

## Digital Ordering System and Customer Flow Prediction for Restaurants Using Data Mining

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### Abstract

Technology has almost started its journey in each and every field of our life, but still in some important areas such as food industry or food serving industries such as hotel, motels and restaurant. Even in the age of technology, the traditional pen paper method is followed by many restaurants for receiving the orders, which in turn wastes a huge amount of time of both, the restaurant and the customer. Various earlier efforts were done to bring the technology in the field of food serving industries. PDA KIOSK and Computer based techniques tried to improve the service with use of technology but faced some issues like wastage of customer time and efficiency of service. Each technique had its own advantages and a set of disadvantages. The proposed system tries to analyze the various existing systems and determine the drawbacks of each to overcome them in the proposed system. This system improves efficiency and accuracy for restaurants by saving time, eliminating human errors, getting customers feedback. As the system is automated, it becomes economical even from restaurants point of view, as it reduces manpower and it just requires one-time investment in installing the devices at tables along with this the prediction and data mining used in the proposed system is useful for the management level for managing the resources.

*Keywords---* Digital food-ordering system, Wireless food ordering system, Android application, Touch based food-ordering system, On site Automated food-ordering system, Data mining, Prediction.

### I. INTRODUCTION

This Standard of living of people has developed with rapid economic and technology. By using of technology our life becomes easier and convenient and almost every field technology has developed. In adopting new technology the food industry still lags behind as compare to other technology especially automation in different processes. After many years restaurants and hotels follows completely manual process of paper and pen system in food ordering. In the model of traditional system paper and pen method, the waiter write the orders from customers, takes these orders to the kitchen, updates them in records, delivers the ordered of food items at the exact table and then makes the bill. This system is conventional and too sluggish. This system require more manpower and thus is prone to human errors.

It consumes a lot of time by apart from this human error. It disturbs the patience of a eating and hangout place and results in clutter. So, this process often leads to dissatisfaction between the customers, as sometimes time taken by waiter for taking order is very long. In recent past, some systems like KIOSK technology, PDA based system and multi touchable restaurants management systems were developed to automate the food ordering system. However, the output of these systems were not up to the expectation as we think. They provide unattractive and uninformative menu details, and they were also very costly to adopt. To overcome these drawbacks of the system, a digital based food ordering using an android application is proposed to automate the food-ordering system. This system provides an effective user interface through the android application system. It also facilitates the prices of all the menu items along with their images

so that it becomes very easier for the customer to order. It provide facility to give customized personal message to the manager for the items of food order. It provides a facility to allow the customer to give feedback to the manager. It also facilitates to the customer to call a waiter, using the android application, for help.

## **II. RELATED WORK**

### **A. Pen and paper based traditional system.**

First, This is the very easiest and the widely used system today. In this traditional system, every time customers enter into the restaurant and search his table, a waiter comes at customer table and show him a food menu card.

Waiter then waits with a notebook and a pen to take the customer's order. The waiter then write down the order of the customer in his notebook and the order is stored in the paper. Finally, the order is forwarded to the chef in the kitchen. Although the food ordering system in this system is very easy. Since, this system is a complete manual system, there is a more chance of human errors to note their order due to many reasons such as while taking the orders the waiter may miss some food items to add in the order, the other human error is that the paper of notebook could get damaged by fire, or could get lost or mishandling. The food menu cards having the list of food items are also in a hard paper. So, if the manager wants to change or update the food menu lists or the price of the food items, then it would require him to change the menu details in each and every food menu cards present in the hotel. It is quite evidently cumbersome task to update details in every card. So, eventually it leads to replacement of all the menu cards with the new one, which would make to a great wastage of papers. Mostly in every hotels menu cards might require very minute changes for which it is not at all convenient to replace all the food menu cards with the new menu ones. We can say in simple words, these paper-based menu cards lacks dynamicity. It even becomes a very tough task for a hotel manager to analyse the food order lists of customers to find the best-selling food items and the peak hour of restaurants to increase its market. There is no proper tracking system process in this paper and pen-based food ordering process. Waiter has to

continuously check with the chefs to find which orders are ready. They also need to check frequently which tables are empty, which are full and which tables need clearance. All these things and to maintain the process, require a big manpower that is costly even from hotel point of view. It comes up with wastage of time, paper as well as money. So, there is a need among hotels to change this process in order to stand out in this competitive food industry.[1]

### **B. Personal Digital Assistant (pdas) system.**

There were no. of improvements have already done in the food-ordering process, one among them was Personal Digital Assistant based system. PDAs devices are that which is easy to handle and portable. It is a wireless system. Some examples of PDA based system are I-Menu, WOS, and FIWOS. These food-ordering systems enable waiters or customers to key in order using mobile devices, called PDA (Personal Digital Assistant).

When a waiter or customer takes the ordering process, the order details are forward to the server from the PDA. The waiters collect the PDAs used by a customer so that other customers can use it. These PDA systems may be a better efforts towards automated food-ordering system over traditional system which is paper and pen based system but it has many limitations too such are discuss below. PDA system process may increase the restaurant expenditures during the peak hours, as in the peak hours the restaurant needs large numbers of PDAs to serve every customer.

There is no other way to get a real time feedback from the customers, in PDA based system. Technical information details are required for the restaurant manager to modify or update the food ordering menu list. The User Interface of the PDA system is not so effective. It consists of only textual information of food menu. There are no prices and images of food items. So, it contains uninformative and unattractive details about the menu list.[2].

### **C. Kiosk Based System**

KIOSK system is a screen that have the complete menu of food list. It is more advanced than previous systems which is already discuss. It is not only cover the textual information of the menu items but

also include their prices and images of every food-items. KIOSK screen is installed near to the cash counter. Whenever, a customer enters into restaurant he has to check the food menu list at the KIOSK screen system. He searches through the list and selects his food items and completes the order. Payment is also complete through the system of KIOSK screen by a suitable payment option. He receives his order number with their name. His ordered list along with the order number is sent in kitchen. After that order of customers is ready and the order number is displayed or announced on the screen at the cash counter. The customer has to come to the counter and receive his order. This process, although, is more advanced than the previous two systems.

It has also too limitations such as if the restaurant is in its peak hours and is crowded with more customers then this system ends up in make a big queue for the KIOSK screen. It leads to inconvenience and frustrations among the customers. Eventually, it becomes even a worse option than other two systems in that case. This is the greatest drawbacks of this system. However, this process shows to be good with restaurants having moderate number customers or the restaurants that do quick orders such as, fast food.[3]

#### *D. Computer based food ordering*

This process is same to KIOSK system. In this process, when customer come into the restaurant, he/her has to tell the food orders to the cashier and pay the payment. The person on cash counter makes a bill with order numbers and name. After, order the customer has to wait in his table to their food. The cashier forward the order of the customers to the chef in the kitchen. When the order is ready, the waiter serves the customer order at his table. This technology being similar to the KIOSK system has similar limitations as that. If more number of customers come in the restaurant then it would become difficult for the cashier to handle the orders from each customer and forward to the kitchen.[4] Before applying classification methods pre-processing is required. In which, class imbalance and feature selection are some of the issues need to be considered. There are some literature existed to

address these issue. SMOTE is an oversampling technique used to address the class imbalanced problem[5,6]. Authors of the research article [7] applied the SMOTE with ensembling approaches for increasing the prediction rate of kidney disease data. Filter based feature selection algorithms have been applied by the researcher for the classification of SONAR signal data [8,9]. Symmetrical Uncertainty based feature selection method have been applied over some of the medical dataset to derive the best features before applying classification algorithms [10,11]. Feature selection based on correlation coefficient and Symmetrical Uncertainty is proposed by the researchers and applied over various dataset belongs to diverse areas [12].

### **III. PROPOSED SYSTEM**

The proposed system digitalize the food ordering system by taking the order from the android device placed on the table itself. The system does not demand for the customer to have the Android device with him, even though the customer is not having the Android device with him still he can order the food in the restaurant or hotels. The one-time investment will require for the hotel or the restaurant management for the placing of Android device on the table itself from where the customer can order the food oh his choice by using the application already installed in the device. Along with this the wi-fi router will also required for providing the network facility. The android device and the database server will be connected to the router. Whenever the customer will visit the restaurant or the hotel he will order the foodOf his choice through the app itself. The food ordered by the customer will send to the manager, cashier and the chef.

Everyone of them have the separate functioning with the ordered food item. The chef will prepare the food ordered and will give the waiting time to the customer from which customer will come to know the time he have to wait. The same order will

also be forwarded to the cashier which will help in automatic bill generation. The manager will also have the details of the customer details and food ordered by customer. The whole data of the customer and the food ordered by the customer will be stored in the database which will be accessed only by the manager. The data mining and the prediction done on this dataset will help the management level to manage their resources. The prediction will result in the number of customer visiting the restaurant, the most sold food item on that day. The whole system is convenient and user friendly and cost effective from point of view of both the customer and the management of the restaurant or the hotels.



Fig.1

The figure displays the attractive menu screen display and the details of every menu item is displayed to the customer

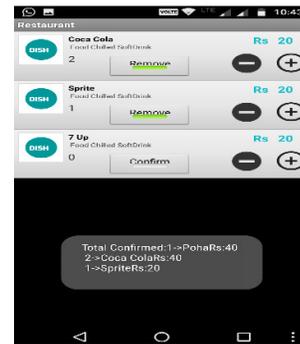
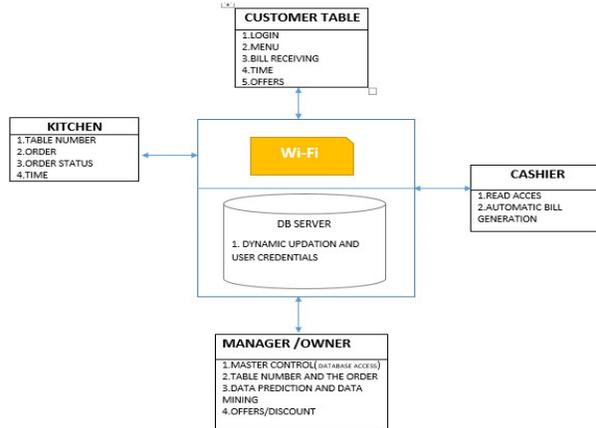


Fig.2

The customer can select the menu item that he wants to order with ease.

A. System Architecture



The system architecture describes in detail about the system. All the four modules are connected to the database server through the wi-fi router. The fields in each module shows the working related to them.

IV. RESULT

The result is shown in terms of the figures.



Fig.3

After selecting the menu the confirmation pop up is generated for the customer on screen through which he can decide what to do.



Fig.4

After confirming the order the total bill is generated for the customer and the menu item ordered by him.



Fig.5

The waiting time is displayed to the customer from which he can understand for how much time customer has to wait.



Fig.6

After confirming the success message is generated.

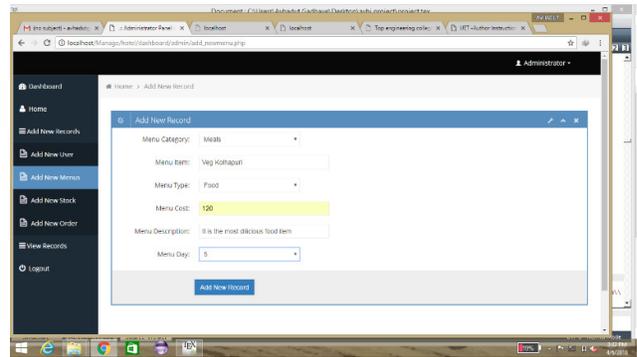


Fig.7

The dynamic menu editing can be done by manager at any time.

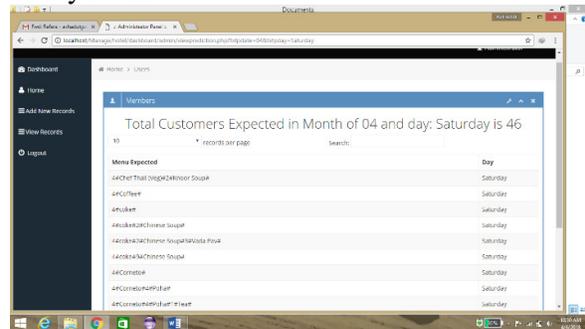


Fig.8

The prediction results in predicting the customer flow by which the management can manage their resources accordingly.



Fig.9

At the chef side the orders from different table are visible to the chef in kitchen which helps them in preparation of it.

Table Orders in Progress		
OrderID	Order Menu	TableNo
140101_14101	Order Menu	TableNo
140101_14102	Order Menu	TableNo
140101_14103	Order Menu	TableNo
140101_14104	Order Menu	TableNo
140101_14105	Order Menu	TableNo
140101_14106	Order Menu	TableNo
140101_14107	Order Menu	TableNo
140101_14108	Order Menu	TableNo
140101_14109	Order Menu	TableNo
140101_14110	Order Menu	TableNo

Paid Bill Orders		
OrderID	Order Menu	TableNo
140101_14111	Order Menu	TableNo
140101_14112	Order Menu	TableNo
140101_14113	Order Menu	TableNo
140101_14114	Order Menu	TableNo
140101_14115	Order Menu	TableNo
140101_14116	Order Menu	TableNo
140101_14117	Order Menu	TableNo
140101_14118	Order Menu	TableNo
140101_14119	Order Menu	TableNo
140101_14120	Order Menu	TableNo

Fig.10

At cashier side the order in progress and completed orders appear to cashier in cluster.

## V. CONCLUSIONS

In this section, we discuss the automated food ordering system for the hotel or restaurant. The system is compared to earlier food ordering traditional system. It has the potential to attract customers to the restaurant and changing their dining experience in efficient way, even will help in completing the dream of digital INDIA. The idea can be improved to add an extra functionality of accepting payments through debit cards, credit cards or through mobile wallet, in the customer's app. It can also be extended to accept the food items order by customers from outside the restaurant and hotel by making an application that can be used by the customers to place orders from their office and home.

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