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FoodBridge AI:A Survey Paper

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Abstract-*FoodBridge AI is an intelligent food donation platform designed to reduce food waste and combat hunger by connecting food donors with nearby NGOs and recipients. The system leverages artificial intelligence to match surplus food availability with real-time demand, optimizing distribution based on location, quantity, and freshness. It integrates analytics to monitor donation trends, predict future needs, and enhance decision-making for resource allocation. Through a user-friendly mobile and web interface, FoodBridge AI streamlines the donation process, improves transparency, and supports sustainable food management practices. By bridging the gap between donors and recipients, the platform promotes social responsibility, reduces food insecurity, and contributes to achieving sustainable development goals.*

Keywords- Food Donation Platform, Artificial Intelligence, Machine Learning, Donor-Recipient Matching, Real-Time Analytics, Surplus Food Management, NGOs, Hunger Reduction, Sustainable Development, Web Application, Mobile Application, Resource Optimization, Location-Based Matching, Data-Driven Insights.

1. Introduction

Food wastage and hunger remain two critical global challenges, where surplus food is often discarded while millions face scarcity. Traditional donation systems are mostly unorganized and inefficient, leading to delays and wastage of perishable items. To address this, technology-based solutions can bridge the gap between donors and recipients effectively. FoodBridge AI is a web-based platform developed using Django (Python) and MySQL that facilitates smart food redistribution. The system integrates an AI Matching Engine to automatically connect donations with requests based on food type, location, and urgency. Donors, recipients, and NGOs interact through a responsive interface built with HTML, CSS, and JavaScript. This ensures timely allocation, reduces wastage, and enhances transparency. By combining AI with scalable web technologies, FoodBridge AI contributes toward sustainability and social good.

2.Objectives

1. To develop an AI-powered platform that accurately connects surplus food donors (restaurants, shops, households) with verified recipients (NGOs, shelters, families) in real-time.

2. To analyze surplus food details including type, quantity, and expiry time to ensure proper and safe redistribution before food spoils.

3. To create an automated matching system using AI algorithms based on location, demand, and availability to minimize delays and food wastage.

4. To provide real-time notifications and alerts to recipients and timely meal distribution.

5. To maintain a centralized dashboard for tracking food donations, collections, and distributions, helping measure impact effectively.

6. To generate reports and analytics to show food saved, meals served, and overall reduction in food waste, supporting data-driven decisions for future expansion.

2.Related Work

[1] The document discusses "Food Wastage Reduction through Donation Using Modern Technological Approach: Helping Hands"is a web-based food donation management system aimed at reducing food wastage and addressing hunger. The platform connects food donors, such as restaurants, events, or households, with NGOs and individuals in need. Donors can register and log details of surplus food, including type, quantity, and availability time. NGOs can view available donations, request the required items, and coordinate pickup or delivery. The system maintains a record of all donations and allocations,

ensuring transparency and accountability. By tracking surplus food and facilitating efficient distribution, Helping Hands optimizes resource utilization, reduces waste, and improves access to food for needy individuals. Its organized approach and user-friendly interface make it an effective technological solution for social welfare.

[2] The document presents Food Sharea web-based collaborative platform designed to minimize food waste by efficiently connecting donors, NGOs, and volunteers. Donors, including restaurants, events, and households, can register on the platform and log details about their surplus food, such as type, quantity, and availability time. NGOs and volunteers can access this information in real time, view geolocated food sources nearby and coordinate pickups or deliveries accordingly. The system maintains records of all donations, requests, and allocations, ensuring transparency, accountability, and proper tracking of food distribution. By leveraging geolocation and real-time updates, Food Share streamlines communication, reduces delays, and enhances the overall efficiency of food redistribution. Its organized and user-friendly interface allows multiple stakeholders to collaborate effectively, making it a scalable, technology-driven solution to reduce food wastage and address hunger in communities.

[3] This project highlights a review on Food Wastage Reduction Through Donation. The system is designed to reduce food wastage by efficiently connecting food donors with NGOs and beneficiaries in need. Donors can register and provide details of surplus food, including type, quantity, and availability time. The platform tracks all donations and manages distribution, ensuring that surplus food is allocated to recipients in a timely and organized manner. By maintaining records of donors, NGOs, and beneficiaries, the system enhances transparency, accountability, and proper monitoring of food flow. It streamlines communication between stakeholders, reduces delays in redistribution, and promotes social responsibility. Overall, the system demonstrates how technology can be leveraged to minimize food waste, improve resource allocation, and provide a reliable solution for hunger reduction in communities.

[4] This feature explores "Helping Hand Donation System" a technological platform designed to connect food donors with NGOs and recipients, enabling efficient management of surplus food. Donors can log available food, while NGOs and recipients can view and request donations in real time. The platform uses database management and notifications to ensure timely and organized redistribution of surplus food. By tracking donations and facilitating quick communication between stakeholders, Helping Hand aims to reduce food wastage and support needy communities. Its structured and user-friendly approach demonstrates how technology can improve social welfare and resource allocation.

[5] This overview describes "Waste Food Management and Donation " presents a mobile application designed to manage and donate surplus food effectively. The app connects donors, NGOs, and recipients, enabling efficient coordination and ensuring that excess food reaches those in need. Donors can register and log details about available food, including type, quantity, and pickup timing, while NGOs and recipients can access this information in real time. The system leverages database management and GPS tracking to monitor donations and optimize distribution routes. Real-time notifications keep all stakeholders informed, reducing delays and enhancing timely delivery. By streamlining the donation process and improving communication, the app minimizes food wastage, addresses hunger, and contributes to environmental sustainability. The platform also emphasizes social responsibility by making the process transparent, organized, and scalable for wider community impact.

[6] The analysis introduces a literature review on Modelling and Simulation of Food Bank Disaster Relief Operations which focuses on enhancing the efficiency of food bank operations during disaster relief scenarios through the use of simulation techniques. The study recognizes that during disasters, food banks face immense pressure to manage large volumes of donations, coordinate volunteers, and ensure timely delivery to affected communities. To address these challenges, the paper develops a simulation model that represents the entire disaster relief supply chain, including the flow of food from donors to warehouses, the transportation of supplies to distribution centers, and the scheduling and allocation of volunteers. By simulating these operations, the study identifies potential bottlenecks, such as delays in transportation, inefficient volunteer assignments, or congestion at distribution points, which can hinder effective relief efforts. The model allows decision-makers to test different strategies for resource allocation, logistics planning, and operational scheduling under high-pressure conditions without real-world consequences. Ultimately, the paper demonstrates that simulation can serve as a powerful tool for improving the responsiveness, reliability, and overall efficiency of food bank disaster relief operations, ensuring that resources reach those in need more effectively during crises.

[7] The project focuses on creating a mobile application aimed at minimizing food wastage by efficiently connecting

donors, such as restaurants or households, with NGOs and volunteers who can redistribute surplus food to those in need. The application monitors food availability in real time and ensures timely coordination so that excess food reaches recipients before it spoils. By leveraging IoT (Internet of Things) devices, the system can track food storage conditions and locations, while cloud-based technologies enable seamless communication among donors, volunteers, and NGOs, ensuring faster and more organized distribution. This approach not only reduces food wastage but also improves resource utilization and addresses hunger in a community-focused, technology-driven manner.

[8] The report "Mobile Application for Excess Food Donation and Analysis" presents the problem of food wastage by creating a technology-driven platform that connects donors with recipients in need. The proposed mobile application allows donors, such as restaurants, households, and institutions, to register and notify the system about surplus food available for donation. Recipients, including NGOs and individuals, can access this information in real time, enabling prompt collection and redistribution of excess food before it spoils. A key feature of the system is its analytics component, which collects and analyzes data on donation patterns, such as frequency, quantity, and locations of food donations. These insights help optimize the distribution process, allowing coordinators to allocate resources more efficiently, predict demand, and identify areas with high food wastage. By combining real-time coordination with data-driven analysis, the application not only reduces food wastage but also improves the overall efficiency and effectiveness of food donation networks, ensuring that surplus food reaches those who need it most in a timely manner.

[9] The assessment introduces "Food Share Network: An AI-Based Food Donating Application" presents a web-based platform designed to streamline and enhance the process of food donation. The system connects donors, such as restaurants, cafes, and individual households, with NGOs and charitable organizations that distribute food to those in need. By leveraging digital coordination, the platform reduces surplus food by ensuring that available donations are efficiently routed to recipients in a timely manner. A notable aspect of the system is the integration of AI concepts, which helps match donors with the most suitable recipients based on factors such as location, type and quantity of food, and urgency of need. This AI-driven matching improves operational efficiency by minimizing delays and reducing wastage. Additionally, the authors highlight the future potential of predictive analytics and automation, which could enable the system to forecast donation patterns, optimize logistics, and even automate allocation of food resources to maximize impact. Overall, the platform demonstrates how combining AI with web-based coordination can significantly enhance food redistribution efforts, reduce wastage, and ensure timely delivery to communities in need.

[10] This synopsis provides an overview of "G-GET: All in One Donation App" introduces a mobile application that consolidates multiple types of donations - including food, clothes, and monetary contributions - into a single, unified platform. The application is designed to streamline interactions between donors and recipients, making the donation process simpler and more user-friendly. One of its key features is real-time tracking, which ensures transparency by allowing donors to monitor the status and impact of their contributions. By supporting diverse donation types and providing an intuitive interface, G-GET not only enhances operational efficiency but also broadens the scope of community support, enabling a more organized and effective distribution of resources to those in need.

[11] This appraisal details a study and implementation of "Food Wastage Reduction Through Donation" focuses on tackling the widespread problem of food wastage by creating a structured system to link donors with NGOs. The proposed approach targets restaurants, households, and institutions that regularly generate surplus food, enabling them to quickly notify registered NGOs about available donations. The system emphasizes improved coordination by streamlining the process of food collection and redistribution, which minimizes delays and ensures that edible food reaches underprivileged individuals before it spoils. By enhancing communication between donors and NGOs, the system not only reduces waste but also maximizes the efficient utilization of resources such as transport and volunteers. Furthermore, it highlights the potential for scalability and community impact, as such a platform could be expanded to include additional features like real-time tracking, analytics for demand forecasting, or automated alerts for urgent donations. Overall, the study demonstrates a practical, technology-assisted solution to bridge the gap between surplus food availability and hunger relief efforts.

[12] This exploration highlights Food Donation Application a mobile application developed as an institutional project at the Global Academy of Technology, Bengaluru. FEEDIE is designed to bridge the gap between food donors—such as households, restaurants, and event organizers—and NGOs or individuals in need, making the donation process more structured and efficient. The application allows donors to

submit donation requests quickly, which are then visible to nearby NGOs or volunteers who can claim and collect the surplus food. It also incorporates tracking features to monitor donations and delivery progress, ensuring transparency and accountability throughout the process. By simplifying coordination and logistics, FEEDIE minimizes delays, reduces food wastage, and ensures timely redistribution of surplus food. The project demonstrates how a user-friendly digital solution can improve community-driven efforts to combat hunger and make better use of available resources.

[13] This analysis sheds light on An Android Application Development for Food Donation: A Geographical Location Based Approach" by Andey, Kumar, and Patel (2023) presents a mobile solution that leverages Android technologies and GPS-based location services to improve food donation logistics. The authors developed the application using the Android SDK in Java/Kotlin within Android Studio, combining XML-based layouts for the user interface. The app integrates Google Maps APIs and Android's built-in location services to detect donor and recipient positions, optimize collection routes, and display nearby donation opportunities. For backend support, the system is described as using a cloud-based database (such as Firebase or a MySQL server) to store user registrations, donation details, and real-time status updates. HTTP/REST protocols handle communication between the client app and the backend, while push notifications or Firebase Cloud Messaging are likely used for alerts and updates. By combining these technologies, the authors ensure efficient coordination between donors, NGOs, and volunteers, reducing food spoilage and improving resource utilization through a reliable, location-aware platform.

[14] This project "Food Waste Management System" presents a technology-driven approach to addressing food wastage. The authors propose a digital platform that connects food donors—such as restaurants, event organizers, and households—with NGOs and charitable organizations to ensure surplus food is collected and redistributed efficiently. The system is designed to streamline the donation process, enabling real-time updates on food availability, pickup scheduling, and delivery coordination. By using GPS-based tracking and potentially cloud storage or databases, the platform ensures that food is delivered to recipients before it spoils, thereby reducing waste and contributing to community welfare. Additionally, the paper emphasizes improved coordination and transparency, suggesting that features like donor–recipient matching, status tracking, and notifications can increase participation and accountability. This work highlights how modern technologies can transform food waste management into a more organized, efficient, and impactful process.

[15] This paper "Food for You (F4U) Mobile Charity Application" presents a mobile-based charity platform aimed at addressing food wastage and improving the distribution of surplus food to underprivileged communities. Developed within a computer science and technology faculty environment, F4U is designed to connect food donors—such as restaurants, households, and event organizers—with NGOs, volunteers, and recipients through an easy-to-use interface. The application simplifies donation requests, tracks food availability, and enables donors to schedule pickups or deliveries efficiently. By incorporating mobile technologies and likely GPS-based location services, F4U ensures that donations are routed quickly and effectively to those in need, minimizing spoilage. The authors emphasize that F4U not only promotes efficient coordination and transparency in food redistribution but also encourages broader community participation in charitable efforts, thereby contributing to social welfare and reducing food waste on a larger scale. Furthermore, the application's data-driven approach allows for analysis of donation patterns and demand trends.

3.Proposed Work

The proposed work focuses on designing and implementing FoodBridge AI, an AI-powered platform aimed at solving two major problems — food wastage and hunger. The system allows restaurants, grocery stores, caterers, and households to register as donors and upload details of surplus food such as type, quantity, and expiry time through a web or mobile interface. Once the data is submitted, the platform uses AI-based algorithms to match the donated food with the most suitable recipients, such as NGOs, shelters, orphanages, and needy families, based on their location, demand, and urgency. The system generates real-time notifications to inform recipients about available food, enabling them to collect it before it gets spoiled. It also provides route optimization suggestions to reduce delays and ensure that food remains fresh during transportation.

In addition, the platform maintains a tracking dashboard where donors and administrators can monitor food availability, collections, and distributions. Detailed analytics and reports are generated to show the number of meals served, the quantity of food saved, and the reduction in waste. This structured and scalable approach helps create a reliable and efficient food redistribution network that can expand from local communities to larger cities

and regions, significantly reducing hunger and food wastage. Some Advantages of the proposed system:

- Less time-consuming.
- More flexibility for users.
- Easy to manage event workflows.
- Increased accuracy in data handling.
- Enhanced security for sensitive information.

4.Result and Inference

The implementation of FoodBridge AI has shown that technology can effectively bridge the gap between surplus food and people in need. The system successfully matches donors and recipients using AI-based algorithms, reducing delays and ensuring that food reaches beneficiaries before it spoils. Real-time notifications and optimized routes improve coordination and help maintain food freshness during transportation. The dashboard feature provides a transparent view of food collected, distributed, and saved, along with reports showing the number of meals served and the reduction in waste.

From these results, it can be inferred that FoodBridge AI creates a structured and reliable food redistribution process. The use of AI improves speed, accuracy, and fairness compared to manual systems. The solution can also be scaled to serve larger regions, making it a sustainable model for fighting hunger. Additionally, by reducing food waste, the system contributes to environmental sustainability and supports social welfare initiatives. Overall, the project demonstrates that an AI-powered approach can significantly reduce hunger, minimize food wastage, and create a long-term positive impact on communities.

5.Future Scope

The FoodBridge AI platform offers several promising directions for future development and expansion. These enhancements will improve usability, increase reach, ensure food safety, and provide stronger evidence for policy and large-scale adoption. Several areas for future development and improvement include:

1. Enhanced User Experience & Accessibility:

Continuously refine the user interface to make it intuitive and responsive across devices. Adding multi-language support, simplified on boarding for donors/recipients, and larger-font or voice-assisted options will make the platform accessible to diverse users, including those in rural areas.

2. Integration with Advanced AI & Machine Learning: Incorporate predictive models to forecast surplus food generation (based on historical patterns, events, restaurant orders) and demand at recipient centers. Use computer-vision models to assist in basic food-quality checks (e.g., detecting visible spoilage) and to auto-classify donated items, speeding up posting and matching.

3. Smart Logistics & Route Optimization: Enhance routing by integrating live traffic data, ETA prediction, and dynamic rerouting to minimize delivery time. Future work can include partnerships with transport services or automated scheduling to handle bulk pickups efficiently.

4. Cold Chain & IoT-based Food Safety: Integrate IoT sensors (temperature/humidity) and cold storage links for highly perishable donations. Real-time monitoring of storage conditions during transit and automated alerts for temperature deviations will improve safety and expand the range of food types that can be redistributed.

5. Quality Assurance & Compliance: Add standardized checklists, QR-tagging, and simple digital certification processes to verify food safety and donor compliance. This can help build trust with recipient organizations and meet regulatory requirements when scaling to larger jurisdictions.

6. Block chain for Transparency and Traceability:

Implement block chain or immutable ledgers to record donation flows and distribution events. This will increase accountability, make audits easier, and improve donor confidence—especially for corporate partners and governmental stakeholders.

7. Partnerships with Government & NGOs : Build formal collaborations with municipal bodies, food safety authorities, and NGOs to integrate FoodBridge AI into public welfare programs. Such partnerships can enable subsidized logistics, centralized collection points, and policy-driven expansion.

8. Advanced Analytics & Policy Reporting : Expand the analytics module to include long-term trend analysis, carbon-footprint reduction estimations, and demand-supply forecasting. Generate policy-ready reports that help decision-makers plan interventions and measure the platform's social and environmental impact.

9. Community Engagement & Incentive Mechanisms: Introduce donor recognition, impact badges, small tax-invoice automation, or CSR reporting tools to encourage sustained participation. Community features (testimonials, local drives, educational content) can increase trust and awareness.

10. Scalability & Multi-Region Support : Architect the platform for multi-tenant deployments so it can be localized for different cities/states with separate admin controls, localized languages, and region-specific regulations. This will ease expansion from pilot regions to statewide or national rollouts. By pursuing these avenues, FoodBridge AI can evolve

from a local redistribution tool into a robust, trusted, and scalable ecosystem that reduces food wastage, supports vulnerable populations, and informs policy for long-term sustainability.

6.Conclusion

FoodBridge AI provides an intelligent and scalable solution to address the twin challenges of food wastage and hunger. By integrating artificial intelligence with a user-friendly digital platform, it effectively connects donors with recipients in real time. The system ensures timely redistribution of surplus food through AI-based matching, route optimization, and instant notifications. Its transparent dashboard and analytics help track donations, monitor impact, and promote accountability. The project demonstrates how technology can enhance social responsibility while reducing environmental burden caused by food waste. Compared to manual systems, FoodBridge AI ensures faster, fairer, and more reliable food distribution. Its scalability allows adoption across local, regional, and national levels. The model not only supports hunger reduction but also contributes to sustainable development goals. Ultimately, FoodBridge AI showcases how technology-driven solutions can create lasting positive impact on communities and the environment.

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