A PROPOSED APPLICATION FOR WIRELESS CUSTOMIZABLE FOOD ORDERING SYSTEM USING DATA MINING TECHNIQUES

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ABSTRACT

The advancement in information and communication technology has greatly influenced the business transactions. In earlier days, food industry traditionally has lagged behind other industries in adopting new technology. However rapid advances in computer technology and heightened expectations of consumers have forced the food industry to bring automation in the process. Nowadays, the adoption of wireless technology & emergence of mobile devices has led to automation in the food industry. The business and services in restaurants can be improved with the combination of wireless and mobile technologies. The competition in restaurants with respect to business has increased with the advancements in food ordering techniques. In this paper, an automated food ordering system is proposed which will keep track of user orders smartly. Basically we are going to implement food ordering system for different type of restaurants in which user will make order or make custom food by one click only. The implementation of this system will be done using android application for Tablet PC's. The front end will be developed using JAVA, Android and at the backend MySQL database will be used.

Keywords: Android Application, Cluster, Data Mining Techniques, Frequent Item Sets, Wireless food ordering system.

I. INTRODUCTION

The basic problem in the food service industry is that restaurants are not realizing efficiencies that would result from better applications of technology in their daily operations. The earlier food ordering system was entirely a manual process which involved waiters, pen and paper. The waiter had to note down orders from customers, take these orders to kitchen, update them in records and again make bill. Even though this system is simple it may involve human errors in noting down the orders. There are many reasons leading to the feeling of dissatisfaction including being entertained late in terms of order taking by the waiter and meals serving. To overcome these limitations in manual system, multi-touchable restaurant management system is proposed in this paper to automate food ordering process.

The food restaurant with automated food ordering system will be equipped with a user-friendly touch screen, display screen in the kitchen, and software for completing the process at the backend. For this system there will be a system administrator who will have the rights to enter the menu with their current prevailing prices. The

system administrator can enter anytime in the system by a secured system password to change the menu contents by adding or deleting an item or changing its price. Now when the customer enters the restaurant, customer will place his order with the help of the touch screen using the intuitive graphical user interface, right from the selection of menu items, confirming the order and viewing offers. The customer will select from the food options according to his choice and the system will display the payment amount customer has to make once finished with the order.
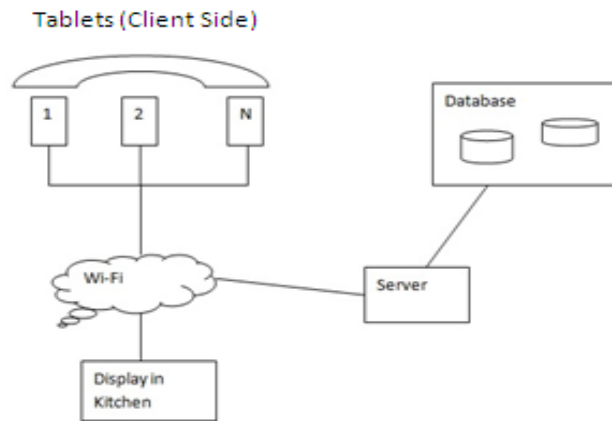
II.   RELATED WORKDONE

In [3] here an application of integration of hotel management systems by web services technology is presented. Digital Hotel Management integrates lots of systems of hotel industry such as Ordering System Kitchen Order Ticket (KOT), Billing System, Customer Relationship Management system (CRM) together. This integration solution can add or expand hotel software system in any size of hotel chains environment. This system increases quality and speed of service. This system also increases attraction of place for large range of customers. Implementing this system gives a cost-efficient opportunity to give your customers a personalized service experience where they are in control choosing what they want, when they want it – from dining to ordering to payment and feedback.
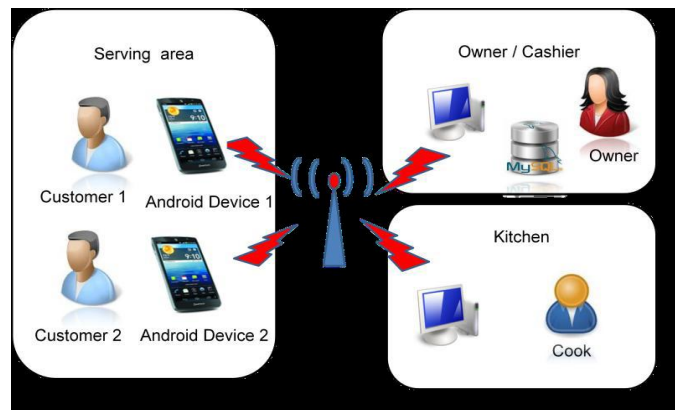
Also in [4] paper they done a research work aims to design and develop a wireless food ordering system in the restaurant. The project presents in-depth on the technical operation of the Wireless Ordering System (WOS) including systems architecture, function, limitations and recommendations. It is believed that with the increasing use of handheld device e.g. PDAs in restaurants, pervasive application will become an important tool for restaurants to improve the management aspect by utilizing PDAs to coordinate food ordering could increase efficiency for restaurants and caterers by saving time, reducing human errors and by providing higher quality customer service. With the combination of simple design and readily available emerging communications technologies, it can be concluded that this system is an attractive solution for the hospitality industry.

III.   PROPOSED SYSTEM

In this system customer orders the food by using android based touchpad. Figure shows the system architecture, which cover three main areas of the restaurant: the serving area, the restaurant owner's working desk (cashier table), and the kitchen. Customer first orders the food from the touchpad looking at various combination of food which is further carried to the kitchen for fulfilling the order and the same is passed for billing at the each customer's tablet.

Fig 1 System Architecture

Fig 2 Working of Proposed System

Following are the major system functionalities in the proposed system-

1. Tablet on Table

There will be a tablet on each table. This will allow the customers to browse the food items as many times as they wish. Customer can view the suggestions for a particular menu item generated by the system. Customer can enter his/her details during bill payment. This helps the Restaurant owner to analyze the service and can notify the customer regarding different offers through messages or emails.

2. Suggestions for Customer

The Restaurant owner can post various combinations of menu items on tablet. This will help the customer to place the best order and increase sales.

3. Attractive Presentation

The Menu is organized in an attractive way. There are images of every food item which will make the view of customers more clear about how the food will look like after delivery. There is an attractive use of various themes and color schemes.

4. Modifiable Menu

The menu can be modified by the Admin manager. Admin manager can add, update, delete menu items.
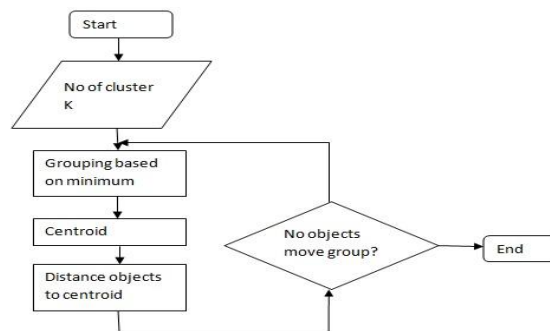
5. Market basket analysis for a restaurant.

Generating frequent itemsets from the previous placed orders and suggesting their combinations to customers, this knowledge can also be used for promoting the other non-frequent items.

6. Customer relationship management

7. Based on the classification in k-means appropriate text messages are sent to customers offering them attractive discounts and other suitable deals.

IV.   ALGORITHMS USED

i) K-means Clustering

Fig 3 Flow of K-means Clustering

This is an algorithm to classify or to group your objects based on attributes/features into K number of group. K is positive integer number. The grouping is done by minimizing the sum of squares of distances between data and the corresponding cluster centroid. Thus, the purpose of K-mean clustering is to classify the data.

Algorithm: The k-means algorithm for partitioning, where each clusters center is represented by the mean value of the objects in the cluster.

Input:

k: the number of clusters,

D: a data set containing n objects.

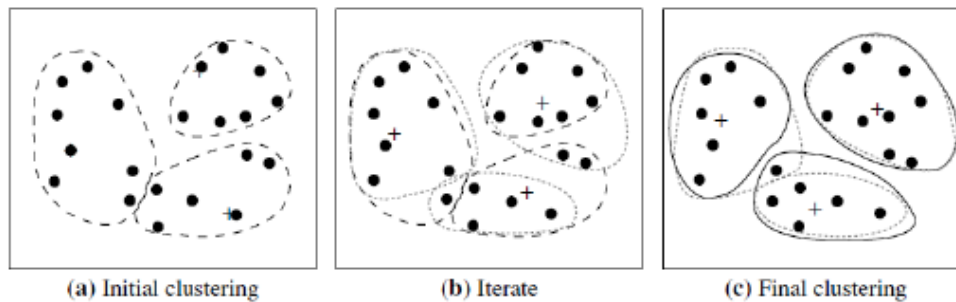Output: A set of k clusters.

Method:

(1) arbitrarily choose k objects from D as the initial cluster centers;

(2) repeat

(3) (re)assign each object to the cluster to which the object is the most similar, based on the mean value of the objects in the cluster;

(4) update the cluster means, that is, calculate the mean value of the objects for each cluster;

(5) until no change; Cluster by k-means partitioning.

(a) Initial clustering   (b) Iterate   (c) Final clustering

Fig 4 Clustering of a set of objects using the k-means method; for (b) update cluster centers and reassign objects accordingly (the mean of each cluster is marked by a c)
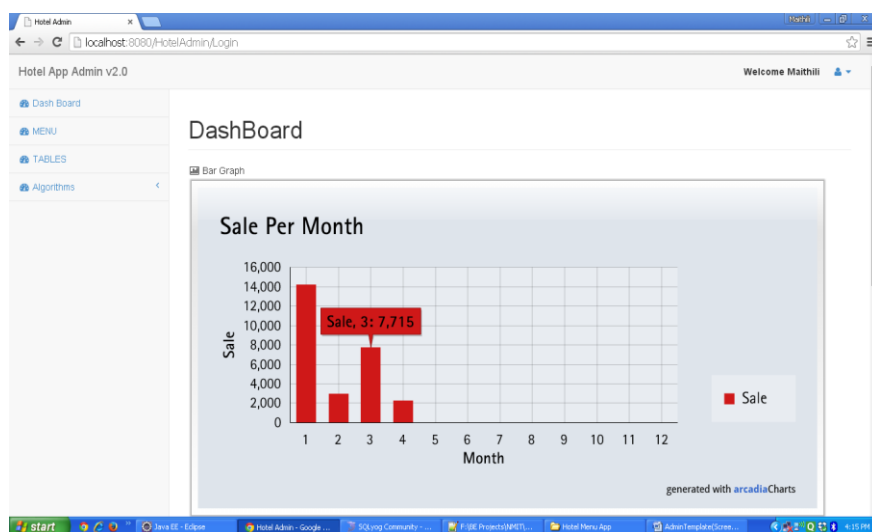
ii) Apriori Algorithm

Association rule generation is usually split up into two separate steps:

1. First, minimum support is applied to find all frequent itemsets in a database.

2. Second, these frequent itemsets and the minimum confidence constraint are used to form rules.

Apriori uses breadth-first search and a tree structure to count candidate item sets efficiently. It generates candidate item sets of length k from item sets of length $k - 1$. Then it prunes the candidates which have an infrequent sub pattern. According to the downward closure lemma, the candidate set contains all frequent k-length item sets. After that, it scans the transaction database to determine frequent item sets among the candidates.

V.   SYSTEM RESULTS

The wireless food system has mainly three modules i.e. admin module, online website and android application. Following are some of the screenshots of the implemented system.

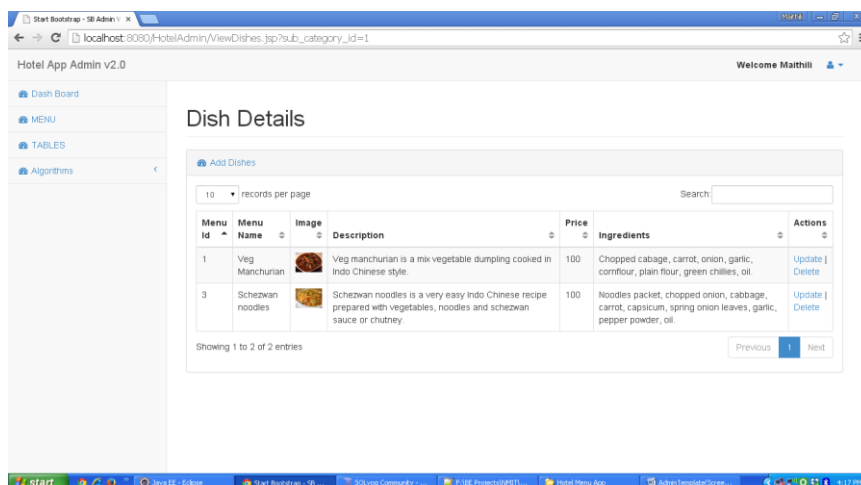**Fig 5 Screenshot showing bar graph of Sale per month in Admin module**

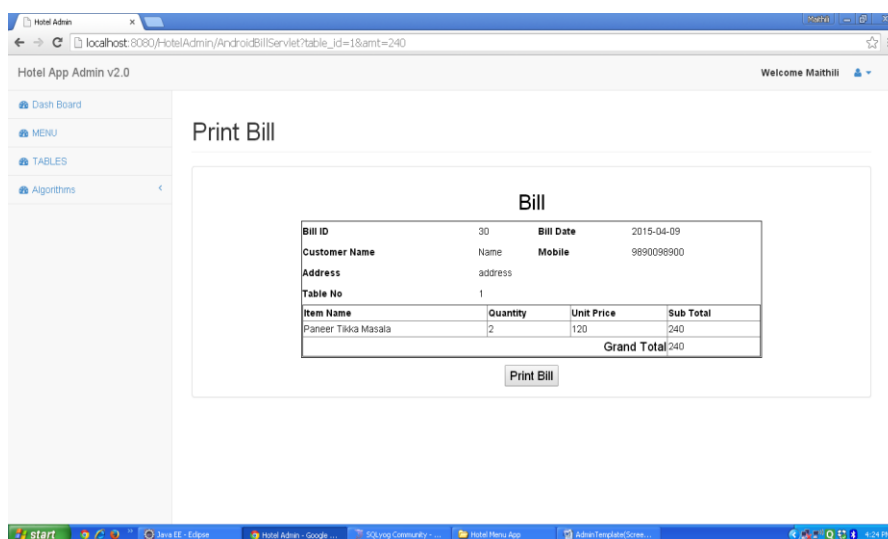**Fig 6 Screenshot showing dish details in Admin module having actions like update & delete**

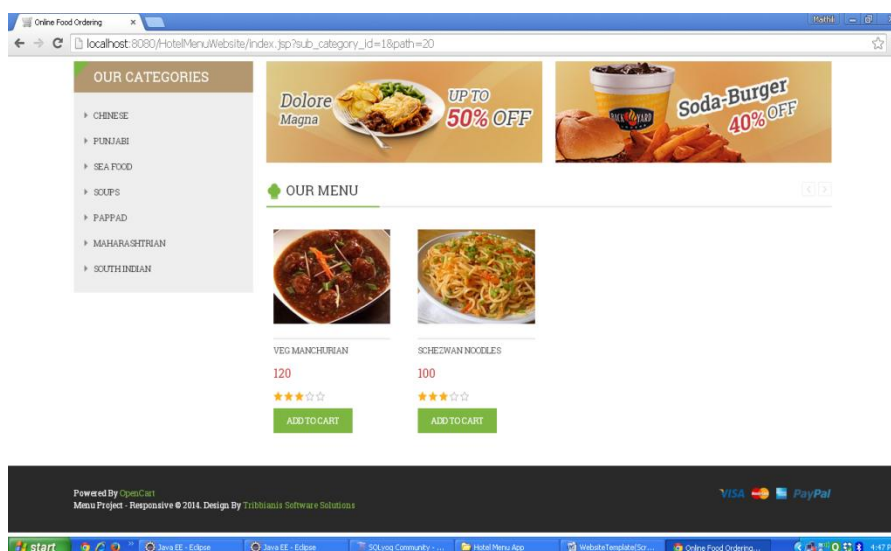**Fig 7 Screenshot showing bill generated for customer on table number 1**

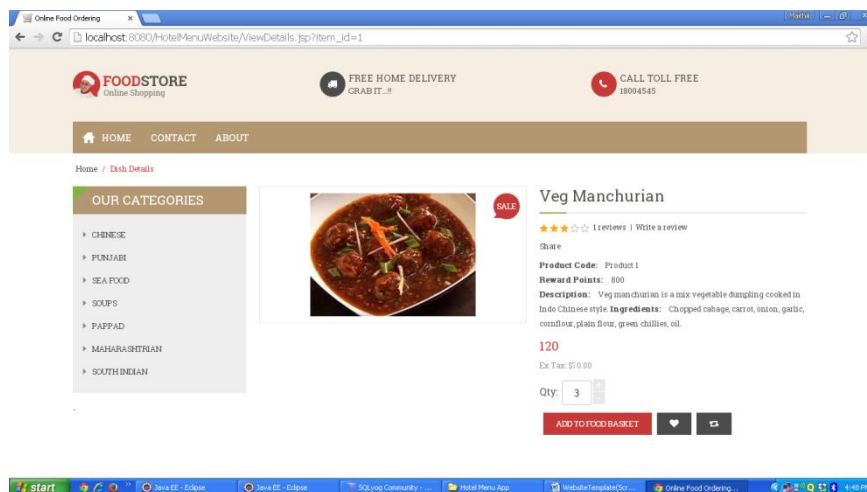**Fig 8 Screenshot showing customer website for online food ordering**

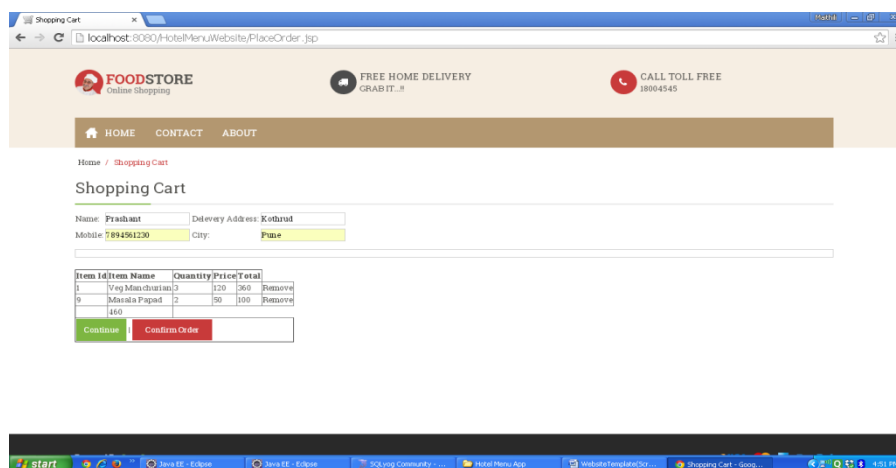**Fig 9 Screenshot showing functionality of "Add to Food Basket"**

Fig 10 Screenshot showing order confirmation form

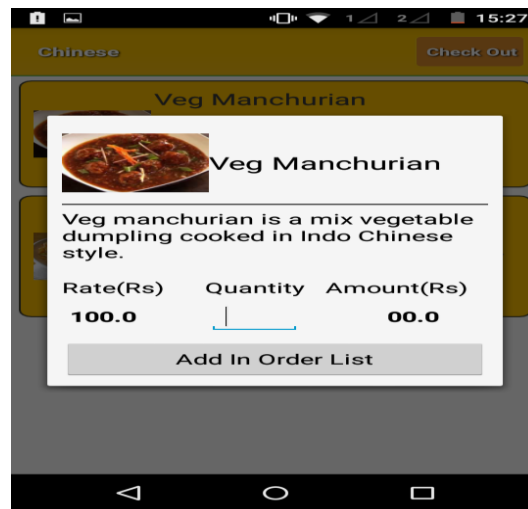**Fig 11 Screenshot of android application where table id is selected**

Fig 12 Screenshot showing dish that can be added in order list by customer
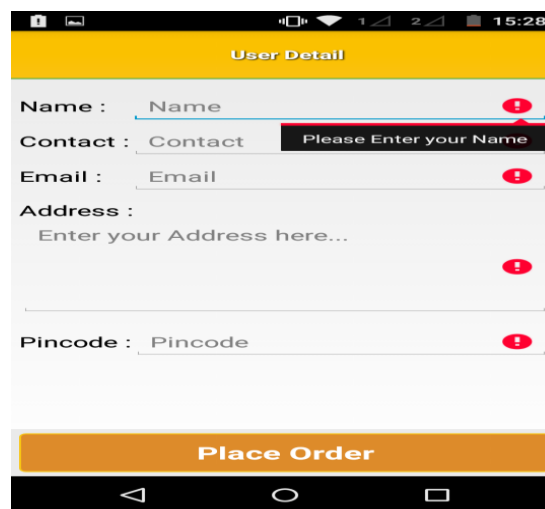

Fig 13 Screenshot showing bill confirmation form where customer details are sent to the server

VI.   CONCLUSION

In future, work can be done on providing provisions to accept different types of payments like credit cards, debit cards, tips, etc. The system can be further extended to register and link multiple restaurants to enhance the dining experience of customers. The implementation of such type of proposed automated system will minimize the number of employees at the back of the counter. Also the system will help to reduce the cost of labor. As there are lots of orders at the restaurants, there is possibility of human errors during calculations or taking orders. By using this system, such type of errors can be eliminated and controlled up to some level. The proposed system would attract customers and also adds to the efficiency of maintaining food orders at different tables in the restaurant. The another advantage of the automated food ordering system is that the system will be available 24 hours for 365 days, because the machine is not going to take any sick or vacation leave. The proposed system will have an admin module which will help the restaurant owner to get the required analysis. Data mining techniques like apriori, k-means are used to perform association mining and clustering operation.

The proposed system makes use of these data mining techniques for recommendation and clustering features to acknowledge the frequency of customer in restaurants and to get the preferred combinations of menu items.

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