data into the AI algorithms so as to get the desired output.

3) Less user-friendly :
   Use of AI in online food delivery such as chatbots etc. makes it less user-friendly for the end-customers as these robots cannot communicate efficiently with them and hence, any enquiry about future delivery conditions cannot be made. This is particularly difficult for the rural population and the older people who are not very tech-friendly.

4) Difficult to achieve objective:
   It has been observed that many companies find it difficult to understand how the AI models and their algorithms should be implemented to achieve their objectives.

5) Technology Malfunction :
   AI technologies such as the chatbots, are, at-the-end, robots. Any small glitch in technology can ruin the entire functioning of the chatbots or the food delivery robots. This suggests that companies need to periodically and regularly check for loopholes and glitches, and fix them as quickly as possible.

6) Security Breach :
   As AI uses different algorithms to store the history of products placed by customer in order to customize and update their menu, the personal data of customers are compromised which could potentially lead to a security breach.

Conclusion:

With the increasing use of online food delivery platform, the use of AI and its algorithms are increasing at an exponential rate. More food delivery companies are implementing the different AI algorithms extensively to ensure faster delivery of foods and ensure customer satisfaction. With more and more evolution of technology, the use of robotic delivery and NLP based voice assistants are definitely going to be an integral part of the online food delivery industry in future. Already, gadgets such as drones are being tested by companies for online delivery of food and groceries (CNBCTV18, 2022; Kroger, 2021). If the challenges of AI implementation are addressed efficiently, its advantages and benefits could be utilized to the fullest.

References

1. Anyoha, R. (2017, August 28). The History of Artificial Intelligence. Retrieved from The History of Artificial Intelligence - Science in the News (harvard.edu)

2. Chen, Y., & Biswas, M. I. (2021). Turning Crisis into Opportunities: How a Firm Can Enrich Its Business Operations Using Artificial Intelligence and Big Data during COVID-19. *Sustainability*, *13*(22), 12656.

3. CNBCTV18 (2022, February 24). Drones may soon deliver food, medicines and groceries in India. Retrieved from Drones May Soon Deliver Food, Medicines And Groceries In India (cnbctv18.com)

4. Inference Labs (2021, August 24). AI In Food Delivery System. Retrieved from https://www.linkedin.com/pulse/ai-food-delivery-system-inferencelabs/?trk=organization-update-content_share-article

5. Infolks Pvt. Ltd. (2021, march 03). Impact of AI in Online Food Delivery System. Retrieved from https://medium.com/tech-break/impact-of-ai-in-online-food-delivery-system-5c65a28aedae

6. Khan, R. (2022). Artificial Intelligence and Machine Learning in Food Industries: A Study. *J Food Chem Nanotechnol*, *7*(3), 60-67.

7. Kroger (2021, May 3). Kroger and Drone Express Partner to Provide Grocery Delivery by Drone. Retrieved from Kroger and Drone Express Partner to Provide Grocery Delivery by Drone - The Kroger Co.

8. Kumar, I., Rawat, J., Mohd, N., & Husain, S. (2021). Opportunities of artificial intelligence and machine learning in the food industry. *Journal of Food Quality*, *2021*, 1-10.

9. Leung, X. Y., & Wen, H. (2020). Chatbot usage in restaurant takeout orders: A comparison study of three ordering methods. *Journal of Hospitality and Tourism Management*, *45*, 377-386.

10. Livemint (2019, February 05). Food delivery apps bet big on AI to boost delivery in India. Retrieved from https://www.livemint.com/companies/start-ups/food-delivery-apps-bet-big-on-ai-to-boost-delivery-in-india-1549362221145.html

11. Martınez-Plumed, F., Loe, B. S., Flach, P., O hEigeartaigh, S., Vold, K., & Hernández-Orallo, J. (2018). The facets of artificial intelligence: A framework to track the evolution of AI. In *International Joint Conferences on Artificial Intelligence* (pp. 5180-5187).

12. Reis, J., Amorim, M., Cohen, Y., & Rodrigues, M. (2020, April). Artificial intelligence in service delivery systems: a systematic literature review. In *World Conference on Information Systems and Technologies* (pp. 222-233). Springer, Cham.

13. Sinha, R. (2019, September 24). How AI is Taking Over the Indian Online Food Delivery Industry. Retrieved from https://www.esds.co.in/blog/how-ai-is-taking-over-the-indian-online-food-delivery-industry/

14. Sinur, J. (2019). Top 5 Facets of AI. Retrieved from https://www.forbes.com/sites/cognitiveworld/2019/07/08/top-5-facets-of-ai/?sh=5e5891ff6485