Literature Review on Waste Food Management System

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ABSTRACT

Food is a global issue that impacts individuals and organisations across various sectors, including homes, schools, restaurants, grocery stores, production facilities, and transportation systems. This project uses web technology to address food waste by facilitating the donation of leftover food from hotels, functions to people in need. The web application also uses real-time DB to store information. Through this website, donors can add details about the food they wish to donate, and volunteers from NGOs can view images of donated food from different donors. This platform aims to streamline the process of food donation, ensuring that excess food is redirection to those who can benefit from it, rather than being wasted.[1]

Food is an essential need for all human beings. But in the current society, many people cannot afford or fulfil their daily food requirements. Many people want to help people who are starving, but the problem is there isn't a good and reliable platform to get information and connect the donor and receiver that is available. The application's main purpose is to bring together individuals who have excess assets and are eager to give back to the community to help those who are in need. Another advantage of this system is that it allows organisations to create funds within the system that raise funds for their charitable projects related to food insecurity and improving agriculture. It also helps in improving the trustworthiness of the users of the system. For example organisations need to be verified by the admin to use the system. Also, each fundraiser program created by the registered organisation will be reviewed by the admin before publish it in the system.[2]

Keywords: *Donation Management, Food Insecurity, Poverty, Fundraising, Donar, Nutritions, Food Donation, Web Application*

1.INTRODUCTION

In this study, it has been developed as a web application to stop food insecurity. In the world more than 829 million people are malnourished. Due to covid-19 pandemic and other crisis situations the number of people who are starving has increased rapidly. With the lack of food, it often results in malnutrition in which children and women become mainly vulnerable.

People use computers and smartphones in their day-to-day life, our application can be used from both mobiles and computers. The common reason for food insecurity is poverty. Through our application users can create donations based on what they can give, users can create requests if they know someone who needs support, and organisations can organise fundraisers and other campaigns to end hunger and promote some methods to overcome food insecurity. The platform is managed by an admin to avoid scams and any other not related information from publishing. The total goal of our application is to end hunger, help people who are in need, and gradually create sustainable agriculture to overcome food insecurity.[2]

Food waste is a major worldwide problem with serious negative effects on the environment, the economy, and society. Food insecurity is still a serious issue, though, particularly for vulnerable groups like homeless people and orphanages. In order to effectively manage food surplus and guarantee its allocation to those in need, creative solutions are needed to address these interconnection difficulties. With an importance on supplying food to street orphanages, a waste food management and donation system has been created to close the gap between food waste

and food insecurity. By establishing a connection between food gives, such as grocery stores, restaurants, and houses, and beneficiaries in street orphanages, this approach makes sure that excess food is given to those who really need it.[3]

The year 2020 was marked by the formidable challenge posed by the rapid transmission of COVID-19, a newly identified infectious illness, that impacted the entire global population. The pandemic brought about severe consequences, manifesting in critical shortages of everyday necessities such as disinfectant sprays, antiseptic wipes, hand sanitizers, and personal protective equipment (PPE) including face masks and respirators. The abrupt closure of public schools had particularly adverse effects, especially on schoolchildren who relied on these institutions for their daily meals. To address this crisis, food donation centres emerged as essential providers of food aid, as depicted. These centres played a crucial role in ensuring that surplus food reached those in need during this time of extraordinary disruption.

In response to the challenges presented by COVID-19 pandemic, businesses adapted to a new operational landscape that heavily relied on AI-based virtual environments until regular activities could and expanded their services to cater to new demographics. Notably, several food vendors capitalised on this newfound opportunity to evolve their operations in response to the growing demand for food assistance during these trying times.[4]

Food waste is a major global problem with far-reaching social, economic and environment consequences. According to the Food and Agriculture Organization (FAO), one-third of all food produced for human consumption is wasted each year, amounting to about 1.3 billion tons. This waste not only contributes to hunger and malnutrition, but also strains natural resources, contributes to greenhouse gas emissions and exacerbates food security problems.

In light of this problem, our project aims to solve food waste by developing a comprehensive solution that includes food donation and sales prediction. The primary goal is to minimise food waste by connecting surplus food from restaurants, functions and messes with NGOs and individuals who can redistribute it to those in need. In addition, we use machine learning algorithms such as XGBoost, Gradient Boosting Regressor and Random Forest to accurately predict food sales and facilitate efficient inventory management.

2. LITERATURE SURVEY

In order to address the urgent problem of food waste,extensive research has been conducted into technology based solutions and food waste management. A systematic review by Smith, Johnson, and Williams (2019) examined the effectiveness of various technologies in reducing food waste throughout the supply chain. Their findings highlighted the prudential of technology, including inventory management systems and donation platforms, in improving food waste management practices.[7]

Machine learning algorithms have also gained attention for their ability to predict food sales and optimise inventory management. Chen, Li and Zhang (2020) reviewed the application of machine learning approaches such as XGBoost, Gradient Boosting Regressor, and Random Forest in food sales prediction. Their review highlighted the potential of these algorithms in reducing food waste through better forecasting and planning.[8]

The operation for the customer side gives the option to contribute food to the people in demand. The proposed operation allows benefactors to fluently enter essential information similar to the volume of food, food type, quantum, and their contact number. The streamlined process enables benefactors to give the necessary details for their food donation without gratuitous complexity. NGOs or any social working association can take up that food and deliver it to needy people. When the enrollment will be finished it'll be placed on the garcon side database from where the associations can store the data of benefactors and the position to the nearest NGOs. So that empty people can get food on time.[6]

"Food donation: An initiative to mitigate hunger in the world" Gonzalo Mejia. Universidad De Los Andes. Department of Industrial Engineering. In addition to establishing the structure of food banks and the necessary staff, the logistics of a food bank operation have remained abecedarian. Benefactors are generally advised to communicate their intention to contribute Products to the food bank reaching an agreement with the patron on how the products will be delivered and the benefits that the patron will have (duty impunity). The process to admit goods is performed

at the distribution centre of the bank where the products will be stored on pallets and latterly they must go through a bracket stage, During the bracket stage, products that are supposedly unfit for mortal consumption are discarded. This step ensures that only safe and suitable food particulars are distributed to those in need. Eventually the packaging process is performed. However, the store house process can be added.[9]

A new online-based application that provides a platform for donating leftover food to all or any needy people/organisations [10]. It gives details about the motivation to return up with such an application, thereby describing the prevailing donation system and the way the proposed product works for the improvement of society. The recent depression has grown the amount of individuals living in conditions of food poverty, especially in developed regions. At the client side App gives a facility to donate food to the charity for the assistance of hungry people.

'Aahar' is a Smartphone application that provides donors and seekers with a forum to donate and take food once they have successfully logged into the system.The system consists of three primary donor, volunteer and admin modules.The donor completes tasks such as registration/login and adds items to the donation request to be contributed and viewed. The recipient does tasks such as requesting items, displaying requested items and claiming donations. The manager will track the collection and upgrade it. The administrator and the donor will also see the position of the recipient. The donor-donated objects will be displayed to other users as a reminder in the donation tab and the message will be saved in the DB folders.[11]

In 2016, S.Sudha et.al.[5] through their research paper explained that in India, the garbage disposal system is done manually for segregation of waste. This may even cause different diseases. So the objective of this paper is to bring an automated process for waste segregation. Images will be based on identification and Probability index. Object is then classified as biodegradable. Implementation is done using Caffe-Framework. The project acts as an aid for reducing population levels and development of the nation and restoration of the ecosystem. The advantageous point was that it classifies objects into biodegradable and nonbiodegradable and also decreases pollution to some extent. The negative point is that it is risky in case of improper operations.

[13] Alberto Garrera, Mari Carmen Ruiz, Eloy Hontoric, Application of Machine Learning to support production planning of the food industry in the context of waste generation under uncertainty. It illustrates the added value that the application of advanced analysis to historical data can bring to the food industry. ML methods have provided valuable information, outperforming classical statistical methods for predicting the amount of food waste. This research shows some different ways to deal with uncertainty in production planning using modern methods in the field of operation research. Those tools improve classical methods and provide production managers with valuable information to access the economic benefits of improved machinery or process controls.

The paper 'Surplus food donation' [14] which was published in 2021 discusses how food can be preserved and how a sustainable approach can be taken through it, As a result, this study distinguish the effectiveness, carbon footprint, and rebound effect of a food donation system run by a charity in Sweden to anaerobic digestion.

In 2020, Roe et al. [15] delved into various subjects within the food waste literature, highlighting ethical issues that, in their perspective, deserve additional contemplation, These encompass the focus on food donation as a strategy for minimising food waste, the rise of markets for imperfect-looking food (i.e., "ugly food"), the suitability of guilt appeals for instigating reductions in waste food, and the ethical dilemmas associated with selecting dates on food labels.

3. Methodology

In this system we are providing three modules as admin, donor, recipient. Firstly the donor has to register by filling in personal details after a successful registration donor will login into the system. After successfully login, the donor can also put up items for donation & the message will be sent to the recipient via email. A donor can be any Restaurant or person who wishes to donate food & will put up their donations on the system. The recipient will also raise the request through the system and admin will control both.[1]

The methodology applied in crafting the food aid website focuses on establishing connections between food donors and registered agents, with the primary objective of reducing food wastage and streamlining the distribution process. The website encompasses functionalities such as donor, agent, and admin registration and login/logout procedures. The methodology is organised into distinct stages, including Needs Assessment and Planning, System Design, Development, Testing, and Deployment.[4]

1. Need Assessment and Planning

- Identify the key stakeholders (donors, administrators, agents) and conduct surveys and interviews to understand their requirements and expectations.
- Define the goals and objectives of the Food Donation Website, including the scale of operation, geographical reach, and target beneficiaries.

2.System Design

- Develop wire-frames and prototypes for the website's user interfaces.
- Design the DB to store donor, donation and beneficiary information.
- Plan the architecture and technology stack for the website, considering scalability and security.

3.Development

- Create the website's components according to the design.
- Implement user registration and authentication systems for donors, administration, and agents.
- Develop features for posting donations, managing donations, scheduling pickups, and delivering food to beneficiaries.
- Integrate a matching algorithm to connect donors with nearby agents and beneficiaries efficiently.

4. Testing

- Conduct through testing, including functionally testing, usability testing, and security testing.
- Ensure that the website is user-friendly, responsive, and free of critical bugs.
- Taking feedback from potential users to make necessary improvements.

5. Deployment

- Roll out the Food Donation Website to a broader audience, extending its reach to a wider geographical area.
- Market the platform to attract more donors, administrators, and agents.

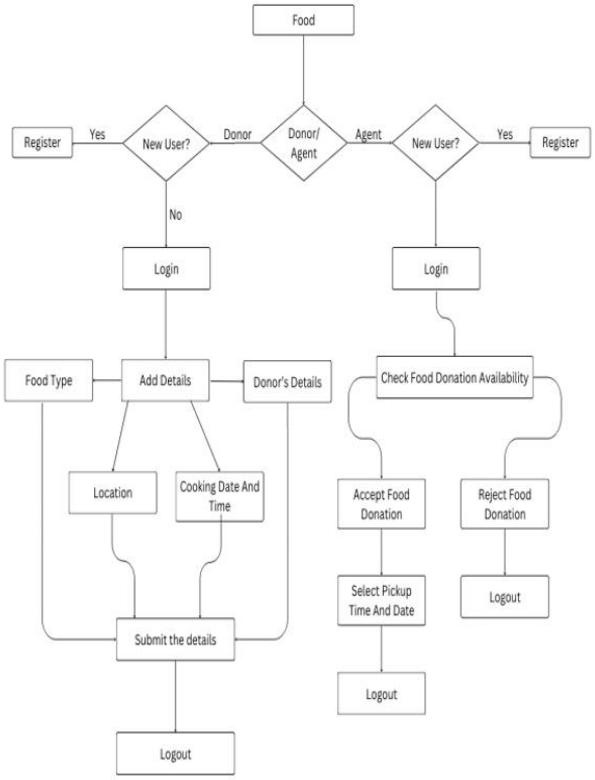

Fig.1 Flowchart Diagram

4. Conclusion

The establishment of a food donation website represents a pivotal step in addressing the issue of food insecurity within our society. By harnessing technology and uniting those in need with generous donors, we have the potential to profoundly impact the lives of individuals and families grappling with hunger. This research paper has delved into the advantages and obstacles associated with food donation websites , illustrating how they can streamline the donation process, boost efficiency, and reduce food wastage. Furthermore, they serve as a platform for individuals and organisations to collaborate and effect positive change in their communities.

Nevertheless, it is imperative to recognize that food donation websites, on their own, cannot offer a comprehensive solution to the multifaceted problem of food insecurity. They should be considered as one component of a more comprehensive strategy that encompasses policy reforms, educational initiatives, and community involvement. The pivotal element lies in collaborative efforts among government agencies, non-profit organisations, and businesses to establish a sustainable and all-inclusive food system.

By lending our support and utilising food donation websites, we can contribute to a fairer society in which no one suffers from hunger. Let us persist in raising awareness, fostering empathy, and taking concert steps to ensure that every individual has access to nourishing food. Together, we can generate a lasting impact and shape a brighter future for all.[4]

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