A Review: Artificial Intelligence in Restaurant Business

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Abstract. Food is an essential part of our lives. India is a diverse country with each region having its own special cuisine. Eating out was not much of Indian style, but the present senior is different. The restaurant industry in India has been emerging at a rapid pace in recent years and is expected to continue in upcoming years also. There has been exponential growth in food ordering startups in India over the past few years. To address this growth technology like Artificial Intelligence (AI) plays a vital role. Not only restaurant but street vendors too are now depended on such technology to increase their sale. The use of Artificial intelligence will transform the restaurant industry and will help India to take a step ahead towards better economy. In this paper, we have presented a review on various AI based approaches utilized in restaurant Business.

Keywords: Food Industry · Indian Restaurant · Street Vendors · Artificial Intelligence (AI)

1 Introduction

The food industry is one of the leading industries in the world [1]. The frequency of eating out differs from country to country and in this Indians lag far behind other Western countries and even some Asian countries.

As per the analysis of National Restaurant Association of India (NRAI), probability of dinning out among Asian varies from 60 times a month for Chinese to 45 times a month for Thai people and 15 times a month for Indonesians to 3–4 times a month for Indians [2]. Despite the less eating out habit of Indians, Indian restaurant industry does not have to worry much as there are numerous options of growth for this business. The scenario in India is changing and a vast pool of women is working as well as families are becoming nuclear which has increased the frequency of eating out or ordering. Another factor is the concept of double-income of household, exposure to global cuisines through television shows especially (cooking shows) as well as traveling abroad. On the other hand, India itself is a hot tourist destination and people from around the world are coming, which has

given new options and the level of restaurant services have also been enhanced. As per the report of NRAI, the food services market is estimated to be more than 5,00,000 crore in 2022. The Indian restaurant industry is growing at an annual rate of 7%, however, the organized segment is rapidly growing at an annual rate of 16%. Though in pandemic time it was the worst hit industry and many restaurants were permanently closed.

The Indian restaurant industry can be broadly categorized into 3 segments: The first one is full service which includes family dining, casual dining, and fine dining. The second segment is quick services which basically include fast foods. The third segment is quick casual which includes Paav Bhaaji etc. In the year 2021–22 dining inn in a restaurant was decreasing considerably but take-away increased tremendously. Maximum orders for such takeaway were online or by telephonic which has raised the urge of involvement of IT development to manage the demand-supply chain and also monitor the smooth execution of the right order, etc. All these issues can be addressed completely with the use of Artificial intelligence (AI) algorithms or computer vision (CV). By using the AI-based system, production and delivery processes of food can be efficiently handled and also enhances the operational competence [3–5].

Artificial intelligence (AI) is nothing but a set of programs which are designed to accomplish a particular task by responding to specific environments or inputs. As this program depends on their context it seems that they tend to imitate human behaviour. Machine learning (ML) is just a part of AI which involves a program or a specific machine "learning" functions that analyses input data and provide related suggestions as for example in zomato you get suggestions based on history. Depending upon the use of site (that is what you order) the algorithm continues to "learn" your behaviour and provide suggestions based on it. Therefore in broader terms Machine learning (ML) is a part of artificial intelligence (AI) that assists software to predict and create accurate inventory. Also, Machine learning algorithms use past data as input to predict new output values, whereas deep learning (DL) addresses more complex and abstract problems. While computer vision (CV) assists computer systems to obtain information from visual inputs. Combination of all this system will play a revolutionary role in the food chain market.

2   Existing and Proposed Applications

The food business scenario in India is changing every single day. Being an occasion-driven place, it has become a place to be. Competition in this sector is cut-throat and retaining staff is even a great challenge. If we talk about in-hotel restaurants they bring in the specialty chefs to do the cuisine. To keep up the standard and growth of 5-star in-hotel restaurants various food fests are organized and for that expert chefs in different categories are required. It is an expensive affair to maintain such qualified staff and food served at such in-hotel restaurant are costlier too. On other hand, many new restaurants are mushrooming which provide 5 start quality foods at a much lower rate, but the problem is that there is always someone who is copying your recipe and idea. Hence, to be in business new age technology is needed and artificial intelligence (AI) can be the answer. Following are the areas where artificial intelligence (AI) can be very useful:

2.1   Reduce Errors

In a restaurant due to human error lot of things can go wrong. Errors happen in restaurants every day, either due to poor communication or staff making simple mistakes. For example, a server (waiter) in a busy dining room might mishear a guest's order, resulting in the guest receiving the wrong dish. But when guests order via AI that is using digital menus and kiosk system, there are less chances of human error. For example, the Eatsa a restaurant in San Francisco allows there customer to order and receive a meal without having to speak or interact with a human. Thus, this transaction may be considered to have become 'virtualized' [6]. AI-powered sensors come with a variety of modules which are intended to decrease human error and creating major efficiency gains. By following exactly what goes into delivery orders and warning the team when the order is assembled wrongly, the technology promises to reduce refunds and waste by more than 50%. Several restaurant owners believe that digital solutions like the food ordering system via mobile app or website have increase sales and provide them an upper edge over their competitors.

2.2   Shelf Life of Food

Continuous monitoring is required for raw materials like vegetables, fruits, meat, fish, flour or pluses, etc. as well as for pre-cooked food. Generally food type, for example, fast food or Indian food like Punjabi sabji the grave or base of that dish is prepared in advance and stored. If the dedicated staff fails to monitor then some perishable product may become unfit to be used and need to throw-out but it will be a finical burden. It may happen that some restaurants may even overlook this hence knowing the shelf life of food is an important factor from the consumer point of view. Artificial Intelligence (AI) Computer Vision (CV) can play a vital role in determining its shelf life and indicating which product is to be consumed first or prioritized using techniques. Hence a high rise in Shelf-life prediction technology has been observed. Also, the owner of the restaurant can tie with local vendors and he can monitor the quality of fruit or vegetables or flowers or meat or fish, etc., which are purchased for its restaurant. At each and every stage of the food supply chain, Shelf-life prediction technology aids businesses growth. For a country like us where a large amount of vegetable and fruits etc., if not sold on same day create financial loses to vendors or framers. But with the proper use of Artificial Intelligence (AI) this can be solved and framers of our country can get a better deal as well as with the use of data set they will have an idea about how much amount of vegetable or fruits etc., should be plucked from there field. So, Proper use of Artificial Intelligence (AI) can help change the senior of our farmers and vendors.

2.3   Blend of the Menu by Using AI Algorithms

For a country like India having such a diversified population to keep them delighted constant innovation in food is required. Artificial Intelligence (AI) can be useful in this. A single recipe can be cooked in number of ways by combining the ingredients in proper proportion, controlling Cooking time etc. Basic ingredients of various recipes are mostly same, so using a vast dataset which are available online allows the exploration

of components in several cuisines from common man to professionals. For example, Marathi food has some similarities with Gujarati and Rajasthan food but preparation method may differ. The technologists can review which food components have a decent savor and mark a cuisine that is popular in a few provinces. India is becoming the hot hub for tourists from all around the world, these tourists love Indian food but they find Indian food spicier. With basic use of artificial-intelligence-based algorithms the chefs can use various types of combinations of ingredients that will surely result in broadening the menu and will also help in customizing dishes for our "Atithi" – the tourist (interstate as well as global). This will result in more customer satisfaction and increase sales of a restaurant.

Another advantage of Artificial intelligence (AI) is customers can have the privilege of customizing their order well in advance and also allow the restaurant to store its information for further use. Pick hours for restaurants are generally from 7.00 pm to 10.30 pm, within this time frame any restaurant tries to accommodate as many guests as possible but, it's a time-consuming process. As every guest takes time in deciding.

Their order and after that preparation time is also required, so to manage large inflow is tough. To keep them waiting for a long time can lead to losing customers in long run. Hence, ordering in advance through the digital platform can help in reducing waiting time and restaurants can accommodate a large number of guests in a limited period, and also it will enhance customer services.

2.4   Food Waste

Still many people in our country sleep without food and so monitoring the waste of food is necessary. Maximum waste is observed at the event like a wedding and secondly dining in a restaurant. Many restaurants have set up various processes and technologies, including inventory management systems to reduce food waste and manage inventory costs. These technologies can assess fresh produce (veg, fruit, etc.) and help to tell the number of days it has left. This information about the shell life of whichever batch of fruits and vegetables, fish and meat, etc., can be useful in understanding and predicting how long food will last. Which ensures that only high-quality product reaches the customer, so it helps reduce food waste. The use of AI can help to reduce wastage at the same venue and help to track the items that are about to expire soon, as well as brings into light those items that are being underutilized. Besides this, by using appropriate programs using machine learning algorithms the thrown food can be identified. AI can also help by designing out avoidable food waste and preventing edible food from being thrown away. As per the report by the Ellen MacArthur Foundation and Google, with research and analytical support from McKinsey, they found that AI can have the biggest impact on the transition to a circular food system.

Using technology solution systems launched by Winnow, a whole new approach to the massive problem can be addressed. Based on preliminary results, the new technology is extremely promising. Utilizing computer vision and machine learning, the technology may well revolutionize food management in restaurant kitchens. Using a touchscreen display, restaurant staff can know what type of food they have just thrown away into the system. Over the period, it learns to recognize different foods that are being disposed of in the bin. So it can calculate the financial and environmental cost of this discarded food

on a cumulative basis. Hence restaurants can then adjust their food purchasing decisions accordingly, reducing their spending amounts as well as their contribution to food waste.

3   Street Food Vendors

In India, street food has a gained reputation over the years. As per data obtained from various food websites, a prominent growth in this sector is observed. For a country like us, the local food system is very fragile and about 91% of the total workforce is from the informal sector [7]. To be in business Street vendors are constantly striving to maintain the quality of food and serve great variety at nominal cost. They have always held a significant place in the economic processes of India [8].

With the entry of technology in this sector the senior is changed and have great potential for further development too. Social media has helped to reach a larger amount of people, owing to greater internet access. New age aggregators such as Zomato, Swiggy, UberEats, etc., prompted unorganized vendors to catch up to sell food online [9]. Further Zomato a food delivery and Technology Company has scaled up its program to support about 300 street vendors on its platform, across six cities in the first phase [10]. Also, a rise in B2B supplies (hyperpure) is seen in the last 2 years and is expected to grow with the involvement of artificial intelligence with computer vision. Swiggy has partnered with a research institution, industries, and various universities to work together in developing innovative models using artificial intelligence, machine learning with computer vision, etc.[11]. As Street vendors play a vital role in the economy of our country government under the Prime Minister Street Vendor's AtmaNibhar Nidhi (PM SVANidhi) Scheme has signed a memorandum of understanding with the Ministry of Housing and Urban Affairs (MoHUA) with Zomato. Deepinder Goyal Founder and CEO, Zomato believes that the use of AI and ML will serve as a milestone for this informal sector.

4   Conclusion

Few years back restaurant business was about guest satisfaction, but today it is about customer delight. Technology like AI, ML, CV play a great role to achieve it. Not only restaurant but street vendors as well as small farmers, local dairy etc., too will be using technology to increase their sale. This will increase the circular economy as well as it will take our country towards self-sustainability- Atmanirbhar Bharat. It can be concluded that artificial intelligence (AL) can play a vital role in transforming restaurant business.

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