

Online FDS

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Abstract

The online food delivery system is one of the fastest growing marketing strategies for food and hotel industries to gain more profits. Food is a basic need for every human, major business and industries. It is difficult for business professional, students to get fresh food available on daily basis due to the workplace busy schedule. So to make good food available at ones doorstep we started a online food delivery service through a very reliable and secured android FDS application. FDS have a multi-vendor system with user friendly dashboard. FDS has the most famous vendors in the city and a wide variety of food items. A user can order his/her favorite food following easy steps. He/she can choose the vendor of his/ her choice and go through all the food items it provides. He/she then, can select the food items and place the order. Now he/she has to proceed to payment. People can enjoy their favorite food without ever leaving sofa. Thus FDS designed to save the time of waiting at vendor location; user can order the food in advance by our app.

Keywords: *Clustering, GPS, Delivery System, Scheduling, Google Maps, Android Application*

INTRODUCTION

India has a rich tradition of home-made food industry. But the change in the life style has welcomed the food online delivery applications. The digitalization

has boosted the technology usage of people. Food is the biggest necessity of life and this online food delivery service lessens the efforts. Food delivery is gaining popularity with more and more

people especially the younger generation turning to mobile food ordering apps, thereby changing the way food is delivered and picked up. Customers prefer using the food ordering app over ordering food online. The customer can generate an order without having to explain it to another human being and have the food delivered at his doorstep. The online food delivery seems to grow 30% over the normal food industry.

There are many new entrants joining this segment day by day. The various food market players in India are Swiggy, Zomato, Food Panda, Fasoos, Box8, fast food delivery app etc.

Customer satisfaction increases customers' loyalty to a product or food service provider. One way to improve the customer satisfaction is by having a ordering system which enables customer to purchase food online which then can be delivered to the customers address safely and in a good condition. In delivery system one of the main problem is to find the shortest path between customers addresses in order to deliver the food in shortest time, so as it will save the fuel usages and to optimize the utilization of vehicles and delivery person[2].

In proposed system, the areas are get divided into different clusters, clusters get divided into zone according to customers address. The routing problem that is related to food delivery service is resembles Travelling Salesman Problem. In TSP delivery boy starts moving from his location and is required to visit several customers exactly once before going back to his location with minimum total distance[10]. In addition, the system also uses Global Positioning System (GPS) technology and Google Maps. The GPS technology can be used along with Google Maps Application Programming Interface (API) to make the proposed delivery service system working better. GPS technology can return the coordinate of specific position and Google Maps gives information about streets name and directions while travelling [2].

The application uses smartphone used by the delivery staff. This application is used to access information about the customer, their orders, the address for delivery and the recommended route that should be passed. FDS also records the position of delivery staff so that the customer can check the position of his / her ordered food.

MOTIVATION

Customer crowd is very large about 20 to 30 crore. Its difficult for business professionals as well as students to get a fresh food available on daily basis due to workplace busy schedule. The application mainly targets to them. With the use of this application people are able to select the food of their choice. They get their delivery in right time.

LITERATURE REVIEW

The present online ordering food economy allow users to apply a single tap of their mobile phone to order from a wide array of Vendors, so we want to check some literature to understanding in what reason online food delivery are quite important for people in this century. Using online food ordering services is gaining popularity in cities. The customers prefer eating in, as compared to going out to a restaurant when there are issues of traffic congestion. Customers' attitude towards online food purchase also showed the convenience, no hassle and ease of use as the major factor, also the preference among the mobile food app is choice based on the perceptions of consumers' reviews or feedback the smart systems can cut down the paper and time of the waiter at restaurants to write down the menu. This is

enabled by the online food delivery system.

A traditional paper-based system is one of the most commonly used food ordering systems. All entries in this system are stored on paper. The waiter used traditional food order processing by bringing a paper-based menu to the customers, and then waiting for the customers to select an order from the menu. After placing the order customer have to wait till his order get fulfilled. Thus it takes lot of time to serve the order to the customer.

In order to minimize the waiting time for the end user online delivery system started service to the user at their doorstep. This system improves the method of taking the order from customer. The online food ordering system sets up a food menu online and customers can easily place the order as per their choice. This system also provides a feedback system in which user can rate the food items. Also, this system can recommend hotels, food, based on the ratings given by the user, the hotel staff will be informed for the improvements along with the quality. The user has provided his own ID and password so that he can made payment securely online or pay-on-delivery. System

is based on customer needs. The system is developed for consider the issues related to all customer which are included in this system. Wide range of people can use this if they know how to operate android smart phone. Thus, implementation of Online Food Ordering system is done to help and solve one of the important problems of people.

The Delivery person has its own login ID. Using this ID and verified mobile Number he can login to the system. All today's order list will be viewed with respective zone to the delivery person with end users address. GPS system is provided so as customer can track their order. Some of the challenges faced by the online food delivery businesses are delivering within the time frame and optimization of the resources. Efficient and cost-effective algorithm through allocation and routing problems that aims at identifying optimal solutions and near-optimal solutions by identifying routes that minimize operation costs. The objective is not only to identify an optimal schedule but also account for the frequency of under runs and overruns and minimize wastages of resources. The Periodic unpaired pickup and delivery vehicle routing problem is a planning problem for designing routes. The Traveling Salesman Problem (TSP) is used

in the delivery system to provide the shortest path to the delivery person. So that delivery time will be reduced and chances of food wastage will get reduced.

OUTSOURCING TO ONLINE FOOD DELIVERY SERVICES:

PERSPECTIVE OF F&B BUSI-NESS OWNERS [16] paper focuses online delivery services as to further satisfy customer demands and needs. Innovations in the restaurant business are also resulted in the increase of online food ordering as it is continuously growing in the internet businesses. Business owners adopt different approaches in providing online ordering service to their customers with the intention to ease the ordering process. Restaurants are also creating their own websites, mobile apps, and, or text messages for customers to place orders. There are mobile apps like Zomato that offers data of different restaurants where customers could place order with, saving their time and effort. Online food ordering system is convenient to customers as it eliminates the frustrations from bad traffic or weather.

Technology has also contributed to the changes in customer preference as their dependence on technology has moved them to do everything online including

getting cooked meals delivered to their doorstep. Citizens across the nation are shifting towards online ordering and more ways to purchase with less effort and cost. Modern and young consumers may be labeled as lazy for depending on technology and convenience. Besides that, the time taken for the food to be delivered serves as a good reason for consumers when they do not have plans on where and what to eat. It is proven that the demand for online food delivery is the highest during lunch time and dinner time due to conveniences. Consumer preference is the main motivating factor for business owners to engage with online delivery services as to further satisfy customer demands and needs.

A STUDY ON CUSTOMERS ATTITUDE AND PERCEPTION TOWARDS DIGITAL FOOD APP SERVICES [17] This paper focus on the study of Customer behavior how individual customers, groups or organizations select, buy, use, and dispose ideas, goods, and services to satisfy their needs and wants. It refers to the actions of the customers in the marketplace and the underlying motives for those actions. Paper analyzes factors affecting attitude of customers regarding food delivery apps. Also it analyzes relationship between food

delivery app and the facilities provided by the same. Customer is the king in the business world. So it's necessary to study the customer attitude towards that service. From this research paper we would understand the shift of consumers' behaviors with the introduction of technology and what are the different kinds of applications that customers are satisfied with and what makes them happy and satisfied about the service. The main objective of the paper is to understand the relation between facilities and the purchase behavior.

eatlex.com: ONLINE FOOD DELIVERY SERVICE [13]

Delivery is the process of transporting goods from Source Location to Predefined Destination. Average Indian spends around 25% of income on food and beverages. But good food is not ubiquitous. So, to make good food available at ones doorstep started a online food delivery service In food delivery the customer demands for the restaurant to deliver their food at their doorstep. It overcomes problem faced in traditional delivery system. In traditional way delivery is made with phone calls and it will cost a lot of money and time. Also the seller will not guarantee to receive his money. This system builds an online website for restaurant food delivery. It

increases the sell through new channels and reduces the cost as well as time for seller. But here optimization routes are not considered.

Net food: A SOFTWARE SYSTEM FOR FOOD ORDERING AND DELIVERY [19]

The Net food project aims to develop a delivery- oriented order management system that allows users to order from multiple restaurants simultaneously and helps the work of the delivery personnel in tracking the orders. There are many applications for food ordering from local restaurants in particular cities. Some systems support group orders too, but these are usually restaurant-oriented: an order can only contain items requested from a single restaurant. Net food allows the customer to order the food from multiple restaurants. Orders can be placed by users through the web interface. The data related to restaurants, foods and orders is managed by administrators. A mobile application is used by the delivery personnel. Both client applications are served with data by a central server. Thus net food provides the customer the platform to order the food from multiple restaurants.

A FOOD ORDERING SYSTEM WITH DELIVERY ROUTING OPTIMIZATION USING GLOBAL POSITIONING SYSTEM (GPS) TECHNOLOGY AND GOOGLE MAPS[2] The paper discusses about the main problem in current delivery service is the routing optimization.

In delivery service, one of the main problems is to find the shortest path between customer's addresses in order to deliver the product in reasonably short time, to save fuel usage and to optimize the utilization of the vehicles and delivery personnel. Moreover, the customers usually do not have much information about the status of their order nor the position of the delivery staff. So this research develops an online food ordering system and applies heuristic algorithm to solve the so- called Travelling Sales Problem (TSP) in routing optimization. The system also uses the Global Position Systems (GPS) technology in Android-based mobile phone and takes the advantage of Google Maps for coordinate-to-map solution.

In TSP, the seller starts moving from his/her hometown and is required to visit several cities exactly one time before going back to his/her hometown with

minimum total distance. All cities are connected to each other. In this research, the author develops a system that can optimize the delivery routing process by implementing one of the solutions to TSP, which is heuristics algorithm. In addition, the system also utilizes the Global Positioning System (GPS) technology and mapping solution software, Google Maps.

HEURISTIC APPROACHES TO SOLVE TRAVELLING SALESMAN PROBLEM [10]

This paper provides the survey of the heuristics solution approaches for the traveling salesman problem (TSP). TSP is easy to understand, however, it is very difficult to solve. Due to complexity involved with exact solution approaches it is hard to solve TSP within feasible time. That's why different heuristics are generally applied to solve TSP. TSP can be solved by using optimal algorithms (e.g., IP formulation), however, these solutions are computationally infeasible and it is almost impossible to generate optimal solution within reasonable time. For this reason heuristics are used to solve TSP. So this paper provides a survey of different approaches used to solve the TSP heuristically.

MULTI-POPULATION ANT COLONY SYSTEM FOR MULTIPLE PATH PLANNING OF FOOD DELIVERY APPLICATION [18]

nowadays path planning plays an important role in the related practical applications. To accomplish the delivery tasks in a short time, deliver staffs traverse all the customers in a short tour to guarantee the freshness of food. Generally, a restaurant receives orders from customers in different places around meal time. Then, the delivery staff of the restaurant is required to deliver the ordered foods to the corresponding customers as quickly as possible.

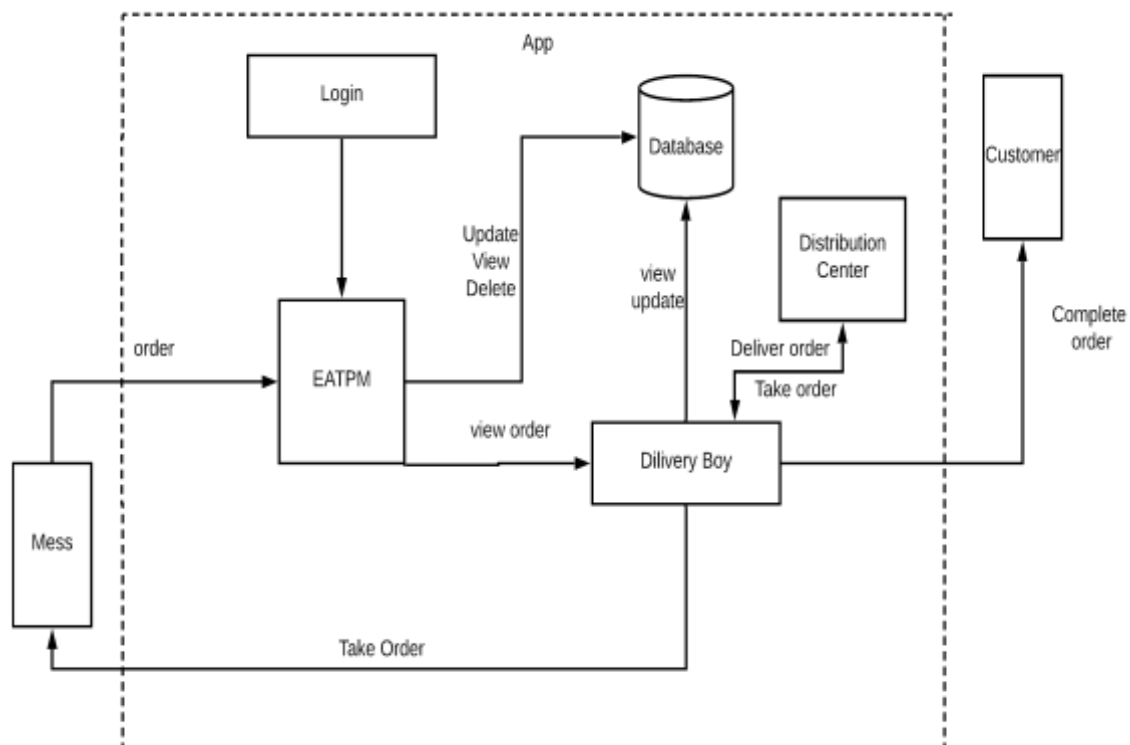
In other words, the staff tends to find the shortest tour to traverse all the customers. Therefore, the path planning of food delivery can be modeled as a Traveling Salesman Problem (TSP). However, the optimizer of TSP focuses on obtaining one single solution, which may become unsuitable for some unexpected situations, such as traffic jam. Therefore, multiple diverse solutions are desired to be offered so that the delivery staff can choose the alternative. Besides, the delivery staff can make the choice based on his/her experience. For example, the staff is familiar with local roads and he/she can choose a road with less traffic signals.

Therefore, in this paper target is at obtaining multiple solutions for a TSP. In other words, diverse tours are desired for multiple paths planning of food delivery. So this paper proposes a multi- population ant colony system algorithm. The ant colony system guides the ants towards a promising space, while the multi-population strategy promises to maintain multiple potential candidate solutions at simultaneously.

GOALS AND OBJECTIVES

Proposed system delivers food to customer on time and with accuracy. Delivery person follows the shortest path so the company costing is reduced.

SYSTEM ARCHITECTURE



Flexibility

Customer Satisfaction Order Accuracy Improves. Reduce Cost.

The system has a user-friendly user interface. The system will help to reduce cost of labor save customers time.

More comfortable ordering environment

Real-time feedback between the restaurant owner and customers.

- Become more known.
- No bothersome work.

APPLICATION

- Hotel systems
- Customer Feedback
- Used in restaurant
- Food delivery systems

We are designing the system for delivery person, fig.1 show the overview of the FDS architecture. FDS is Android-based application. The application is installed in the Android smartphone used by the Delivery Staff. This application is used to access information about the Customers, their orders, the address for delivery.

Nowadays, the usage of GPS has been part of modern human daily activities. The technology can be found and has become the standard feature of most smartphones. This technology can be used to give information about something's or someone's position on earth surface. The GPS technology can be used along with Google Maps Application Programming Interface (API) to make the proposed delivery service system working better.

GPS technology can return the coordinate of specific position; meanwhile, Google Maps can be used to (1) calculate the distance of two coordinates, and return the information of a set of streets name and their directions that must be passed to arrive at one address from other address. This application records the position of delivery staff so that customer can check the position of his/her ordered food. This application also records the position of the

Delivery Staff so that the Customer can check the position of his/her ordered food.

The system is conceptually consists of five components: Mess, Database server, Delivery boy, Distribution Center and Customer.

Customers have to do registration first. Vendors which are nearer to his region are getting displayed to customer. Customer can view all the menu items from different vendors and he puts the order of his choice. Customer can make the order with use of customer Id. All orders are then forwarded to the vendor. Then vendor forward this orders to the App. Delivery person logs in to the system with the registered mobile number the OTP will be generated and delivery person is validated.

When he logs in to the system today's order list is displayed. Orders are assigned to delivery person with respective zones. The Delivery person will collect the orders from food vendor location those are listed under his order collection list. The same will be updated on the server with updated status which will display the customer. Collected orders are then submitted to the respective distribution center. After that these orders are get sorted according to the zones (location).

Delivery person will collect the orders from distribution center those are listed under his order collection list. Then Delivery person will deliver the order to the customer or end user. The same will be updated on the server with updated status which will display to customer. The return orders will be processed in return work flow and the same will be logged to the server and other related teams.

ALGORITHM

K-means Clustering Algorithm:

K-means clustering is a partitioning technique to classify the group of items into k groups (where k is user defined number of clusters). The main idea is to define k centers, one for each cluster. These centers should be placed in a cunning way because of different location causes different result. So, the better choice is to place them as much as possible far away from each other.

The next step is to take each point belonging to a given data set and associate it to the nearest center. When no point is pending, the first step is completed and an early group age is done. At this point we need to re-calculate k new centroids as barycenter of the clusters resulting from the previous step. After we have these k

new centroids, a new binding has to be done between the same data set points and the nearest new center. A loop has been generated. As a result of this loop we may notice that the k centers change their location step by step until no more changes are done or in other words centers do not move any more.

Algorithm: K-means clustering Algorithm

Input: The no of clusters k and latitude, longitude of city

Output: Set of formed Clusters.

Algorithmic steps for k-means clustering

Let $X = \{x_1, x_2, x_3, \dots, x_n\}$ be the set of data points and $V = \{v_1, v_2, v_3, \dots, v_c\}$ be the set of centers.

1. Randomly select c cluster centers.
2. Calculate the distance between each data point and cluster centers.
3. Assign the data point to the cluster center whose distance from the cluster center is minimum of all the cluster centers.
4. Recalculate the new cluster center using:

$$V_i = (1/c_i)^{\sum_{j=1}^{\infty}} x_i$$

where, c_i represents the number of data points in i th cluster.

5. Recalculate the distance between each data point and new obtained cluster centers.
6. If no data point was reassigned then stop, otherwise repeat from step 3.

Travelling Salesman Problem using Nearest Neighbor Heuristic Algorithm:

TSP is easy to understand, however, it is very difficult to solve. Due to complexity involved with exact solution approaches it is hard to solve TSP within feasible time. That's why different heuristics are generally applied to solve TSP. Heuristics algorithm is based on the model of undirected weighted graph.

The constructive heuristics algorithm is applied in the developed system and uses nearest-neighbor (NN) approach. The algorithm that is used to solve TSP has several iterations. The idea of the traveling salesman problem (TSP) is to find a tour of a given number of customers, visiting each customer exactly once and returning to the starting point where the length of this tour is minimized. Traveling salesman problem can be very useful for the

business to determine the visiting route to minimize the cost and earn greater profit margins.

Algorithm: Heuristic Algorithm for TSP Problem

Input: Latitude and Longitude of Customer Address.

Output: Shortest Route from Source to Destination

1. Pick any starting node.
2. Look at all the arcs coming out of the starting node that have not been visited and choose the next closest node.
3. Repeat the process until all the nodes have been visited at least once.
4. Check and see if all nodes are visited. If so return to the starting point which gives us a tour.
5. Draw and write down the tour and calculate the distance of the tour.

CONCLUSION

Proposed system gives chance to the customer to choose the food from various mess of their city. We are going to design the location for delivery is on the basis of the availability of Mess Vendors. Because if the delivery boy is available in the particular area and he wants to go another cluster its makes double distance for him, to avoid this problem we are going to make the delivery smooth and fast, looking for better service. As well as the mess vendors availability help us to find out the exact location for the delivery boy, and it will be great factor for both system and delivery perspective also.

System provides the shortest path to delivery person so that the delivery time will be reduced and low chances of food wastage. System helps company to reduce the delivery cost because of shortest path selected for order delivery.

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