

Feed the Needy- An Application for Minimising Food Wastage

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Abstract

The 2019 Global Hunger Index indicates that India is at a serious condition with range of (20.0–34.9) out of 100 points scale. On the other hand lot of food is wasted in restaurants, marriages, social gatherings and hostels, especially when the quantity of food exceeds the number of guests. This project is an attempt to minimize the food wastage by feeding the needy rather than throwing away. "Feed the Needy" is an internet-based mobile charity application to connect receivers and donors. Food donors are typically the owners of restaurants, hostels and party halls, whereas the receivers are orphanages, old age homes and people living in slum areas. When there is an excess food availability, the donor will update the information in the App. As the cooked food spoils within hours at room temperature and becomes unsafe to eat, our app uses Dijkstra's algorithm to find the nearest receiver and send alerts about the food availability. Once the receiver accepts the request, the food availability details along with the location is intimated to the receiver.

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1. Introduction

In highly populated countries like India, food wastage is an alarming issue. The streets, garbage bins and landfills are the proofs of it. Food wastage is not only an indication of hunger or pollution, but also an indication of many economic problems [1]. Canteens, marriages, restaurants, family get-together and social functions expel lot of food. The study of mankind shows that food is a vital ingredient for survival. It has been estimated that around 40% of the food produced ends up waste [3]. Mobiles had become the part and parcel of common man's life. The number of people downloading and using the mobile applications also had increased significantly. There are many mobile applications available for charities, but they all work for different purpose. It could be for the wellbeing of animals, to support orphanages and old age homes, or for the sake of environmental and disaster relief[2][4].

The current issue in the mobile charity applications built for food surplus and poverty is the lack of connection between the needy, the donors and the food

suppliers. The connection between them is important as it reduces the number of people sleeping with hunger. While there are many Government, Non-Government organizations trying to take strategized actions and conduct campaigns to reduce food wastage, the problem still appear and never been resolved. Currently the rate of poverty at global level is declining year by year but the issue is poor people can become homeless and struggle from lack of food supply because they have insufficient or probably no income at all to buy food. Food is a basic living need. Without food people can die with hunger and malnutrition. This issue is very crucial when the children below five are involved. The mortality rate in children is more compared to adults and is a serious consequence of hunger.

On the other hand, there is increase in the amount of food wastage. Through this paper we propose the concept 'Feed the Needy' a new internet-based application that provides a platform for donating leftover food to the nearest needy people/organizations. It facilitates proper

interaction between the donors and receiver, which in turn helps in establishing trust and motivation between them.

2. Literature Survey

The cooked food, spoils within few hours of preparation and soon it becomes unsafe to it. All packed food expires after a time frame. So, there will be a food wastage right from our own homes to restaurants. About 95% of food we thrown away ends up in landfills or combustion facilities. India wastes foodworth about \$14 Billion a year, 194 million of Indians goes hungry daily and it is also affecting us economically[2]. According to a recent survey 1.3 billion tones of food is being wasted globally each year according to the Food and Agriculture Organization [4]. Their by an android application has been developed through which people can donate their items as per their capacity. The majority of the population today uses smartphones with active internet connection, which is the basic requirement for this product to function properly.

The purpose of this project is not just supplying food to the poor, but also providing an opportunity for them to have a healthy, nutritious food which a middle-class people can afford.. It is one of the most serious problems in under- developing and poor countries. According to FAO, there is enough food for the world's population but it is hampered due to lack of access to it. This situation shows that proper supply of food in the market does not necessarily bring the implication of food for 10 every individuals or household. Most the problem of food security is the result of access to food, rather than due to lack of food. This is because not everyone can afford or buy due to the difference in economy level. The world's total food is also estimated to be more than sufficient in 2030 where food production will increase by more than 70% higher than that produced in 1990, but still some people cannot afford it. Poverty is also a cause that is often associated with hunger that causes people to face the risk of hunger. Deficiency is the most basic threat that can cause deaths. According to the food agencies of United Nations, there are 166 million people in 22 countries in the world face hunger or difficulty in getting enough food.

The system that is currently available is the one which is not computerized and all the work is done manually. The people in need of food have to wander kilometers to find themselves a meal. Even if someone wants to donate food, they don't know where to find the receivers or hungry people. Currently, people donate food manually by visiting organizations that they are familiar with.

[2] gives a brief idea on Food donation activities and offers. It provides a medium to connect with organization like NGO'S etc. In "Food donation portal" [3] is an app based on how we donate the food and leftover things. It also shows how this app helps for the betterment of the society by helping the needy and those who can't afford the basic necessities it also provides dashboard where a donor and receiver can interact with each other. The only drawback is each action is done by admin himself. [4] provides perfect dashboard for interacting with donor and

receiver but does not implement a facility to find nearest receiver, so that food can be donated before spoiling

Our project makes food more accessible to people in our nearby community. It provides a social platform for the interested people to donate and able to track who had received the food. Reducing food wastage not only solves hunger problem, but it minimizes environmental impacts, and saves money. It takes months to produce food, but a cooked food needs just hours to get spoiled. Our project searches for a nearest receive, so that food is delivered fresh as it takes less time in transportation. This application strives to builds a healthier community, where most of under privileged can get a chance to eat healthy food.

3. Proposed System

"Feed the Needy" is an android-based mobile application which provides a dashboard for donors and receivers to connect with each other in order to minimize food wastage.

A. System Architecture

"Feed the Needy" mobile application uses a Firebase backend as depicted in Figure 4. System Architecture has connection with Firebase software framework provided by Google with three important elements namely Firebase Database, Firebase Cloud Messaging, and Firebase Authentication.

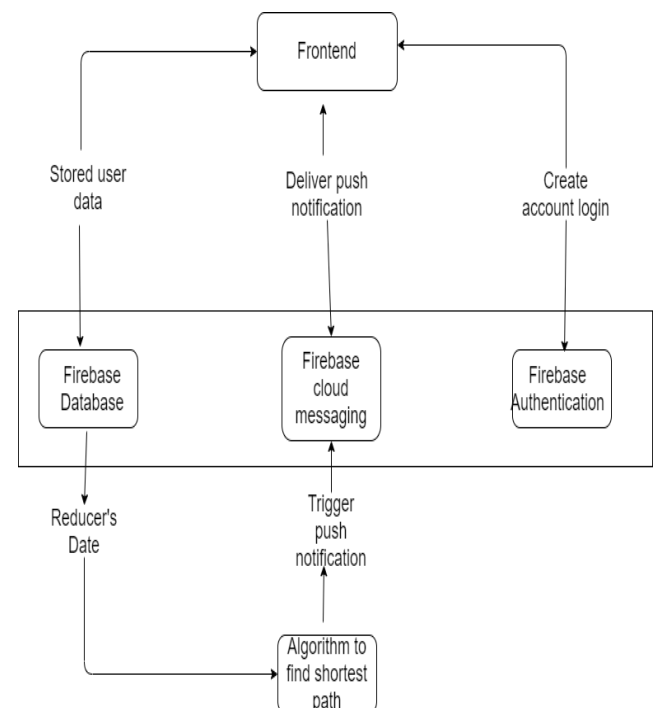


Figure 1: System Architecture

Firebase stores the user's dataset, profiles and all the activities run by the user when using the application. At the backend of the Firebase, all the real-time activities done by the users such as donation request or confirmation

of acceptance of food by the receiver, the algorithm is responsible to trigger the notification to the Firebase Cloud Messaging. The Firebase Cloud Messaging then push notifications to the related users. Firebase authentication is provided using the mail Id of the user.

The following step shows how the receiver and sender can interact with each other via application

- All the application user's must register into the app
- Donor places the order for the food availability in the software
- Then application forwards the food availability for the nearest receiver.
- The information about the food which is updated by donor is only send to the selected user's(receiver) who are nearest to the donor with help of Google maps(API package for digital map) and dijkstra's algorithm used in the application. Notification is send to the nearest identified user.
- If receiver confirms the acceptance, then software forwards acceptor information to the donor
- And shares the location of the needy to the transport person.
- The transport person picks up the food from the donor and delivers to the receiver.
- Then donor gets the confirmation of food delivery.

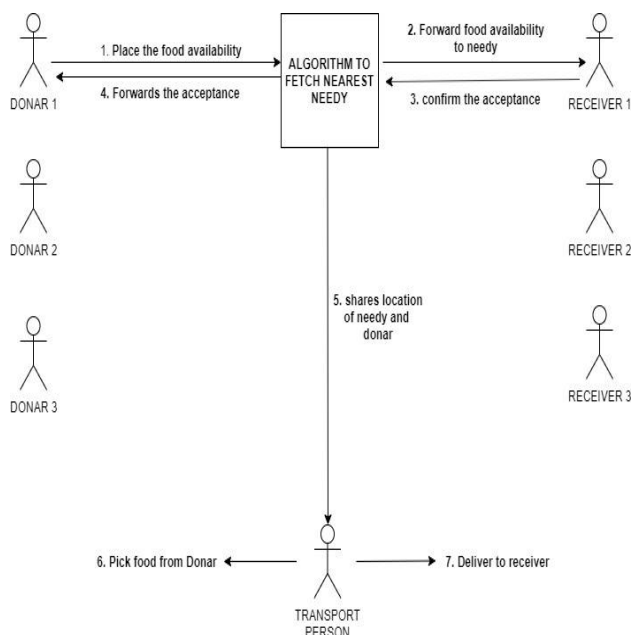


Figure 2: Sequence Diagram of Methodology

B. Algorithm to Find Shortest Path

The flow chart is depicted in Figure 3. During registration, we store the addresses of all donors and receivers to the Firebase database. Based on the address of the donor and receivers, the locations are calculated using Google Map's API. When a donor raises a request for food donation, among all the receivers, we identify the nearest receiver to the donor using Dijkstra's algorithm, so that the food can

be supplied within short time. The app sends a notification of food availability to the identified receiver. On receiving confirmation from the receiver, an alert is send to transport team along with sender's and receiver's location, so that they can pickup and deliver the food to teh needy. The receiver now updates the delivery confirmation on the app, which can be seen by the donor.

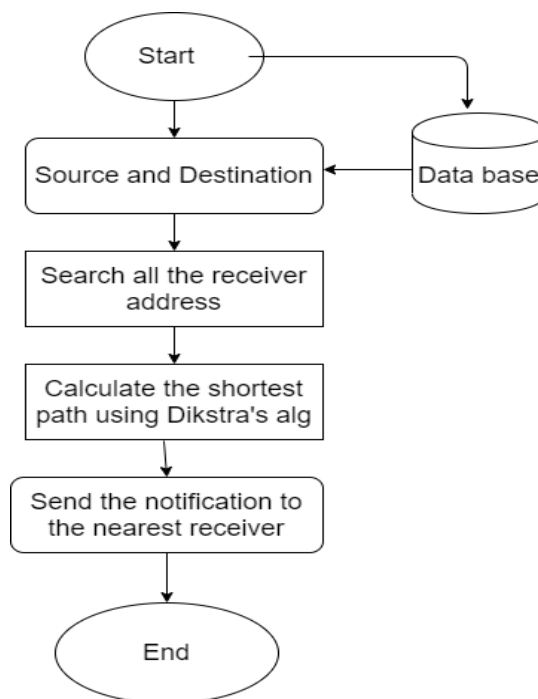


Figure 3: Flowchart

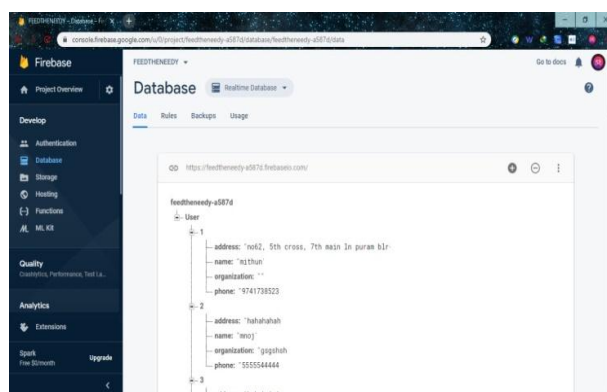


Figure 4: Sample Firebase Dataset

C. Map Implementation Processing

The receiver linked dataset shown in Figure 4 will be used identifying the location of the app user's it is loaded on Google Map by using system calls with the help of Google Map API package on to geolocation, which involves the generation of a set of geographic coordinates its usefulness is enhanced by the use of these coordinates to determine a meaningful location, such as a street address., all the route that leads from donor to acceptor has can be shown in Figure 5.

Google Map API (Application Programming Interface) is one of the advantages provided by google to access data from google map and google local search. With this API, it allows the us to develop a software to be integrated with-in the software. API can be linked in our application and for accessing it allow programmers to use the system function. This process is managed through the operating system. The advantage of this is to allow an application to

interact and allows to display google maps on the app, By using the google map API. This API provides us with various services within the generalized google map to recognize a number of utilities(location) for manipulating maps and adding content in maps through various services, allowing the creation of powerful map applications for our application.

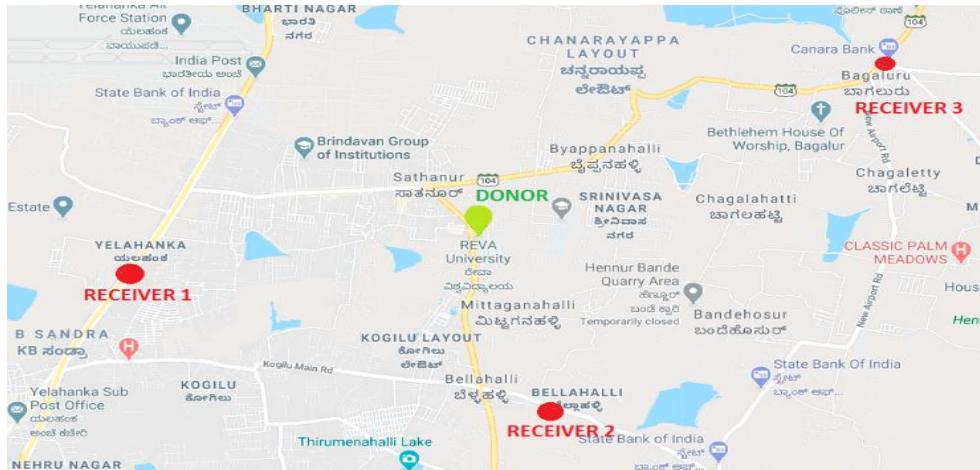


Figure 5: All Receiver Location

The address of the user data are preprocessed to use in the proposed system. Some sample location of donor and receiver is shown in Figure 5. Donor is represented in

Green and three receivers are identified in red. These datasets required for the proposed system are stored in firebase database.

4. Result

Table 1: Coordinates

FROM	RECEIVERS	COORDINATES	NODE POINTS	WEIGHT IN KM	ADDRESS
DONAR1	RECEIVER1	52°N, 34°E, 17°N, 22°E	A	0.5	YELAHANKA
			B	2.2	
			C	1.0	
	RECEIVER2	52°N, 34°E 26°N, 14°E	D	1.5	BELLAHALLI CROSS
			E	0.3	
			A	0.5	BAGALUR
	RECEIVER3	52°N, 34°E 10°N, 31°E	F	2.1	
			G	4.0	

Determination of the coordinates of donor or receiver location is done by using geolocation for identification or estimation of this coordinates on real-world geographical location. Locations generated from geolocation are not all coordinates that are listed on the location data in route

search information system ,But coordinates that already present in the system.

The data used for this study is the location of places in Bangalore which is interconnected between one point with another point with information weight / distance in

meters, latitude longitude coordinates, and address which will be explained in.

A. Implementation of Dijkstra's Algorithm

Dijkstra algorithm keeping donor coordinates as initial node will find the closest vertices to the receiver nodes,

when it finds the nearest node, the node will be joined with the next node until the recipient is found which is existing in the system and returns the shortest distance between the initial node(donor) with the destination (receiver) node along with the points that have been passed.

Table 2: Route Search Matrix

FROM	RECEIVERS	FROM DONAR TO RECEVIER IN KILOMETERS						
		A	B	C	D	E	F	G
DONOR 1	RECEIVER1 NODE:C	0.5	$2.2+0.5=$ 2.7	$2.7+1.0=$ 3.7				
DONOR 1	RECEIVER2 NODE:E				1.5	$1.5+0.3=$ 1.7		
DONOR 1	RECEIVER3 NODE:G	0.5					$2.1+0.5=$ 2.6	$2.6+4.0=$ 6.6

1. Each receiver is given a unique ID which can be used to identify the receiver information
2. As shown in the fig.6 shows the different points of location from donor to receiver in the map
3. **Dijkstra's algorithm** is used to solve the shortest distance problem. That is, we use it to find the shortest distance between two vertices on a graph. The **algorithm** works by starting at the end vertex(donor) and visiting vertices(receiver) by finding the shortest distance from that start vertex to the ending vertex has shown in fig.6
4. The algorithm find all the possible path from donor to receiver's and the nearest receiver is selected and notification is send only to this receiver's as shown in Table.3

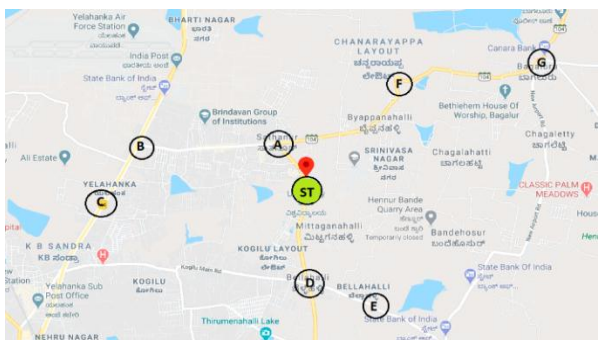


Figure 6.1

Dijkstra algorithm will be described in Table 2 where the we have taken one example for finding the path from node donor to Receiver 2 shown in Fig.5. we have calculate into the assessment matrix starting from point ST with the goal to point C in Fig.6.1.

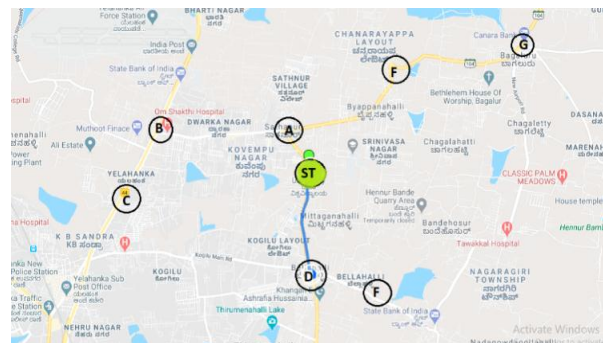


Figure 6.2

With this matrix we can show that the Node Combination in Dijkstra algorithm and calculate the pattern with Node Combination this can also save the history passed through each nodes As shown in Fig6.2 to reach Receiver 2 the possible path is via D node.

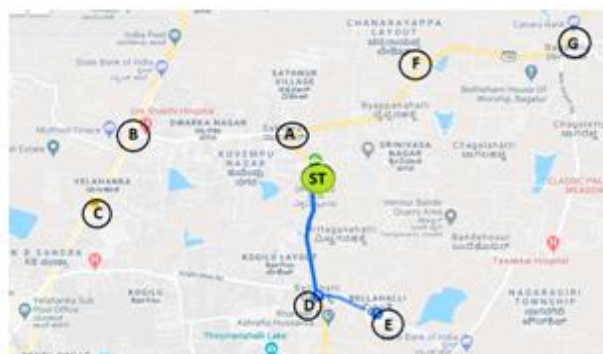


Figure 6.3

Figure 6: Route From St to E

From Table2 it can be concluded that the process of finding the shortest route from point ST(donor) to point E(receiver2) can be reached through the point ST-A-E shown in Fig.6.3 with a distance of 1.7 kilometers. From Table.2 it can be concluded that the system finding the shortest route from point ST(donor) to point E(receiver2) can be reached through the point ST-A-E shown in Fig.6.3 with a distance of 1.7 kilometers.

B. System Analysis

To prove that the system has chosen the shortest route, Among few alternate paths from the donor point are located point to the end(Receiver) point at point e. Alternative routes that can be passed will be explained in Table 3.

Table 3: Finding the shortest distance

Donor location coordination	All the receiver	Receiver location in coordination	Route	Distance between donor and receiver	Minimum distance
52°N, 34°E	Receiver1	17°N, 22°E	A-B-C	3.7km	1.7km
	Receiver2	26°N, 14°E	D-E	1.7km	
	Receiver3	10°N, 31°E	A-F-G	6.6km	

In Table.3 we can see that there are several alternatives receiver that are available but we can conclude that the shortest route search system using the Node Combination-Dijkstra Algorithm selects the first alternative with a distance of 1.7kilometers which is the shortest distance with D-E route among other alternatives receiver.

5. Conclusion

Its an effort made to feed the hungry people who cann't afford to have food twice a day.Our focus is to minimize the food wastage. Although it directly stops food wastage, indirectly improves our economy. Our strategy is to find the nearest needy and deliver the food, so that we can minimise the transportation time and deliver food safely. As afuture scope we would like to build a system that ensures food security.

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