AI-Powered Food Redistribution System

PROBLEM DESCRIPTION:

Food waste is a major global issue, with **over 1.3 billion tons of food wasted annually** while millions suffer from food insecurity. The problem is worsened by inefficiencies in food distribution:

- **Restaurants, supermarkets, and farms generate surplus food**, which often goes to waste due to logistical challenges.
- **NGOs and food banks struggle to match supply with demand efficiently**, leading to uneven food distribution.
- **Limited real-time coordination** between food donors, logistics providers, and recipient organizations results in food spoilage.
- **Lack of optimized delivery routes** increases transportation costs and delays, making redistribution ineffective.

A **technology-driven solution** is needed to **bridge the gap** between food donors and recipients, optimizing redistribution efforts while minimizing waste.

PROPOSED SOLUTION:

An AI-driven platform that connects food donors (restaurants, supermarkets, farms) with NGOs and food banks to efficiently redistribute surplus food. The system includes:

Smart Food Matching System (AI-powered):

- Uses TensorFlow AI models to predict where surplus food is most needed based on demand patterns and food expiration data.

Real-Time Platform for Food Donations:

- Food businesses list surplus food, and AI recommends the best recipients (NGOs, shelters, food banks).

Optimized Delivery & Logistics:

- Google Maps API & AI-based route optimization ensure efficient delivery routes, minimizing delays and costs.

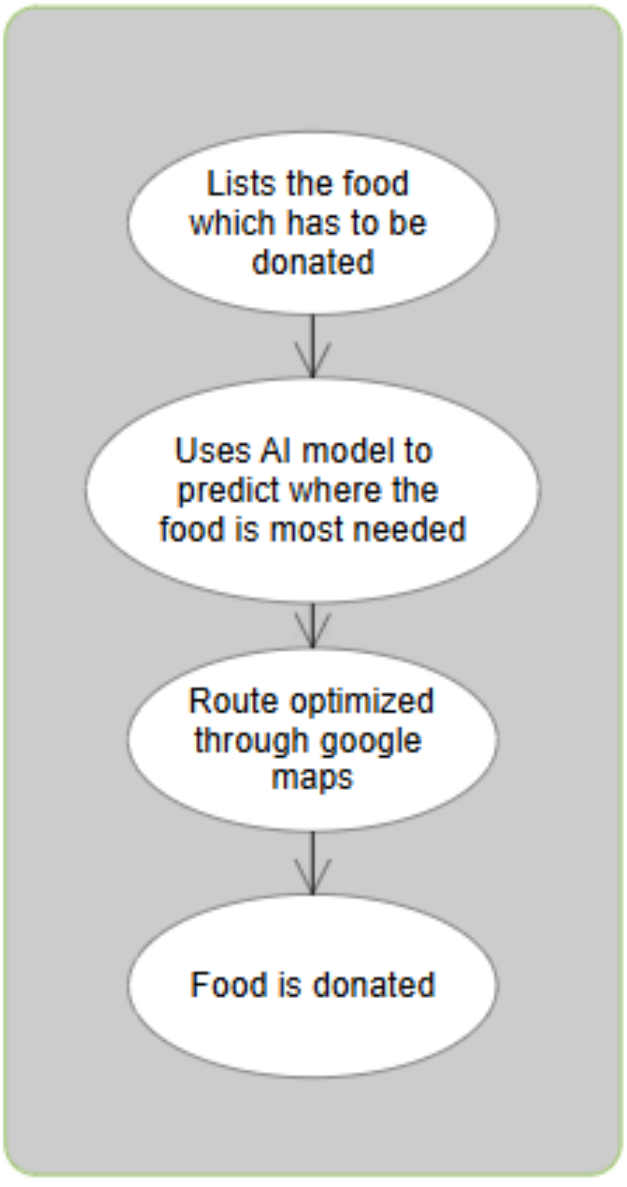
Mobile & Web Access for All Users:

- Web app (React.js) and mobile app (Flutter) provide an easy interface for food donors, NGOs, and drivers.

Cloud-Powered & Scalable Solution:

- AWS Lambda (Server less Execution) ensures high scalability with minimal infrastructure costs.

USE CASE DIAGRAM:



TECHNOLOGY STACK:

1. Backend (API & Business Logic)

- **Node.js (Express)** – Fast, scalable backend for handling API requests.
- **Django (Python)** – Manages business logic, user authentication, and AI integration.

2. Database (Storage & Real-Time Updates)

- **PostgreSQL** – Stores structured data (food inventory, users, and donation records).
- **Firebase** – Provides real-time database updates for mobile and web users.

3. Frontend (User Interface)

- **React.js (Web App)** – Ensures a smooth and responsive interface for food donors, NGOs, and logistics teams.
- **Flutter (Mobile App)** – Provides a cross-platform mobile experience for on-the-go users.

4. AI & Machine Learning

- **TensorFlow / PyTorch** – AI-driven demand prediction and food-donor matching.
- **Google Maps API / Mapbox API** – Optimized delivery route planning and real-time tracking.

5. Cloud Services (Scalability & Hosting)

- **AWS Lambda / Google Cloud Functions** – Serverless architecture for high scalability and cost efficiency.
- **Docker & Kubernetes** – Containerized deployment for robust system performance.

APPLICATIONS :

1. **Restaurants, Supermarkets & Farms** – Donate surplus food efficiently, track expiring products, and distribute excess produce to food banks.
2. **NGOs & Food Banks** – Optimize food distribution, reduce manual efforts, and ensure equitable food allocation based on real-time demand.
3. **Logistics & Delivery Services** – Improve food transportation with AI-driven **route optimization** and real-time tracking, reducing delivery costs and delays.
4. **Government & Municipal Programs** – Support **hunger relief efforts, disaster response, and food waste reduction policies**, ensuring surplus food reaches those in need.
5. **Corporate Social Responsibility (CSR) Initiatives** – Help businesses meet **sustainability goals**, track donations, and strengthen partnerships with non-profits.
6. **Smart Cities & Sustainability** – Reduce food waste in urban areas, support **zero-waste city initiatives**, and encourage community-based food-sharing programs.
7. **Hotels, Catering & Event Management** – Minimize post-event food waste by **redistributing leftover food** to shelters and food banks efficiently.

This system **bridges the gap between food surplus and food scarcity**, ensuring efficient, tech-driven redistribution to minimize waste and fight hunger.