EXCESS FOOD MANAGEMENT SYSTEM

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Abstract

Food wastage is a huge problem arising in today's world. It has become a serious issue in our society in the last years that affects “poor and rich countries” equally and according to the Food and Agriculture Organization (FAO) almost half of all produced food will never be consumed. By wasting food, we also waste the “time and energy” that we have used to produce the food and as well our “natural resources” and the “limited available agricultural land” will be used up which could be handled in a much better and sustainable way.

Introduction

India is a country where millions of people aren’t getting food at least twice a day, also India is one of the largest producers of food items. One of the main reasons for this food scarcity is ‘WASTAGE OF FOOD’. Hundreds of metric tons of food get wasted every day. If we find a method to properly manage that food, no one in India will go to bed empty stomach. There are many people who want to donate the excess food available with them but can’t, and there are many organizations which are already engaged in charity activities but can’t expand their works due to lack of resources.

If India spends almost Rs 1.5 lakh crore on cheap and free food grain each year, a study in 2016 estimated that Rs 92,651 crore is lost annually in farm produce wastage. Worse, the cost of wasted procured grains is a bone of contention between the Centre and states like Punjab. The government’s conventional reply for decades when it comes to wastage of food grain procured, secured and distributed by it has been it isn’t much. As recently as September 20 this year, the government released data presented earlier in April by food and civil supplies minister late Ram Vilas Paswan. Paswan had informed Parliament that only 0.02 lakh tonnes of grain procured by the Food Corporation of India (FCI) qualified to be called “wasted”. But it’s a fact that the government only mentions FCI when it comes to wastage of farm produce, while it is just one small contributor to the mountain of waste. Food is politics in India. Its shortage can lead to public outcry and political setbacks. So conventionally, governments have been playing it safe rather than pragmatic. While food grain production has gone up, storage capacity at different levels has lagged terribly. That’s why each time a bumper crop nears harvest time, FCI gets a headache. For example, on February 18 this year, when the agriculture ministry’s second

advance estimates of production of wheat was released, the 106 million tonne estimate gave FCI the jitters.Wheat can be stored safely under good storage practices for 4-5 years but fearing large amount of food grain turning waste due to poor storage facilities and natural adversities, the FCI decided to lower the bar to three years for wheat and two years for rice. Worse, the government holds 1.8 lakh tonnes of rice from the crop year 2017-18, 153.7 lakh tonnes from 2018-19 and 114.5 lakh tonnes from 2019-20. In 2019, the total wheat procured stood at 341 lakh tonnes and rice at 443 lakh tonnes. These numbers are way beyond FCI's and states' storage capacity. The total covered godown capacity of FCI is 382.27 lakh tonnes, while for state agencies, it is 238.17 lakh tonnes. In addition to this 620.44 lakh tonne capacity, FCI and states have additional 132 lakh tonne cover and plinth (CAP) for wheat and not rice for it can be stored in covered godowns only. Beyond claims and challenges, India wastes a large amount of its farm produce. The government cites low wastage at FCI godowns to counter charges, but the spread of the malady is deeper and wider. Of the total production of cereals in India, which is around 30 crore tonnes, the FCI procures only 8 crore tonnes, which is merely a little over one fourth of the food grain generated by India's farmers. Most of the remaining food grain lies in the open. And it's not that the quantum of wastage is not documented. In 2006, scientists at ICAR devised a formula and methodology to establish comprehensively how much India wastes of what it produces, while millions survive on empty bellies. By 2013-14, the first study was over, and by January 2016, the second study involving survey of storages and supply chains was done and presented in the Parliament. The study was titled 'Assessment of Quantitative Harvest and Post-Harvest Losses of Major Crops and Commodities in India', carried out by ICAR's Central Institute of Post-Harvest Engineering and Technology (CIPHET). The content of this report underlines how careless governments in the past have been and how tough the task ahead is for the present one. In 2016, Rameshwar Teli, the junior minister in the agriculture ministry, had informed Parliament, "Food wastage in India is driven by the lag in many stages of the supply chain in the country. Cold chain and storage facilities, exports, transportation, processing facilities and marketing need to be upgraded." The wastage culture has been bad news for decades in India which produces some of the world's best rice, grains, tea and spices, courtesy the country's 46 soil varieties. In 2019-20, total food grain production was estimated at 292 million tonnes, while as per estimates, 225-230 MT is needed to feed its population in a year. Still, the country is struggling to feed its own. The United Nations Food and Agriculture Organization (FAO) estimates that more than 40 per cent of food produced is wasted in India, and its costs could be as high as US\$14 billion (12.42 billion euro) every year. This has been a problem for decades and is worsening with time. It was only when the COVID19 pandemic came along in 2020 that many of us began taking note. Affluent Indians were suddenly inconvenienced by things otherwise taken for granted, like procuring groceries or worrying about how long their supplies would last. We came to realize that the food we eat goes far beyond the few bites it takes for us to finish it. We started becoming more conscious of our food choices. As the deadly second wave ravages India, individual states have imposed lockdowns and strict restrictions to curb the spread of the virus. During the first phase, the plight and misery of the migrant workers and other vulnerable communities was laid bare. But this time, the health crisis has overwhelmed the existing livelihood and hunger crisis which still

looms large in most of our towns and villages.
The CMIE Unemployment Data reveals a grim picture, with rural unemployment spiraling to 14.34\% and urban unemployment reaching 14.71\% as of 16 May 2021. In a country where most of the workforce is in the informal sector, people have been massively affected due to loss of jobs and the lack of access to the benefits (including social security) that come with formal employment. The daily wagers, construction workers, street vendors and domestic helpers have been disproportionately affected by the pandemic and lockdowns and are living a life of uncertainty and disrupted incomes. Agriculture is the primary occupation in the villages, but due to frequent lockdowns, there has been a disruption of supply chains and access to markets for the sale of agricultural produce, impacting the income of rural households. And while there is no gender disaggregated data on the impact of COVID-19 specifically on women, experience shows women are disproportionately affected during pandemics, economic downturns, and times of food insecurity. In the 2020 Global Hunger Index, India ranks 94th out of 107 countries. The pandemic and resulting unemployment have made India's hunger crisis worse. The First Phase of the National Family Health Survey (2019-2020) has revealed alarming findings, with as many as 16 states showing an increase in underweight and severely wasted children under the age of 5. The pandemic is becoming a nutrition crisis, due to overburdened healthcare systems, disrupted food patterns and income loss, along with the disruption of programmes like the Integrated Child Development Scheme (ICDS) and the mid-day meal. We believe that the solution to the hunger crisis should follow a two-pronged approach of addressing food insecurity as well as providing livelihood opportunities to the people whose voices have largely been left unheard in this second wave. Our project is an attempt to solve this problem.

Literature Survey

1.	TITLE: System to Reduce and Manage Waste Food AUTHORS: Rucha Jadhav, Priyal Kulkarni, Neha Kumari, Komal Pagere, Prof J.R. Suryawanshi PUBLISHER: IRJET DATE OF PUBLICATION:12 Dec 2019	The product is a web application that aims to establish a link between restaurants and charity homes/needy households to enable excess food donation by using a forecasting simulation model.	The simulation model does not take into consideration the human uncertainty and assumes data in accordance to the population at that place
2.	TITLE: An Excess Food Redistribution System using IoT AUTHORS: Jadhav Renuka Shivdas, Kadlag Aishwarya Subhash, Mandlik Sanket Pradip , Jadhav Nilesh Sunil, Mr. Kishor N. Shedge PUBLISHER: IRJET DATE OF PUBLICATION:5 May 2020	The product equips itself with an RFID sensor , light sensor and temperature sensor to check the humidity and air pressure inside the smart food container so as to evaluate how much of the food is rotten and can be segregated.	Scalability of the sensors isn't seen and can only be used for small containers and not for big warehouses
3.	TITLE: Aahar - Food Donation App AUTHORS: Mrigank Mathur, Ishan Srivastava, Vaishnavi Rai, Assistant Prof. Mr. S. Kalidass PUBLISHER: IJSRET DATE OF PUBLICATION:3 May 2021	The food donation application serves as an interface between consumers searching for a channel to donate without wasting the surplus food. It encourages to donate the surplus food by notifying local users of the available food information. The requested users demand the notice.Depending on the priority, the machine allocates food products.	The priority system is flawed and can be exploited by fraud users thus delaying help for those actually in need of help no GPS service is available. That implies that the structure does not make it easy for the company or charity to locate the needy.
4.	TITLE: SeVa: A Food Donation App for Smart Living AUTHORS: Christina Varghese, Drashti Pathak, Aparna S Varde PUBLISHER: ResearchGate	The SeVa app targets COVID-19 food relief, in addition to addressing UN SDGs on hunger, poverty and healthcare . This app aids Smart Living via HCI-based ubiquitous access to useful knowledge that positively impacts healthcare and environment by helping to reduce hunger and food waste.	Targets a small region as of now Stakeholders are very

	DATE OF PUBLICATION: January 2021		limited (NGO and grocery owners)
5.	TITLE:Tackling the challenges of reducing and managing food waste in Mumbai restaurants AUTHOR: Jehangir Pheroze Bharucha PUBLISHER: British Food Journal DATE OF PUBLICATION:January 2018	Collection of food wastes from various hotels and restaurants and converting them into nutritious organic biofertilizers through the fermentation process.	The use of food waste is considered to be contributing but is historically associated historically with disease transmission Current technologies available for converting food waste to energy are lacking on the scale of economic feasibility and efficiency. Uses a top-down approach
6.	TITLE: Trends and challenges in valorisation of food waste in developing economies: A case study of India AUTHORS: Sujata Sinha, Pushplata Tripathi PUBLISHER: ScienceDirect DATE OF PUBLICATION:2021	In the event of desserts and sweetmeats left over in large quantities, five of the restaurants send these to an orphanage. Some of the restaurants donate the food to the nearby temples for distribution among the needy.Some of the luxury restaurants have a have tie-ups with NGOs to distribute the leftovers.	The sample size chosen is not fully representative of every restaurant in Mumbai and the whole of India. 18% of food is still disposed off
7.	TITLE: Assessing the current food waste minimization practices adopted in Hotels AUTHORS: Manzoor Nabi Naikoo, Sanjeev Kumar, Zahid Iqbal PUBLISHER: EM International DATE OF PUBLICATION: June 2021	Restricted menu structured in order to reduce the food wastage. Giving out meals to the staff, and having enough stock of materials for 8-10 servings.	Proposed method cannot be used to aim for 0% food wastage Very limited methods that would eventually subside

8.	TITLE: Food Waste Management Using Machine Learning AUTHORS: Vinayak Bharadi, Pavan Jadhav, Omkar Nanche and Onkar Munj PUBLISHER: IJCRT DATE OF PUBLICATION: 4 April 2022	Linear regression algorithm is used on data to predict how much food should be prepared on a daily basis to avoid excess amounts of food being prepared and wasted. Wasted amount of food is put up online by the organisation to be visible to the NGO	Distance between NGOs and food donors should be considered so that the nearest NGO can be given a higher priority.
9.	TITLE: IoT Based Food Wastage Management System AUTHORS: P. Manjunath and P. G. Shah PUBLISHER: IEEE DATE OF PUBLICATION: 12 March 2020	Analyzation of food wastage is automatedly done using IoT. The data is then directly pushed onto the cloud for real-time report generation. This gives us a detailed analysis report. The excess food count that is available in the cloud is now shared across the office television dashboards or on the user's mobile devices.	The proposed technique only covers office organisations, it does not cover restaurants and party areas which are the main source of food wastage.
10.	TITLE: A Food Wastage Reduction Mobile Application AUTHORS: H. Hajjdiab, A. Anzer, H. A. Tabaza and W. Ahmed PUBLISHER: IEEE DATE OF PUBLICATION: 11 October 2018	An android application called "food waste reduction app" is developed using android studio where both the restaurants and other users register themselves with firebase authentication. Details of the users, donors and excess food are stored in real-time database storage.	The application is restricted to android. details like the location, contact numbers of the restaurant are not collected making it difficult for the users to communicate with the food donors.
11.	TITLE: FoodX, a System to Reduce Food Waste AUTHORS: R. Shinta Oktaviana, D. A. Febriani PUBLISHER: IEEE DATE OF PUBLICATION: 04 December 2020	FoodX is a food waste management system that is both a mobile-based and a web-based application. There are 4 types of users of this system, application managers, community managers, donors, and volunteers. These Applications are made using the PHP for web and Kotlin for android - based applications. While the DBMS used its PostgreSQL.	There is no transparency between the food donors and the volunteers as there are community managers whose role is to regulate the distribution of the food to the volunteers and report the same to the donors.

12.	TITLE: A Survey on Food Waste Management System AUTHORS: Vikram Ra,Anirudh Rb ,Bhuvaneshwaran Mc,Praveen kumar S d,Suganthkumar Ke PUBLISHER:Turkish Journal of Computer and Mathematics Education DATE OF PUBLICATION: 5TH APRIL 2021	User is divided into different roles where each have their own privileges like filling form,calculating wastages and deciding the recipients.MYSQL is for storing data.PHP for backend scripting,canvas.js for generating the analysis charts.	Only limited people can access this application.(ex:students can not report food waste) No clear idea about the orphanage who actually need the food. No clear segregation of the type of food being wasted.
13.	TITLE: FOOD WASTE MANAGEMENT SYSTEM AUTHORS: S.P Kale, Meet Patel, Mehtab Ansari, Aditi Dhumal, Ruchika Arote PUBLISHER: International Research Journal of Modernization in Engineering Technology and Science DATE OF PUBLICATION: 5TH MAY 2022	Use of web based applications to reduce the amount of food getting wasted in restaurants.The project uses the strategy of pre ordering the dishes in order to minimise the wastage.It uses PHP at the server side for interacting with databases and java for developing web applications.	Even reserved food might get wasted No proper donation option available No proper statistical data of the food getting wasted is displayed anywhere in the app..
14.	TITE: Web – based Application for Food Waste Management AUTHORS: R. Uma , S. Ranjith , I. Kaja Mohaidheen , S. R. Dharaneesh PUBLISHER: IJERT DATE OF PUBLICATION: 25TH MAY 2022	The users are divided into three types such as DONOR,NGO and LOGISTICS. In the home page users can register for any of these roles.later they can raise the requests with the availability for donors,requirements for NGOs and vehicle details for logging in.	only the admin can actually decide where the food goes. There is no transparency in the delivery process Little hard to work in real time,time consuming

15.	TITLE: FOOD WASTAGE REDUCTION THROUGH DONATION AUTHORS: J Manikandan, Mr N Kumar PUBLISHER: International Research Journal of Engineering and Technology (IRJET) DATE OF PUBLICATION: MAR 2020	An android app is developed for the purpose of donating the food.there are only two types of users: DONORS and RECIPIENTS.Users can login into the app and send requests to donate excess food and the recipients can choose whether to accept it or not.	There is no proper authentication for recipients. Only people who know about the app will install and use it. No third party to monitor and fix if something goes wrong.
16.	TITLE: Expiry Prediction and Reducing Food Wastage using IoT and ML AUTHORS:Kartik Nair,Krina Shah,Bhavya Sekhani,Sunil Karamchandani PUBLISHER: IJECES DATE OF PUBLICATION: 3 November 2021	Technologies like the Internet of Things (IoT) and Machine Learning have been used in this project to accurately determine the expiry date of food products to reduce food wastage. To achieve this, a cost-effective version of a traditional e-nose was developed and used for the detection of staleness of food products.	The ethylene gas sensors may not work as intended Can't be used for storages where large quantities of food are stored
17.	TITLE: Turning Human and Food Waste into Reusable Energy in a Multilevel Apartment Using IoT AUTHORS: V.Anbarasu . Karthikeyan, S.P.Anandaraj PUBLISHER: IEEE DATE OF PUBLICATION: 6 March 2020	In order to effectively convert human and food waste into energy, an IoT-based intelligent system has been designed. It can be applied in the multilevel apartment. The proposed system uses a digester unit process to produce biogas and based on the individual input noted, and it supplies a variable amount of gas is provided to each house. The proposed method provides the possibilities of recovering energy and nutrients from human and food waste by discussing the current system of human waste collection, treatment, and disposal at a multi-apartment.	Pollution to generation of biogas will be harmful for the environment The output of the proposed system will be low
18.	TITLE: FOOD DONATION SYSTEM E ANNAPURNA AUTHORS: Bhagwat Vidhole,Mayuri Meshram,Kiran Shahare ,.Mosam Damahe, Ashish Koche, Prof.Ankita Gaware PUBLISHER: IRJET DATE OF PUBLICATION: 2	The E Annapurna is a volunteer based organization that works to get surplus food from restaurants to the less fortunate sections of society in The organization functions on and propagates the basic ideology of self-sustained communities across the city traditional the food distributed to the needy is sourced from restaurants, which regularly provide surplus or freshly cooked food on a goodwill basis.	The food distribution network is not well defined

	February 2021		
19.	TITLE: The use of web based technology as an emerging option for food Waste reduction AUTHORS: C Corbo, F Fraticelli PUBLISHER: wageningenacademic DATE OF PUBLICATION: 1 November 2015	A classification scheme for technology to reduce food waste was effectively deployed. The applied framework is based on three dimensions: "transaction approach" (free or paid food transaction); "type of actors" involved as "givers" in the transaction (business or consumers); and "existence of a mediator" within the transaction. It aims to describe how, as a result of technology, food surplus is redistributed among players at different stages of the food chain. Several platforms could be accurately and completely described by the framework.this framework is applied in 8 Italian It platforms.	The validity of presented framework is not tested on different culture {other than Italian). Different stages of food processing chain is not tested
20.	TITLE: Sharing as an Antidote to Food Waste: Understanding Food Rescuing Apps and Their Users AUTHORS: Johanna Rau and Johan Högberg PUBLISHER: GUPEA DATE OF PUBLICATION: 02 MAY 2021	The five defined indicators are applied to the information that was obtained and connected to earlier studies in the first section of the result. Thus, the practice-theoretical aspects influencing usage of food rescue apps may be categorised and identified. In the second section, indicator adaptations are used to create typologies of various business- and customer-user kinds so that the sample's detected differences and probable trends can be explained.	Dataset considered for building the framework is very small, so no clear assumptions can be made. Clear understanding about users' individual routines and habits is required.
21	TITLE: WORLDWIDE FOOD WASTE IN MUSLIM MARRIAGE CEREMONIES: A CASE STUDY CONDUCTED IN KARACHI, A MEGA CITY OF 23.5 MILLION, AND CITY OF DIVERSE MUSLIM COMMUNITIES AUTHOR: Abdulrauf Farooqi PUBLISHER: International journal of business, Economics and Law DATE OF PUBLICATION: 05 August 2016	Based on the food waste observations during marriage ceremonies in Karachi, action plan to control food waste was proposed. The action plan entails action topics, service-to-society message, and objective. The action plan induces a paradigm shift in eating behavior and self awareness on food waste. In addition, Muslims to seriously consider on reducing their cultural per unit size of oil fried eateries such as 'Samosa', 'Paties', 'Kebabs' etc. and sweats into titbits or mini sizes so collect in plates only the quantity that can be fully consumed and keep the remainder saved in serving plates.	Stakeholders hesitant to reveal facts Limited previous studies on food wastage during wedding ceremonies Majority of Weddings Halls are unregistered and therefore owners and knowledgeable people were extremely discrete

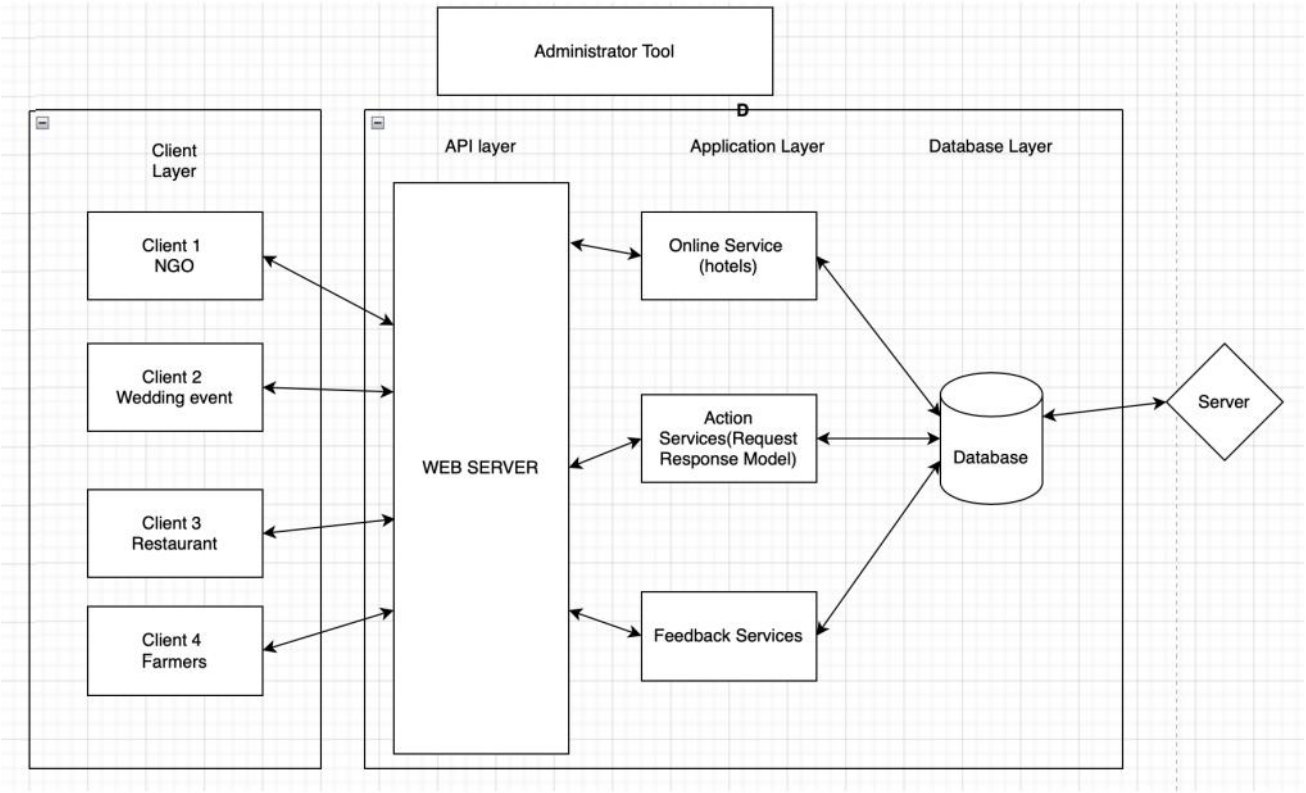
			about revealing the information for well known reasons. Difficulty in accurately quantifying food wastage in marriage ceremonies
22	TITLE: Food waste management innovations in the foodservice industry AUTHOR: Carlos Martin-Rios PUBLISHER : Elsevier DATE OF PUBLICATION: 16th JULY 2018	The great majority of innovations discussed by managers are incremental innovations, including operational improvements and technological advances. The most common type of process innovation encountered were operational improvements, i.e. modification of one or more of the restaurant's processes – menu creation, ordering, and serving, including attempts to reduce and recycle waste.	Not all process innovations are suitable for all types of restaurants No discussion about buffet-type restaurants that usually have high food waste levels due to losses in serving.

Proposed Work

A. Product Description

We follow a three-tier architecture in our website's database design. A lot of food gets wasted in the events such as weddings, there is a lot of food leftover in the restaurants during the closing time. These people can act as potential users who want to donate the food. They will register in our website using the phone number, username and set up password and login, after which they should keep a post about their leftover food by providing it name, quantity, expiry date. The donation organisations can view the posts by potential users and request them to handover the food to the organisation. The needy users such as old age homes, orphanages etc can request the organisations for the food. Each type of resource donated is allotted a donation date, name, quantity, expiry date, id. Each user has a user id, name, phone number, password. Each donation camp has a camp id, camp location, camp contact number. Many employees work at each donation camp and each donation camp has a manager who monitors the camp and the employees working int that camp. Each employee is given an employee id number, details like name, working hours,

phone number.



B. **Advantages of our model**

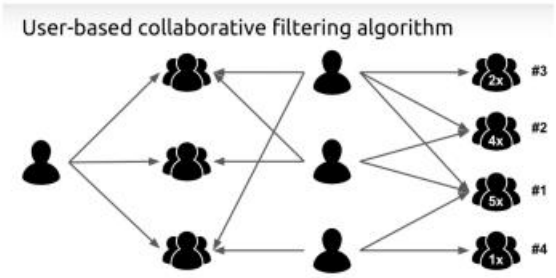
In other websites which are working for the same cause, we can see that either we can donate the food or request for the food only, we can't do both at one place and, we don't know whether the donated resources are really used for charity purpose or not. Our website 'Donate Food For Life' finds a solution to this problem, by creating a platform where anyone can donate any food of any quantity, which can be received by any NGO organisation and can be donated to anyone one who needs it, in a transparent manner.

C. Collaborative Filtering and Quality prediction

The system matches persons with similar interests and provides recommendations based on this matching. Collab orative filters do not require item metadata like its content based counterparts.The method uses only information about the description and attributes of the items users has previously consumed to model user's preferences. In other words, these algorithms try to recommend items that are similar to those that a user liked in the past (or is examining in the present). In particular, various candidate items are compared with items previously rated by the user and the best-matching items are recommended. Our aim here is to create a recommender system in which when an user writes the food and their place recommender system will

look at the reviews of donors in that food category and nearby places , and system will recommend user donors with similar reviews and sort them from the highest rated.Here we also use a quality prediction model with the help of collaborative filtering to sort out donors who provide with best quality of food and are prompted to appear higher on the list than other donors.

D. Architectural Diagram of the proposed working model



Conclusion

This website based Food Waste Management system can assist in collecting the leftover food from hotels restaurants to distribute among those in need. NGOs that are helping poor communities to battle against starvation malnutrition can raise a request for food supply from restaurants through this application. Once the request is accepted, the NGOs can Fig. 2. collect the food from the restaurants for its distribution. In this way this food waste management system will help restaurants to reduce food waste and will help in feeding the poor and needy people. In this system, we have tried to reduce restaurant and overall food wastage by giving waste food to NGOs. NGOs will raise a request, in case of any leftover food restaurants have.A matching algortihm will then come into play where it matches the NGO with a restaurant which is near to their location, time and quantity of food that is being required After the filtration process is done, this request is sent to the restaurant manager of that particular restaurant. The NGO Manager then approves the request and assigns it to one of the NGO employees for takeaway and forwards the request to the restaurant. The leftover food at the restaurant can be given to NGOs at the end of the day. The admin can track the history of restaurants and NGOs for the leftover foods.

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