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AI-Powered Solutions for Food Waste Reduction and Donation System

Ansh Vishnoi [1],Dr.Umesh Dwivedi [2], Aman Chandra [3], Anant Naudiyal [4],Abhishek Singh [5]

[1,3,4,5]Students(Computer Science and Engineering), Babu Banarasi Das Northern India Institute of Technology, Lucknow, Uttar Pradesh, India

[2]Associate Professor.- Dr.Umesh Dwived, Department of Computer Science, Babu Banarasi Das Northern India Institute of Technology, Lucknow, Uttar Pradesh, India

Abstract

Food waste is a vital hassle, exacerbated by using population boom and monetary improvement. Our software program addresses this with the aid of connecting donors with NGOs, facilitating meals donations to the ones in need. Users can sign up their records, permitting NGOs to get right of entry to donor facts seamlessly. This platform objectives to enhance transparency and efficiency in food donation methods, in the long run contributing to environmental sustainability and financial benefits. By bridging the distance among donors and recipients, we strive to reduce meals waste on the equal time as making sure that surplus meals reaches those who require it most.

Integrating AI-powered solutions into food waste discount and donation structures can extensively beautify performance and transparency like automated waste tracking, enhance user engagement, Recipe Generation from Surplus Food, statistics pushed selection making, seamless connectivity.

Key Words – Management System, Food Waste, MERN Stack, Database, Food Donation, Artificial Intelligence, Machine Learning.

I. INTRODUCTION

Food wastage occupies the spotlight in the agenda of countries that have huge populations, such as India, where a large chunk of edible food is thrown out. Females are truly responsible for the waste as they purchase consumable goods that are later wasted. Hence, this only reinforces the need for food banks both nationally and globally. Only this time the statistics will show how ineffective these programs have been in some respects: Not only do they cause famine, but they also pollute soil, water, and the atmosphere; alter climate; and raise temperatures. Looking for ways to tackle hunger without throwing food away will help save environmental concern as well as enhance economic productivity. Developing awareness on food waste and promoting waste reduction strategies that are beneficial to thousands of people and the planet itself needs collective efforts[1].

Basic Concept

Using the MERN stack (MongoDB, Express, React, & Node.js), we created a dynamic and easy to navigate website. There are currently three components that comprise the system: 1. A food donor; 2. a person in needed ;3. an admin. It's a product in the form of an application for Android that aims to get NGOs with food to donate food to the people. The application helps to link those who have food to donate and volunteers who require food and belong to the NGO. Donors can provide relevant information about the food they have to donate or share, including details such as the type of food, where it is going to be, when it has been cooked, and when it will be used. This simple procedure improves food donation processes, which also helps to make sure that idle assets are put to good use in helping needy communities[2].

It(AI-Powered Solutions for Food Waste Reduction and Donation System)addresses meals waste exacerbated via population increase and financial enhancements. It connects donors with NGOs, enhancing transparency and efficiency in food donation processes, contributing to environmental sustainability and economic advantages.[5]

II. LITERATURE SURVEY

On the basis of [3], One of the countries with the highest rates of food waste and the causes of excessive cultivation and disposal of consumable food is India. Food scarcity is made worse by this, and an enormous amount of money is wasted. A lot of people throw away food that is still good to eat, which calls for food donation programs. The effects of food waste go further than just the inability to feed hungry mouths; pollution, global warming, and climate change are also effects that can be attributed to food wastage. Many of these problems can be resolved through less food wastage, which in turn enhances economic objectives and sustainability, calling for concerted effort in education of the right attitude and utilization of measures aimed at reducing wastage.

According to[4]. This type of mobile application focuses on technology as a means to reduce food wastage by allowing donated food to be offered to the needy. In overpopulated nations like India, food wastage is on a higher level, and therefore food scarcity and economic loss are experienced. The problem stems from the fact that a vast number of people throw away food that could still be eaten, indicating a need for systems that facilitate donations. As if that was not enough, food wastage creates an additional problem of environmental degradation in the form of pollution and depletion of nature; thus there is a need to deal with food wastage through better approaches and engagement of the community. It uses advanced machine learning algorithms such as XGBoost, Gradient Boosting Regressor, Random Forest, and many others, aiming to enhance the food sales prediction accuracy and improve the inventory planning process.

According to[5].Waste is a good sized trouble, specially in overpopulated nations like India, in which it results in financial loss and environmental degradation. Literature highlights the need for structures that facilitate donations to lessen waste and beautify sustainability.

III. PROPOSED SYSTEM

Implementation

Donor Side:

Step 1: Registration
People can start signing up by giving their personal info. This might include their name, email, phone number, and other key details. This important step helps create accounts and makes sure users can use what the platform offers. It also keeps correct records for getting in touch and providing services.

Step 2: Login
People can get into their personal accounts by typing in their special ID number and password. This login process helps keep private info and user data safe. By asking for these details, the system stops anyone who shouldn't be there from getting in. This keeps each person's account info secure and private.

Step 3: Create Food Item
People can add a new food item by giving key info like how much they have where it is, the address for delivery or pickup, and how to get in touch. This helps make sure listings are correct and lets users and service providers talk to each other for smooth exchanges.

Step 4: Upload Images
People can add pictures of food to their listings, which makes them look better. This helps grab attention and gives buyers a good idea of what they're getting. By putting in photos, sellers can show off their stuff well. This makes the whole experience better for everyone using the site.

Step 5: Add to Cart
Customers can put more than one food item in their cart, which makes booking easier. This lets them look over what they've chosen before they finish ordering. By letting people add several items, the system makes buying stuff quicker and simpler. It also gives shoppers more options and makes things more convenient for them.

Step 6: Logout
As a next move after information on all the food items that are to be entered, users can do it safely by logging out after being added to the system. This has to provide them with the reassurance that the information entered by them does not end up in the wron g hands. Insufficient logout takes one of the most insecure tasks, making vulnerable accounts of our users, that should be taken into account after a successful transaction.

Volunteer/Need Side:

Step 1: Registration
Volunteers can register for participation by providing their personal details which may include their name, contact information, and experience that is related to the field. This registration process is important for organizing volunteer activities in a way that the volunteers are well-matched with skills and interests to the opportunities which enable a far more productive environment.

Step 2: Login
Volunteers are able to log in their own personal accounts by providing their unique identification number and password. It is the protected login process that really confers security to the classified information that only the approved ones can see. By sustaining persuasive authentication techniques, the solution guarantees the safety of volunteer information while also constructing pathways of efficient communication and management of the volunteer-related activities and opportunities.

Step 3: Search and Book
Volunteers may easily locate food items by determining their geographical location and then choose among the available options. Through this system, they can reserve products for specified time slots which would lead to them having a secure and timely resource accessibility. The location search and appointment features of the platform have made the whole action of food distribution more efficient.

Step 4: Accept Request
After examining the requests thoroughly, the donors have sent in the volunteers who are entitled to give away the foodstuffs. This process goes through to see whether it is really a necessity in the community that the voluntary group comes to such a resolution. By enabling the effective communication between the donors and the volunteers, the system improves the efficiency and the impact of food assistance activities.

Step 5: Provide Feedback
Volunteers are invited to give feedback on both the taste and quality of the food items when they are received by them. This feedback is vital in determining the overall success of the food distribution program. By the systematic gathering and analysis of this data, the organization will then be able to make informed decisions and improvements, thereby ensuring that future offers comply with the standards and preferences of the local community.

Step 6: Logout
The volunteers can log out of the system after they perform the tasks specified for them. This action not just aids the confidentiality of their personal information but also shows the last activity on it. Logging out, as a channel of communication, is a volunteer contribution to data integrity, and protection of sensitive data within the platform.

Admin Side:

It lets the admins control the system, users' profiles, and access permissions.
Tools for creating new user accounts, modifying them, and removing them.
Users can then be assigned the roles and the corresponding rights that they have. Offers monitoring tools for donation activities.
Aids in the resolution of disputes that are caused by the donation process.
A tool that ensures that the rules and guidelines governing the system are kept in place.

AI-Driven Insights for Food Donation Platforms:

It makes use of the MERN stack to create a dynamic platform. It includes additives for donors, recipients, and admins, facilitating seamless meals donation procedures by means of supplying detailed food information and ensuring efficient distribution.
Integrating AI-powered answers into meals waste reduction and donation systems can extensively decorate performance and transparency. Here's how:

Automated Waste Tracking:
AI technologies, consisting of the ones utilized by corporations like Kitro and Orbisk, make use of cameras and sensors to robotically hit upon and categorize meals waste in real-time. This information enables perceive patterns in food disposal, enabling kitchens to modify element sizes and optimize stock management.

Enhanced User Engagement:
By employing AI algorithms, systems can examine consumer conduct and possibilities, facilitating personalized hints for meals donations. This no longer best improves user enjoy however also encourages more common participation from donors.

Recipe Generation from Surplus Food:
AI applications like Snap Snack allow users to input available elements and get hold of creative recipe guidelines. This encourages the utilization of leftover food, hence minimizing waste whilst promoting sustainable cooking practices.
Data-Driven Decision Making:
AI systems can provide actionable insights into food waste trends, helping organizations develop centered techniques for lowering waste and improving donation strategies. For example, they can highlight which varieties of food are maximum frequently wasted, permitting NGOs to tailor their outreach efforts as a consequence.

Seamless Connectivity:
An AI-superior platform can streamline the connection among food donors and NGOs, making sure that surplus meals is successfully matched with those in need. This reduces logistical boundaries and complements the general effectiveness of meals donation efforts

IV. METHODOLOGY

This phase provides the database layout for a consumer registration machine, aimed at capturing crucial information all through the registration manner. The primary aim is to create a database schema that efficiently stores consumer records such as privateinformation, contact facts, login credentials, and category selection.

Overview Of The Registration System

The registration machine is designed to permit customers to sign in through presenting their full name , email address, phone number, password, confirming the password, and choosing a category from a pre defined list. The system guarantees that all fields are proven for specialty and consistency, especially the email and password fields.

Database Schema

The proposed database design consists of a single table, Users, which stores all relevant consumer statistics. The following sections describe the structure and relationships of this desk. The Userstable is principal to the registration system, and it captures vitalrecords for every user. The table includes the following attributes:

Explanation of Fields

user_id:
This is an auto-incrementing primary keythat uniquely identifiers each person. The field ensures that each user inside the database has a unique identifier.

full_name:
This field captures the consumer's full name,that is a required enter.

email:
The electronic mail address serves as the number one contactpoint for the user. Thought to be precise, ensuring that no customers could have the same email cope with the system makes use of this electronic mail for verbal exchange, along with password recovery and verification.

smartphone_number:
The phone number is stored as a string to permit flexibility in formatting. While it isn't always a mandatory field, it offers an additional approach of consumer touch.password:
The password is stored as a hashed pricefor security purposes. The use of a steady hashing algorithm (e.g., bcrypt) ensures that passwords are saved accurately and aren't retrievable in undeniable text.

class:
This field captures the class decided onby means of the consumer from a predefined list. The to be had classes are: 'NGO', 'RESTAURANT', 'EVENT','HOSTEL', and 'OTHER'. This statistics enables classify the person based totally on their registration type.

registration_date:
This field mechanically factsthe date and time

when the user registers. It lets in monitoring of person signal-united states and might be beneficial for auditing or advertising analysis.

reputation:
This feld suggests the status of the person'saccount, which may be both 'Active' or 'Inactive'. When a user registers, their account is about to 'Inactive' till they verify their electronic mail.
e-mail_verified:
This Boolean feld tracks whetherthe person has correctly verified their e-mail cope with. Email verification is normally used to ensure the validity of user debts and save you fraud.

verification_token:
A specific token generated all throughthe registration manner. This token is sent to the consumer's electronic mail deal with for verification. When the person clicks on verification hyperlink, the token is used to confirm the authenticity of the consumer's email address.

Validation And User Registration Flow

The user registration process is designed to make certain facts integrity and safety. Thefollowing validation steps are achieved during the registration:

Email Uniqueness:

The device assessments whether or not the suppliedelectronic mail is already registered. If the email is unique, the registration method continues;in any other case, the consumer is prompted to provide a distinctive e-mail.

Password Validation:

The password and confirmation password fields are confirmed to make sure that each fields fit and cling to strength necessities (e.g., minimal length, special characters).

Email Verification:

After a hit registration,the user receives an e-mail with a completely unique verification hyperlink containing the verification_token.The account stays inactive till the person clicks the link to verify their electronic mail deal with.

Status Change:

Once the consumer clicks the e-mail verifcation hyperlink, their account repute is up to date to 'Active', and these mail_verified field is set to TRUE.

It involves designing a database schema to store user information securely. It includes fields for user identification, contact details, and login credentials, ensuring data integrity and security through validation processes.

V. SYSTEM MODULES

The proposed device includes an structure diagram that visually represents the platform's functionality. This diagram simplifies the expertise of ways various components engage, illustrating records waft, consumer interactions, and device strategies. By imparting a clear assessment, it enhances comprehension of the platform's structure and operational workflow for stakeholders in Figure.1 [5].

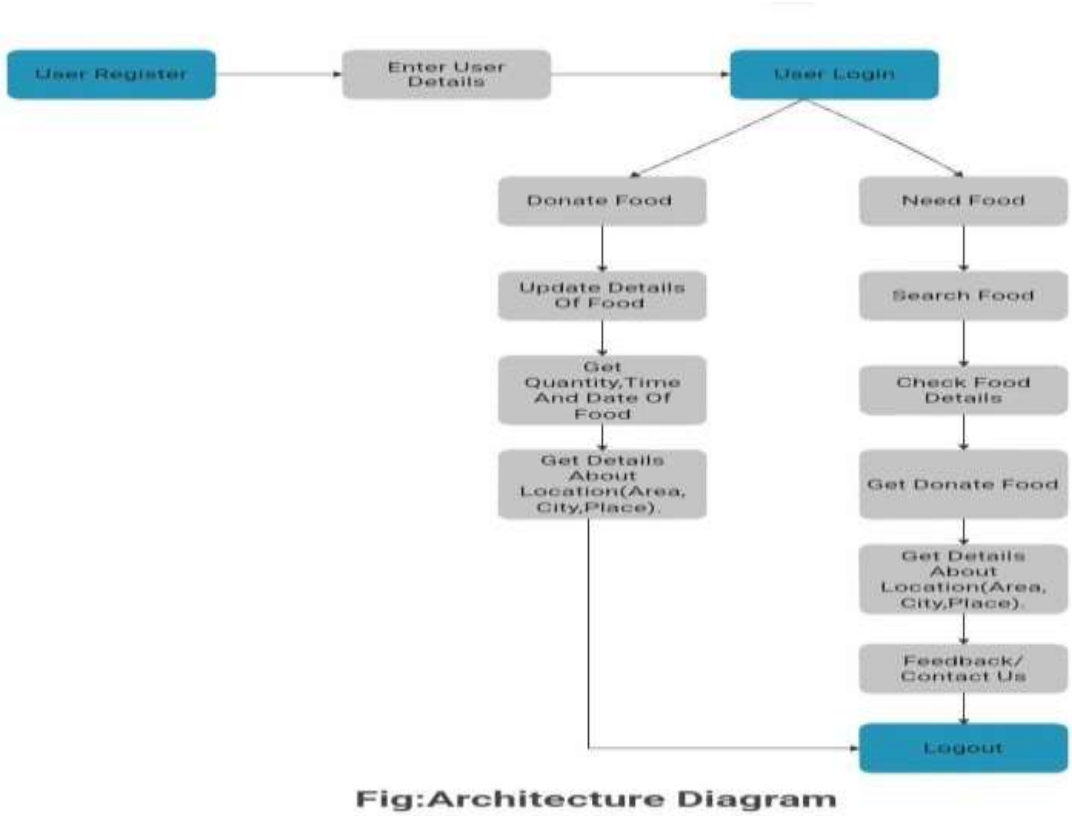

Fig: 1

VI. DESIGN DETAILS

The design section functions a comprehensive flowchart that outlines the whole operational workflow of the platform. This special flowchart illustrates every step of user interactions, records processing, and device responses, offering a clean visual illustration of methods. It serves as a treasured tool for knowledge capability and guiding improvement efforts efficaciously in Figure.2 [5].

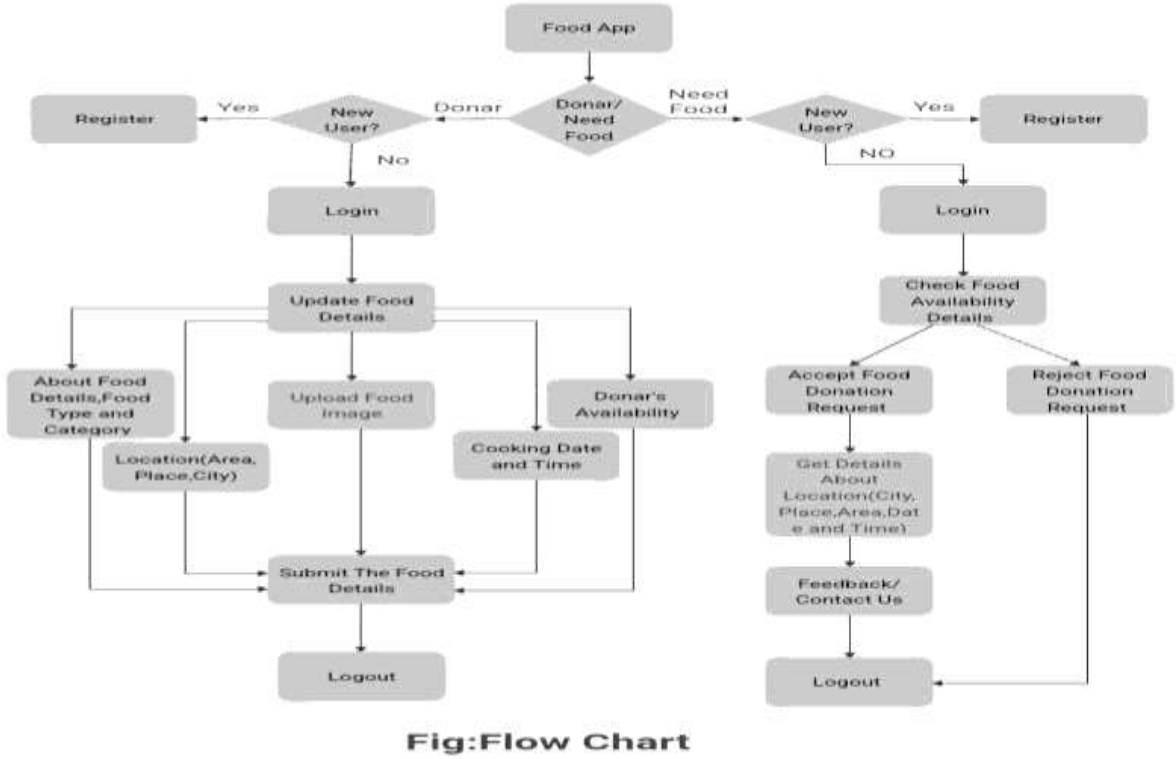

Fig: 2

VII. RESULT

Welcome to Lastbites

User' Initial Page | Landing Page

Fig: 3

Lastbites landing page showcases two main modules: Donate Food and Need Food. This first interface is a centre and referee pointing to six other pages for users, which are Home, Contact, About, Sign In, Login, and a special Donate Page connected directly to the food donation module in Figure.3 .

Fig: 4

Figure.4 , which represents the complete Initial Page of the "Last Bites" site, a [food donation and management system].

User Register Page / Signup Page

Fig: 5

The Registration or Sign-Up Page lets in customers to go into critical info, such as full call, email, category, and speak to number, to create an account and get admission to services in Figure 5.

User Login Page | SignIn Page

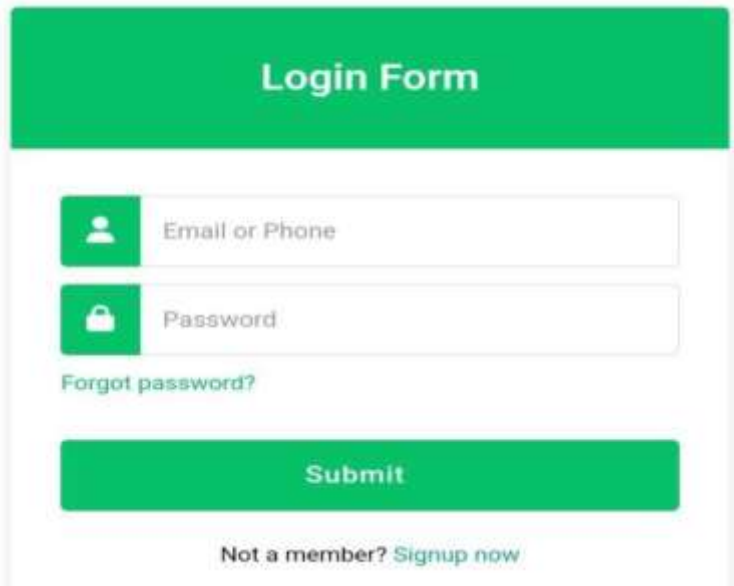

Fig: 6

The User Login or Sign-In Page enables secure access to the platform, allowing users to authenticate their identities and gain entry to personalized features and services in Figure.6.

Need Food Page

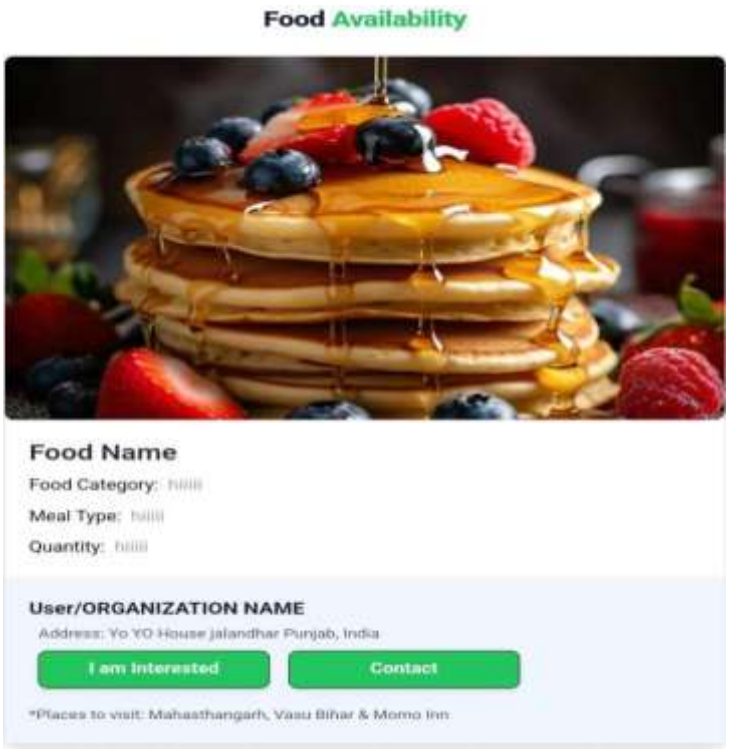

Fig: 7

The Need Food Page permits volunteers and individuals in want to view food kinds, names, portions, and precise descriptions, facilitating efficient food distribution and aid in Figure 7.

Contact Us / Feedback Page

Fig: 8

The Food Donation Page permits customers to provide information including meals call, meal kind, class, and cooking date, facilitating the donation system to the ones in need in Figure.8 .

Donate Food Page

Fig: 9

The Contact or Feedback Page permits customers to submit their name, e-mail, and message, facilitating verbal exchange and comments to beautify person enjoy and carrier improvement in Figure 9.

About Page

Fig:10

The About Page gives unique facts about our platform, which include its challenge, values, services, and the team at the back of it, fostering transparency and user engagement in Figure 10.

VIII. FUTURE SCOPE

Also we enlarge our app to have many forms of donating customers like(Toys, Clothes, Books, Footwear, Money, fruits) from agencies such as eating places, own family or a unmarried consumer.

Adding the location facility to our apps and additionally a delivery companion.

The donating user have to discover the delivery individual and location of the proportion meals. Adding the time and date and expiry of every snack shared by using customers.

Establishing a network of strategically placed warehouses(inventory)across various cities and states enhances delivery efficiency, optimizes operations, and minimizes transit times for powerful logistics control.

Integrating superior delivery features and modules enhances person revel in and boosts reliability in logistics operations.

It includes integrating superior AI algorithms to are expecting food demand and optimize inventory making plans. This ought to decorate the accuracy of food income predictions and enhance the overall efficiency of the donation procedure.

IX. CONCLUSION

Lastbites [The Food Waste Management and Donation System] targeted on efficiently addresses food wastage while assisting groups in need with the aid of facilitating collaboration among donors, administrators, transport employees, and NGOs. This challenge includes a consumer-friendly internet site for food donations, predictive analytics for meals sales using device mastering, and a comprehensive evaluation of world meals waste. By leveraging generation, the device complements donation efficiency and promotes sustainability, ultimately fostering superb social exchange. Through these blended efforts, we can substantially lessen food waste and starvation, creating a greater equitable and sustainable future for all stakeholders concerned within the food distribution manner.

Lastbites [The Food Waste Management and Donation System] represents a transformative approach to mitigating meals waste even as addressing food insecurity. By integrating advanced technologies, such as system mastering for predictive analytics and a consumer-

friendly interface for seamless donations, this device enhances operational efficiency among stakeholders, along with NGOs, donors, and administrators. The incorporation of actual-time monitoring and sturdy records control facilitates powerful tracking of donation activities, ensuring compliance with health and protection standards. Ultimately, this initiative no longer best fosters collaboration across various sectors however also promotes sustainable practices that make a contribution to social fairness and environmental stewardship, paving the manner for a more resilient meals distribution network.

It(AI-Powered Solutions for Food Waste Reduction and Donation System)efficiently bridges the space between donors and recipients. By leveraging era, it ambitions to lessen food waste even as ensuring surplus food reaches the ones in need, contributing to environmental sustainability and financial advantages.

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[6]. We use a EdrawMax software to layout a float chart and architecture diagram see in Figure.1 and

Figure.2. [7]. We taking a Image of Figure.3 from Pinterest link: https://pin.It/5cATоen3K .

[8]. We taking a Image of Figure.10 from freepik link:

https://www.freepik.com/free-photo/close-up-hands-holding-food_20825805.htm#fromView=keyword&page=1&position=11&uuid=f7d1bf3f-b10c-4582-b60b-7c25524db37a