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UPSERVE – Restaurant Sales and Analysis System

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Abstract - *In the current world of technology, we can improve everything with help of technology same is the case with restaurant systems. In restaurant we need waiter to place order, customers are not sure about what to order, restaurants face difficulties on analyzing their sales, customers many times decides what to order only to know that it is not available etc. all these problems can be solved using technology by providing both customer and restaurant a software solution/platform that will provide customer with dynamic menu, recommendation system and admin with analysis of their sales. Therefore, we propose a web application where we are offering the customer a better management service and admin an easy-to-use environment where he/she can easily operate based on the reports generated by sales analysis. This will also boost the sales of the restaurant and it will be one of the key strategies to grow in the food business.*

Key Words: Restaurant Management; Dynamic Menu; Food Recommendation; Data Retrieving; Tasks Allocate; Business Intelligence

1. INTRODUCTION

The project revolves around how to improve the restaurant systems based on the current scenario. In restaurant we need a waiter to place order, customers are not sure about what to order, restaurants face difficulties on analyzing their sales, customers many times decides what to order only to know that it is not available etc. Therefore, the web application we are proposing can be mere strategy to boost the restaurant business since we are providing the customer a better UI using web development technologies and, recommendation system based on our previous sales and admin a graphical representation of sales using data analysis where he can operate on real time menu provided by the technology.

Whereas A restaurant sales and analysis system is a software tool that helps restaurants manage and analyze various aspects of their business, including sales data, inventory, menu planning, customer information, and staff management. This type of system can provide insights into restaurant performance and help owners make data-driven decisions to improve operations, increase profits, and provide a better customer experience. Some common features of a restaurant sales and analysis system include sales reporting, inventory management, customer relationship management, and Online ordering and delivery management, etc.

1.1 Features:

Here are some additional features that a restaurant sales and analysis system may offer:

1. **Sales tracking and reporting:** This feature helps restaurants keep track of their daily, weekly, and monthly sales, including revenue, sales by menu item, and sales by payment method.
2. **Inventory management:** This feature allows restaurants to monitor food and beverage inventory levels, set reorder points, and track food waste.
3. **Customer relationship management (CRM):** This feature helps restaurants track customer information, including contact information, purchase history, and preferences, and provides insights into customer behavior and purchasing patterns.
4. **Menu planning and optimization:** This feature allows restaurants to optimize their menu offerings based on sales data, customer feedback, and trends in the industry.
5. **Marketing and promotions:** This feature help restaurants create and manage marketing campaigns, including email, SMS, and push notifications, and track the results of those campaigns.
6. **Online ordering and delivery management:** This feature allows restaurants to manage online orders, including food delivery and takeout orders, and track delivery status.

These are just a few examples of the types of features that a restaurant sales and analysis system may offer.

1.2 Objectives

Our objective is

1. To provide a clean and easy to search menu system with accurate details of dishes and what it involves.
2. Real Time Menu allows to show if the following dish is available or not based on resources availability.
3. Highlights in a graphical representation the timely sales of dishes help in deciding factor of whether to keep selling or eliminate the dish and much more.

4. Recommendation system highlighting the key options available for the customers according to the previous orders.

5. The system should help the restaurant to track customer feedback, analyze customer behavior, and take action to improve the overall customer experience.

6. By using a sales and analysis system, a restaurant can gain a competitive advantage over other restaurants that do not have access to similar tools and insights.

2. LITERATURE REVIEW

In [1], they have focused on making the customer service better by making the order preparation timeless by considering things like which order dishes should be prepared, taking the order through the device that users have brought with them rather than taking orders by a waiter, not serving wrong or someone else's dish to the customer as these things creates bad user experience and because of which restaurant suffers loss. They have also used the concept of a 3D menu. the menu which we see in the restaurants shows items' name and price and, in some cases, a small description about the dishes but the problem of not knowing the ingredients of the food remains at many places so showing the ingredients of the dish inside the menu will also help to create better user experience as people can avoid dish which has an allergic effect on them or any specific spice or item that they do not like this will, in turn, increase the sales of the restaurant. They have discussed methods to decide which order to prepare first they have considered ordering time, preparation time, and other factors like giving priority to dining customers. Algorithm considering these factors will decide in which order the dishes should be prepared. They have also described making a unique menu for recommendation by putting those dishes first on the menu which are more favorable for customers according to their profile on Facebook, but we will make use of their profile on our database to provide the recommendation.

In today's generation, everyone is in a race to build the best management website possible. Therefore, it is essential to identify the upcoming trends in the market. Dr. Zainab [2], given information about the data analysis algorithms. This paper illustrates that how to analyze the data based on sales. Based on the algorithms mentioned in the paper, they had generated sales patterns. They had also extracted patterns from customer data. Now all these patterns are used for optimizing the sales. Classifying the customer data patterns are a very important factor for business support and decision making i.e., modifying the real-time menu by the administrator. They had also analyzed the database system which consists of item reviews and ratings which helps them to segregate the items based on the different profiles and an easy recommendation process. Based on these ratings, they have compared the items. Therefore, the higher the ratings the more the item got sold and vice versa.

Day-by-day on increasing priorities of the population, satisfying every customer is becoming a huge challenge. Therefore, Jinat Ara and others [3] illustrates how to analyze the reviews and ratings provided by the customer. But in star rating review, often there is a mis-leading since every customer is not so patient with reading every question given by the restaurant and rate accordingly. Therefore, to understand the customer sentiment properly the written reviews are provided those days. To analyze this unstructured material, we'll need to use Natural Language Processing. Sentiment analysis, often known as opinion mining, is a method for determining the strength of a review by automatically calculating the sentiment polarity. Therefore, in this way we can compare the items and filter the necessary recommendations to provide the customer.

Lasek, A., Cercone, N., Saunders, J [4] presents a brief review of the literature and a classification of restaurant sales and consumer demand techniques. The literature provides a variety of forecasting methodologies and models.

Aji Achmad Mustofa and Indra Budi [5] focuses on providing a recommendation system by using the similarities between item and user by using collaborative based filtering and content-based filtering. There are two models that are formed first model will focus on items. It will be used to access the similarities and find the value for similarities between items. The second model will focus on user. it will work on the similarities between the user and will find value for the similarities between users. Algorithm they used is nearest neighbor Algorithm. The method that we will be using for making the recommendation for the user for ordering the dishes will be based on the sales and popularity of the dish in the restaurant and the profile of the user. The profile of the user will have details like age, gender, name etc. and based on these factors' recommendation will be decided by the algorithm.

R. V. Ravi and coauthors [6] proposes an android-based restaurant automation system. The project's main goal is to make restaurant management easier. Most restaurants now order and deliver food items manually, which has the disadvantage of taking a long time and, in some cases, not delivering the right item at the right time, which causes many problems. As a result, we considered automating this procedure with modern electronic technology. They had provided digital touch screen for selecting menus and ordering, touch screen will show the prices and menus according with this customer will orders the items. The order from each table is wirelessly transmitted to the kitchen via Bluetooth. The electronic menu system assists people in selecting food from the rolling screen of an Android touch screen, as well as seeing the cost and recent availability of food items, as well as showing table number. Using a thermal printer, the hotel staff can read the items from each table and take the bill from the kitchen. After food ready in kitchen, an LED glows which indicates to respective tables. They made

only order automation work they was not concentrating on data analysis part of the system.

Md Shamim Hossain and coauthors [7] describes a study of predicting customer feedback for restaurants using machine learning algorithms. The study shows how machine learning techniques, such as decision trees and random forests, can be used to analyze customer feedback data and provide valuable insights for restaurant managers.

Parallel systems like the ones in KFCs, Burger King, BBQ, etc exists. These places also have the system of digital menu and billing and payment method option but the problem of the user to wait for the waiter or to be in queues to order food still exists moreover we are focusing this on the small business who do not know that much about technology. The restaurant will have no need to buy as much hardware as compared to the system in the above-mentioned restaurants because the user is ordering the food through their device rather than ordering it through the device of restaurant. We are also providing recommendations which are not provided in the above-mentioned restaurants.

3. SOME IMPORTANT FEATURES

Here are some the important features included in this project:

1. **Sales tracking and reporting:** This feature helps restaurants keep track of their daily, weekly, and monthly sales, including revenue, sales by menu item, and sales by payment method.

2. **Inventory management:** This feature allows restaurants to monitor food and beverage inventory levels, set reorder points, and track food waste.

3. **Customer relationship management (CRM):** This feature helps restaurants track customer information, including contact information, purchase history, and preferences, and provides insights into customer behavior and purchasing patterns.

4. **Menu planning and optimization:** This feature allows restaurants to optimize their menu offerings based on sales data, customer feedback, and trends in the industry.

5. **Online ordering and delivery management:** This feature allows restaurants to manage online orders, including food delivery and takeout orders, and track delivery status.

4. RESTAURANT DATA ANALYSIS

In this system, data analysis refers to the process of collecting, organizing, and interpreting data to gain insights into various aspects of the business. These insights can then be used to make informed decisions that can improve operations, increase revenue, and enhance the customer experience. Some common types of data analysis performed through this system include:

1. **Sales analysis:** This type of analysis involves examining sales data to identify trends, patterns, and opportunities for growth. For example, sales analysis may reveal which menu items are selling well and which ones are not, which days or times are busiest, and which payment methods are most popular.

2. **Inventory analysis:** This type of analysis involves examining inventory data to identify trends, patterns, and opportunities for cost savings. For example, inventory analysis may reveal which items are frequently running out of stock, which items are expiring quickly, and which items are contributing to high levels of food waste.

3. **Customer analysis:** This type of analysis involves examining customer data to identify trends, patterns, and opportunities for growth. For example, customer analysis may reveal which customers are the most loyal, which customers are most likely to make repeat purchases, and which customers are most likely to refer new customers.

4. **Item Recommendation:** This type of analysis can be used to suggest items to customers based on their previous behavior and preferences. In the context of restaurants, item recommendation can be used to suggest menu items to customers based on their past orders, or to suggest similar items to customers who have ordered a particular dish.

5. **Customer Feedback analysis:** Customer feedback analysis can be used to understand customer satisfaction, identify areas for improvement, and measure the impact of changes to the restaurant's offerings or service.

These are just a few examples of the types of data analysis that can be performed in a restaurant sales and analysis system. By using data analysis, restaurants can gain a better understanding of their business, identify areas for improvement, and make informed decisions that drive growth and success.

5. PROPOSED SYSTEM:

For this system there will be two type of users one will be the customer and other will be the management side of the restaurant. This system provides both of them with different functionalities which suits their requirements.

5.1 Customer Side

Customer will be able to access the system through their device. They will be provided with login and register page after which they will be able to order food from the restaurant and do payment for the ordered item. Customer will also be provided with menu and suggestions about the famous food items of that particular restaurant. After the

order has been completed the order will be shown to the chef in kitchen and he order will be prepared by them. Figure 1 shows a basic layout about the customer side.

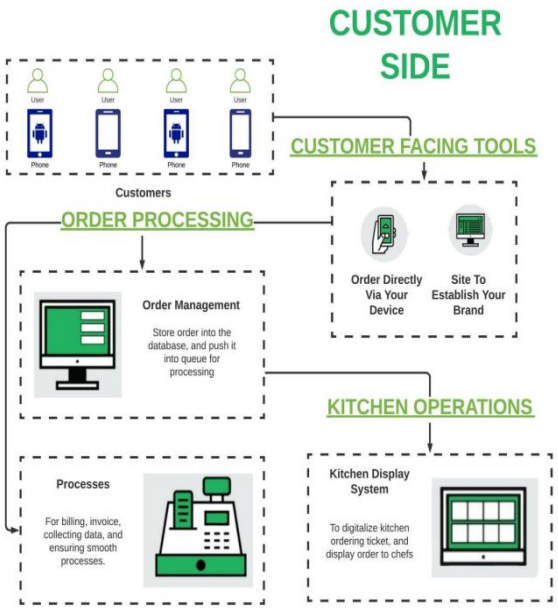

Fig -1: Customer Side System

5.2 Administration Side

On management side there are two major focus one is the dynamic menu and other is analysis of sales of the restaurant. Restaurant will be provided with a feature that will allow them to change the menu according to the availability of the dishes in the restaurant. Apart from this the system provide restaurant with the analysis of the sales of the restaurant which will help them take decisions about changes in particular dishes like what dish they want to keep or discard from their restaurant or what dish they have to work more on so that customer will find those dishes more enjoyable. Figure 2 shows basic layout about the management side.

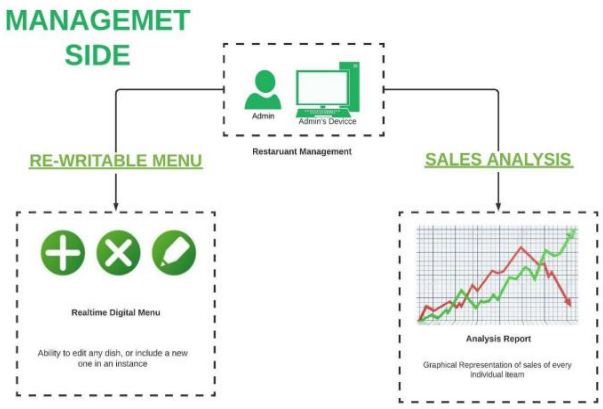

Fig2: Administration Side System

6. RESULTS

This system provides easy to use user interface for the customers. The administration of the restaurant is provided with option to edit, add and delete dishes form the menu they can also see all the orders that have been placed, all the customers that have registered to the website and the option to unregister them and they also have the data about which dish is performing good and which dish is performing bad based on the quantity of the products three groups are made least selling, moderately selling, not selling. Also, various kinds of analysis are done at admin side. Following various diagrams shows some User Interfaces.

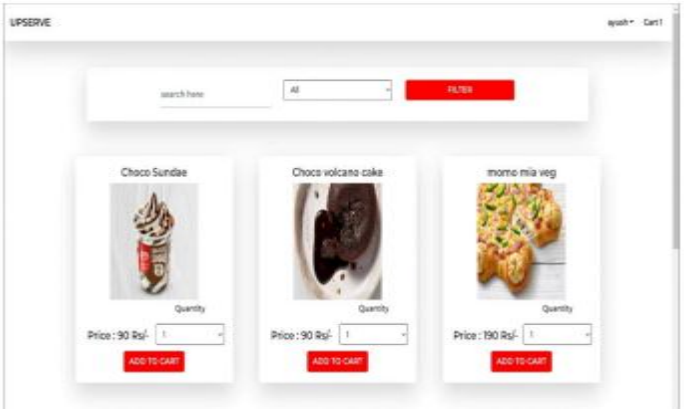

Fig3: Customer Order API

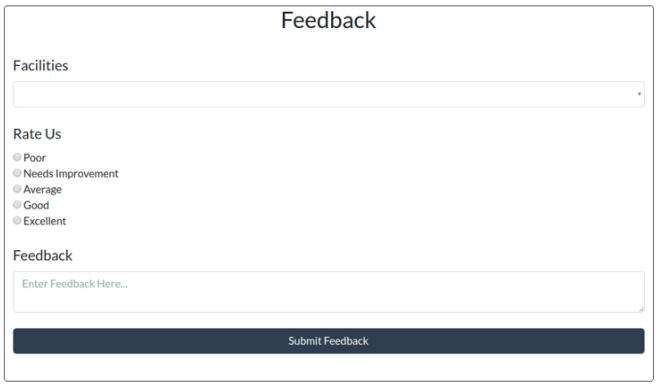

Fig4: Customer Feedback

Fig5: User List at Admin Side

Fig6: Restaurant Item List at Admin Side

Fig7: Data analytics according with sales data

7. CONCLUSIONS AND FUTURE SCOPE

In the increasing demands of this new era, it's becoming very difficult to satisfy the customer same is the case in the business of restaurant. But, through this software both the administration and customer will be satisfied, as the client can get his sales reports which includes the sales prediction of each dish and dishes are divided into three groups least selling, moderately selling, not selling and they can also do the changes required in the menu and also see all the orders placed whereas the customer will get easy to use user interface where they will be able to easily order the food from the restaurant. Therefore, we can expect the rise in the sales and the customers of the restaurant. Customers will also have good experience through our easy to use and attractive user interface.

The future of restaurant sales and analysis systems is expected to be driven by the increasing use of technology, data-driven decision-making, and the need for more personalized, efficient, and effective customer experiences.

REFERENCES

[1] Vindya Liyanage, Achini Ekanayake, Hiranthi Premasiri, Prabhashi Munasinghe, Samantha Thelijjagoda, " Foody – Smart Restaurant Management and Ordering System", Dec 2018

[2] Dr. Zainab Pirani, "Analysis and Optimization of Online Sales of Products" , March 2017

[3] Jinat Ara, Md. Toufique Hasan, Abdullah Al Omar, Hanif Bhuiyan, "Understanding Customer Sentiment: Lexical Analysis of Restaurant Reviews" , June 2020

[4] Lasek, A., Cercone, N., Saunders, J. (2016). Restaurant Sales and Customer Demand Forecasting: Literature Survey and Categorization of Methods. In: , et al. Smart City 360°. SmartCity 360 SmartCity 360 2016 2015. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, vol 166. Springer, Cham. https://doi.org/10.1007/978-3-319-33681-7_40

[5] Aji Achmad Mustofa and Indra Budi , "Recommendation System Based on Item and User Similarity on Restaurants Directory Online" , May 2018

[6] R. V. Ravi, A. N.R., A. E., H. P. and J. T., "An Android Based Restaurant Automation System with Touch Screen," 2019 Third International Conference on Inventive Systems and Control (ICISC), Coimbatore, India, 2019, pp. 438-442, doi: 10.1109/ICISC44355.2019.9036365.

[7] Hossain, M.S., Rahman, M.F., Uddin, M.K. and Hossain, M.K. (2022), "Customer sentiment analysis and prediction of halal restaurants using machine learning approaches", Journal of Islamic Marketing, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JIMA-04-2021-0125

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