Food Wastage Management System

Abstract

Food wastage is a critical issue worldwide, contributing to hunger, economic loss, and environmental harm. This project, 'Food Wastage Management System,' is designed to minimize wastage by connecting food providers (such as restaurants, hotels, and households) with receivers (such as NGOs and needy communities). The system is implemented using Python, Streamlit for frontend, and MySQL database for backend storage. An analytics dashboard has been integrated to provide real-time insights on providers and receivers. This report details the design, development, and functionality of the project.

Introduction

Food wastage has become a pressing problem in modern society. Despite having surplus food production, millions of people still go hungry every day. Restaurants, hotels, and households often discard edible food due to lack of distribution channels. This project seeks to address this gap by creating a digital platform to connect providers and receivers.

The project aims to:

1. Reduce food wastage through effective redistribution.
2. Provide a transparent system for monitoring providers and receivers.
3. Enable analytics for decision-making and awareness.

Literature Review / Background Study

Various platforms and NGOs attempt to reduce food wastage, such as Feeding India and Robin Hood Army, which collect surplus food and distribute it to the needy. However, these initiatives often lack digital integration and real-time analytics. By leveraging modern technologies like Streamlit and cloud databases, our system bridges this gap, providing a scalable and user-friendly solution.

System Objectives

The objectives of the Food Wastage Management System include:
- Minimize wastage by connecting providers and receivers.
- Create a digital database for storing provider and receiver details.
- Develop an analytics dashboard for insights.
- Provide awareness to the public on food wastage issues.

System Design

The system follows a client-server architecture, with Streamlit acting as the frontend interface and MySQL as the backend database. The design includes the following components:

- **Frontend**: Streamlit web app with pages such as Home, Providers, Receivers, and Analytics.
- **Backend**: MySQL database storing information about providers and receivers.
- **Analytics**: Charts and dashboards to visualize food distribution.

Implementation

The system has been implemented using the following tools and technologies:
- **Programming Language**: Python
- **Frontend Framework**: Streamlit
- **Database**: MySQL
- **Other Tools**: VS Code, MySQL Workbench

The application contains multiple modules:
1. **Providers Module** – Add, view, and manage food providers.
2. **Receivers Module** – Manage NGOs and individuals receiving food.
3. **Analytics Dashboard** – Visualize city-wise providers, receivers, and trends.
4. **Awareness Module** – Provide information and facts about food wastage.

MySql Queries:-

```
create database food_wastage;
use food_wastage;


CREATE TABLE providers (
   Provider_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   Type VARCHAR(50),
   Address VARCHAR(255),
   City VARCHAR(50),
   Contact VARCHAR(20)
);


CREATE TABLE receivers (
   Receiver_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   Type VARCHAR(50),
   City VARCHAR(50),
   Contact VARCHAR(30)
);

CREATE TABLE food_listings (
   Food_ID INT PRIMARY KEY,
   Food_Name VARCHAR(100),
   Quantity INT,
   Expiry_Date VARCHAR(20),
   Provider_ID INT,
   Provider_Type VARCHAR(50),
   Location VARCHAR(50),
   Food_Type VARCHAR(30),
   Meal_Type VARCHAR(30),
   FOREIGN KEY (Provider_ID) REFERENCES providers(Provider_ID)
);
SET SQL_SAFE_UPDATES = 0;
UPDATE food_listings
SET Expiry_Date = STR_TO_DATE(Expiry_Date, '%c-%e-%Y');
select * from food_listings;

CREATE TABLE claims (
   Claim_ID INT PRIMARY KEY,
   Food_ID INT,
   Receiver_ID INT,
   Status VARCHAR(20),
   Timestamp VARCHAR(30),
   FOREIGN KEY (Food_ID) REFERENCES food_listings(Food_ID),
   FOREIGN KEY (Receiver_ID) REFERENCES receivers(Receiver_ID)
```

```sql
);
ALTER TABLE claims
ADD COLUMN Claim_Date DATE,
ADD COLUMN Claim_Time TIME;

UPDATE claims
SET Claim_Date = STR_TO_DATE(Timestamp, '%c-%e-%Y %H:%i'),
    Claim_Time = STR_TO_DATE(Timestamp, '%c-%e-%Y %H:%i');

ALTER TABLE claims
DROP COLUMN Timestamp;

 -- 15 queries of sql
-- 1.)
select Count(*) From Providers;
select Count(*) From Receivers;
select Count(*) From food_listings;
select Count(*) From claims;

-- 2.) Ensure no NULLs in key relationships
select * from claims
where Food_ID is null or Receiver_ID is null;

-- 3.)  Providers & receivers count per city
select city, Count(*) as providers_count
from providers
group by city
order by providers_count desc;
```

```sql
select city , count(*) as receivers_count
from receivers
group by city
order by receivers_count desc;


-- 4.) Provider type contributing the most food

select provider_type, SUM(Quantity) AS Total_Quantity
FROM food_listings
GROUP BY Provider_Type
ORDER BY Total_Quantity DESC
LIMIT 1;

-- 5.) Contact info of providers in a specific city

select name, contact
from providers
where city = 'New Jessica';

-- 6.) Receivers with the most claims

SELECT r.Name, COUNT(c.Claim_ID) AS Claim_Count
FROM claims c
JOIN receivers r ON c.Receiver_ID = r.Receiver_ID
GROUP BY r.Name
ORDER BY Claim_Count DESC;

-- 7.)Total quantity of food available
```

```
select sum(quantity) as total_quantity
from food_listings;

-- 8.)  City with highest number of food listings

SELECT Location, COUNT(*) AS Listing_Count
FROM food_listings
GROUP BY Location
ORDER BY Listing_Count DESC
LIMIT 1;

-- 9.) most common food type
SELECT Food_Type, COUNT(*) AS Count
FROM food_listings
GROUP BY Food_Type
ORDER BY Count DESC
limit 1;

-- 10.)Number of claims per food item

SELECT f.Food_Name, COUNT(c.Claim_ID) AS Claim_Count
FROM claims c
JOIN food_listings f ON c.Food_ID = f.Food_ID
GROUP BY f.Food_Name
ORDER BY Claim_Count DESC;

-- 11.) Provider with most successful claims

SELECT p.Name, COUNT(c.Claim_ID) AS Successful_Claims
```

```
FROM claims c
JOIN food_listings f ON c.Food_ID = f.Food_ID
JOIN providers p ON f.Provider_ID = p.Provider_ID
WHERE c.Status = 'Completed'
GROUP BY p.Name
ORDER BY Successful_Claims DESC
LIMIT 1;

-- 12.) Percentage of claim statuses

SELECT Status,
       COUNT(*) AS Count,
       ROUND((COUNT(*) / (SELECT COUNT(*) FROM claims)) * 100, 2) AS Percentage
FROM claims
GROUP BY Status;

-- 13.) Average quantity of food claimed per receiver

SELECT r.Name, AVG(f.Quantity) AS Avg_Quantity
FROM claims c
JOIN receivers r ON c.Receiver_ID = r.Receiver_ID
JOIN food_listings f ON c.Food_ID = f.Food_ID
GROUP BY r.Name;

-- 14.) Most claimed meal type

SELECT Meal_Type, COUNT(*) AS Claim_Count
FROM claims c
JOIN food_listings f ON c.Food_ID = f.Food_ID
```

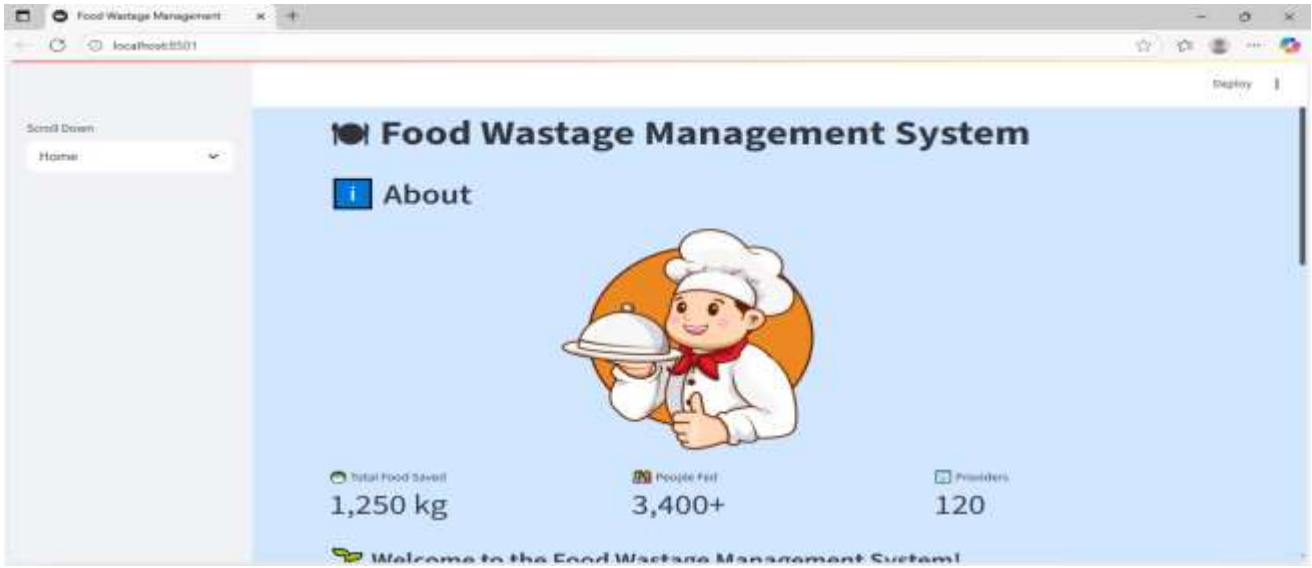
```
GROUP BY Meal_Type
ORDER BY Claim_Count DESC
LIMIT 1;

-- 15.)Total quantity donated by each provider

SELECT p.Name, SUM(f.Quantity) AS Total_Donated
FROM food_listings f
JOIN providers p ON f.Provider_ID = p.Provider_ID
GROUP BY p.Name
ORDER BY Total_Donated DESC;
```

Results & Discussion

The project successfully implements a working food wastage management system. Key features demonstrated include:

- Providers Table: storing and displaying details of food providers.
- Receivers Table: storing and displaying receiver details.
- Analytics Dashboard: visual charts representing providers and receivers by city.
- User Interface: visually appealing, with background colors, images, and headings.

User Interface



🍽 Food Wastage Management System

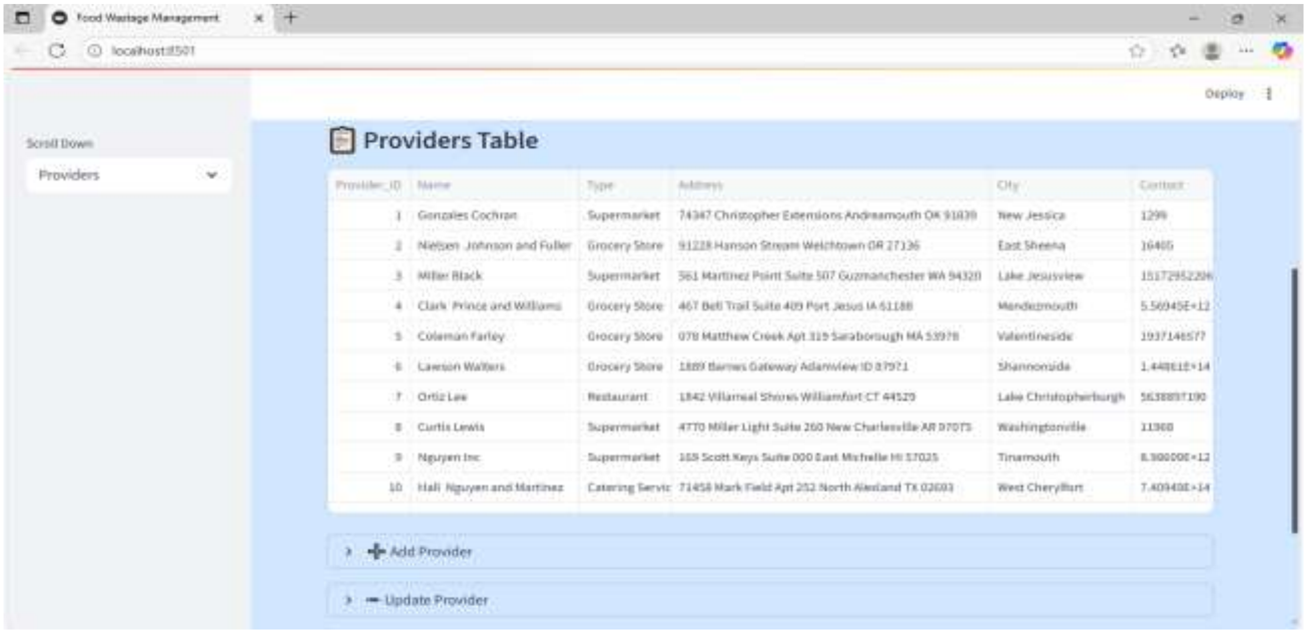
ℹ About

Total Food Saved
1,250 kg

People Fed
3,400+

Providers
120

Welcome to the Food Wastage Management System!

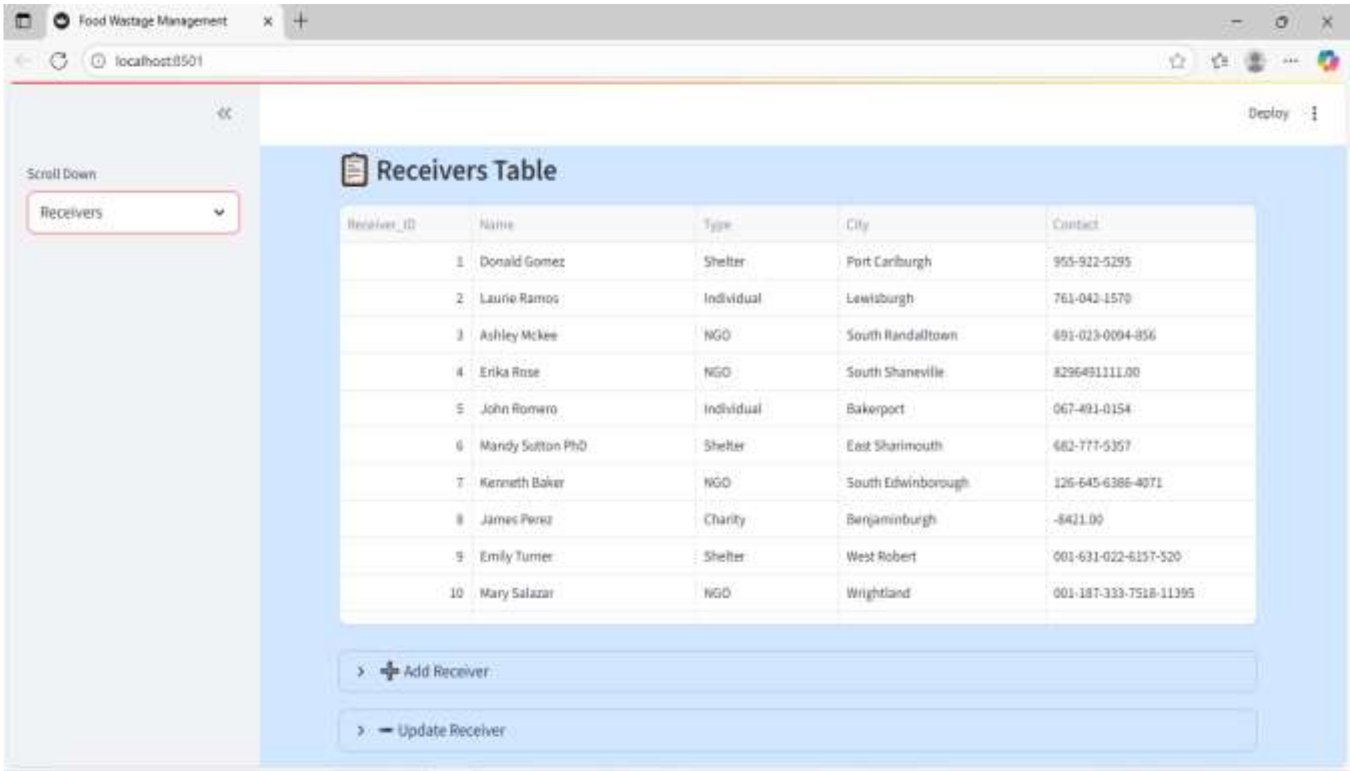


📋 Providers Table

Provider_ID	Name	Type	Address	City	Contact
1	Gonzales Cochran	Supermarket	74347 Christopher Extensions Andreamouth OK 91839	New Jessica	1299
2	Nielsen Johnson and Fuller	Grocery Store	91228 Hanson Stream Welchtown OR 27136	East Sheena	16405
3	Miller Black	Supermarket	561 Martinez Point Suite 507 Guzmanchester WA 94320	Lake Jesusview	1517295220
4	Clark Prince and Williams	Grocery Store	467 Bell Trail Suite 409 Port Jesus IA 61188	Mendezmouth	5.56945E+12
5	Coleman Farley	Grocery Store	078 Matthew Creek Apt 319 Saraborough MA 53978	Valentineside	1937146577
6	Lawson Walters	Grocery Store	1889 Barnes Gateway Adamview ID 87971	Shannonside	1.44861E+14
7	Ortiz Lee	Restaurant	1842 Villarreal Shores Williamfort CT 44529	Lake Christopherburgh	5638897190
8	Curtis Lewis	Supermarket	4770 Miller Light Suite 260 New Charlesville AR 07075	Washingtonville	11360
9	Nguyen Inc	Supermarket	169 Scott Keys Suite 000 East Michelle HI 57025	Tinamouth	8.39000E+12
10	Hall Nguyen and Martinez	Catering Servic	71458 Mark Field Apt 252 North Alexland TX 02693	West Cherylfurt	7.40940E+14

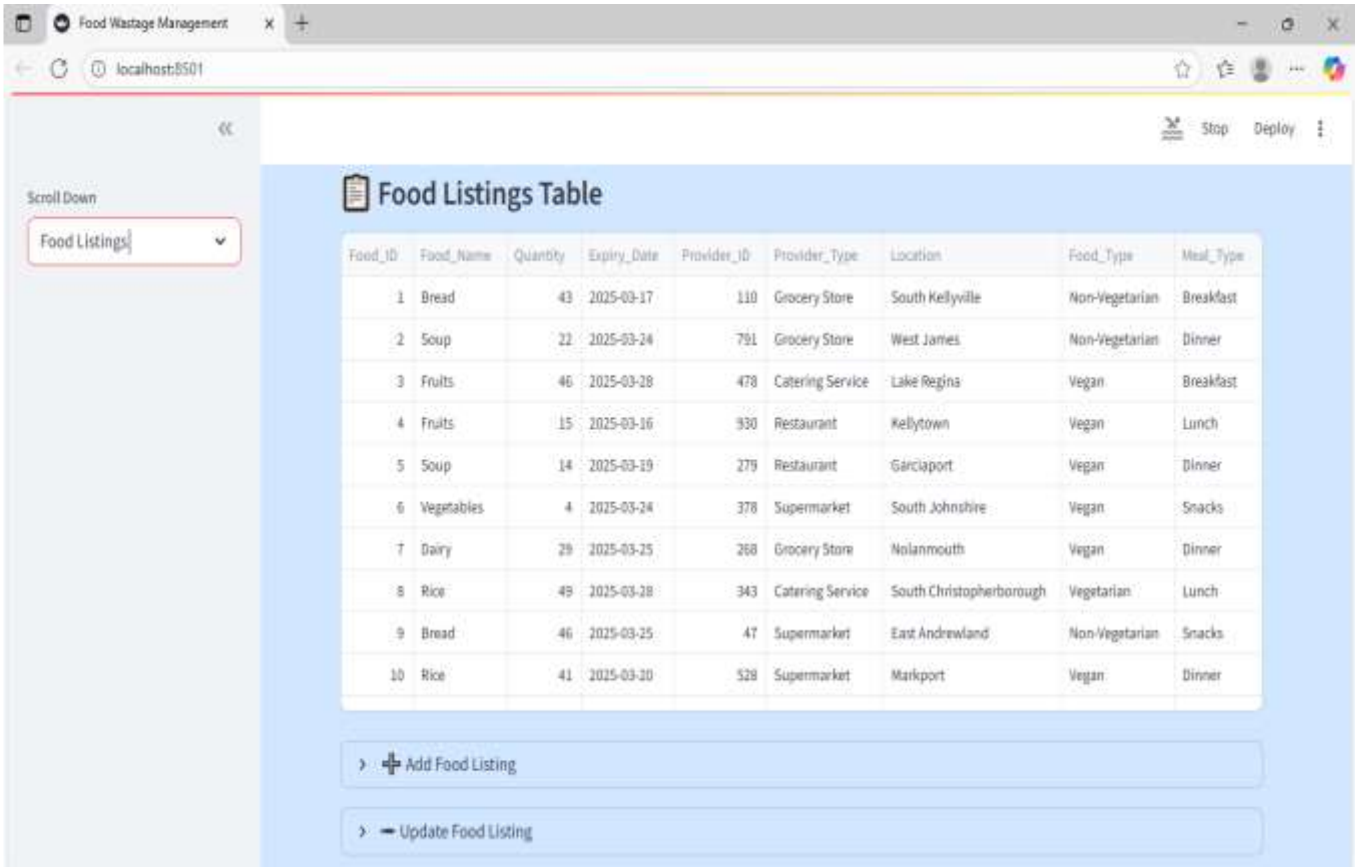
› ➕ Add Provider

› ➖ Update Provider



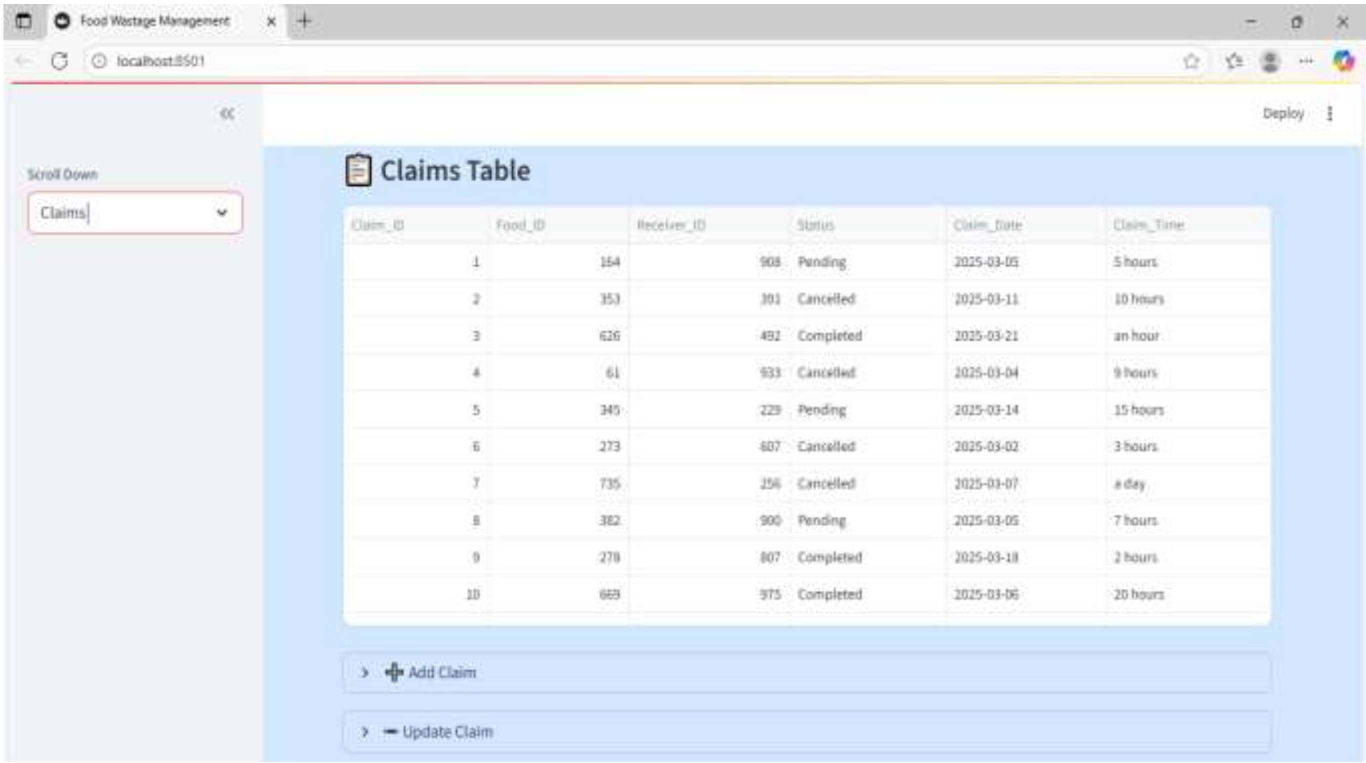
Receivers Table

Receiver_ID	Name	Type	City	Contact
1	Donald Gomez	Shelter	Port Carlburgh	955-922-5295
2	Laurie Ramos	Individual	Lewisburgh	761-042-1570
3	Ashley Mckee	NGO	South Randalltown	691-023-0094-856
4	Erika Rose	NGO	South Shaneville	8296491111.00
5	John Romero	Individual	Bakerport	067-491-0154
6	Mandy Sutton PhD	Shelter	East Sharimouth	682-777-5357
7	Kenneth Baker	NGO	South Edwinborough	126-645-6386-4071
8	James Perez	Charity	Benjaminburgh	-8421.00
9	Emily Turner	Shelter	West Robert	001-631-022-6157-520
10	Mary Salazar	NGO	Wrightland	001-187-333-7518-11395



Food Listings Table

Food_ID	Food_Name	Quantity	Expiry_Date	Provider_ID	Provider_Type	Location	Food_Type	Meal_Type
1	Bread	43	2025-03-17	110	Grocery Store	South Kellyville	Non-Vegetarian	Breakfast
2	Soup	22	2025-03-24	791	Grocery Store	West James	Non-Vegetarian	Dinner
3	Fruits	46	2025-03-28	478	Catering Service	Lake Regina	Vegan	Breakfast
4	Fruits	15	2025-03-16	930	Restaurant	Kellytown	Vegan	Lunch
5	Soup	14	2025-03-19	279	Restaurant	Garciaport	Vegan	Dinner
6	Vegetables	4	2025-03-24	378	Supermarket	South Johnshire	Vegan	Snacks
7	Dairy	29	2025-03-25	268	Grocery Store	Nolanmouth	Vegan	Dinner
8	Rice	49	2025-03-28	343	Catering Service	South Christopherborough	Vegetarian	Lunch
9	Bread	46	2025-03-25	47	Supermarket	East Andrewland	Non-Vegetarian	Snacks
10	Rice	41	2025-03-20	528	Supermarket	Markport	Vegan	Dinner



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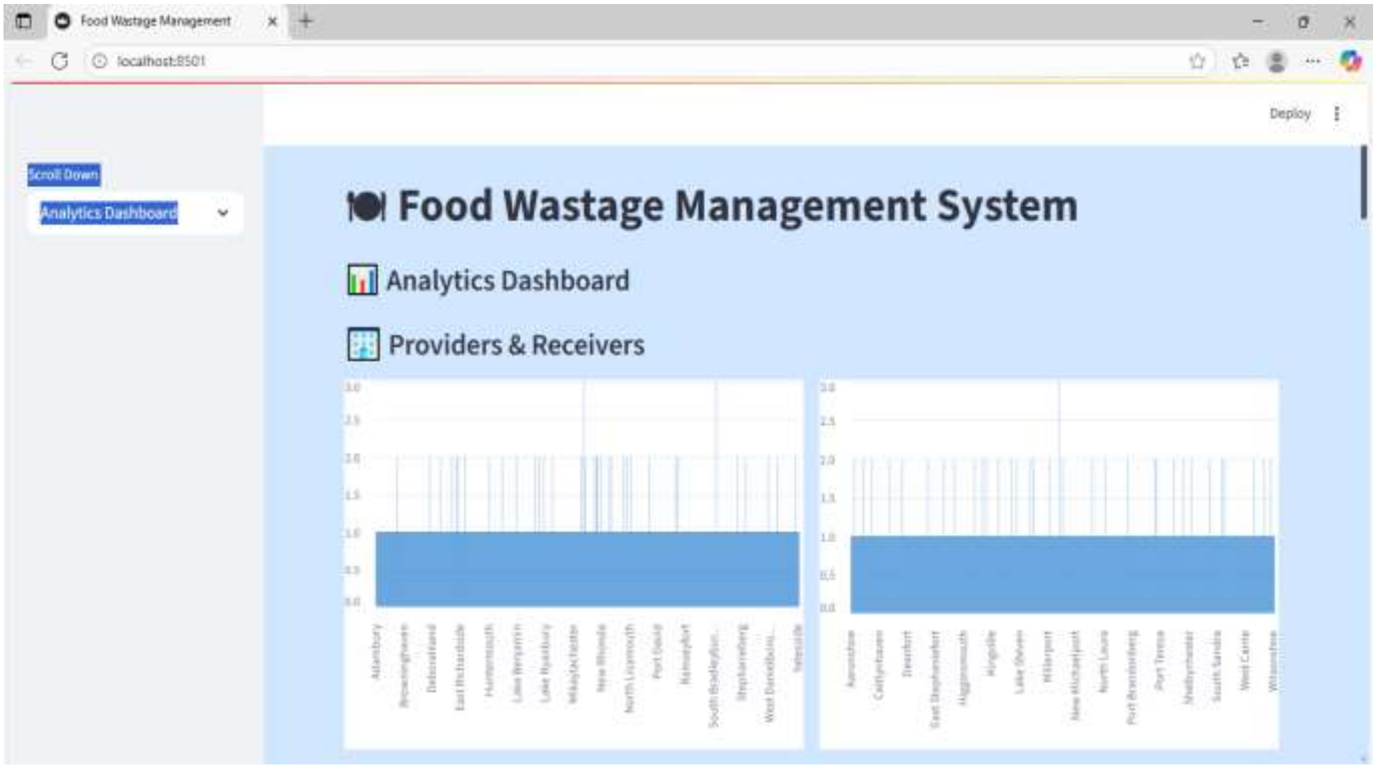
Claims

Claims Table

Claim_ID	Food_ID	Receiver_ID	Status	Claim_Date	Claim_Time
1	164	908	Pending	2025-03-05	5 hours
2	353	391	Cancelled	2025-03-11	10 hours
3	626	492	Completed	2025-03-21	an hour
4	61	933	Cancelled	2025-03-04	9 hours
5	345	229	Pending	2025-03-14	15 hours
6	273	607	Cancelled	2025-03-02	3 hours
7	735	256	Cancelled	2025-03-07	a day
8	382	900	Pending	2025-03-05	7 hours
9	278	807	Completed	2025-03-18	2 hours
10	669	975	Completed	2025-03-06	20 hours



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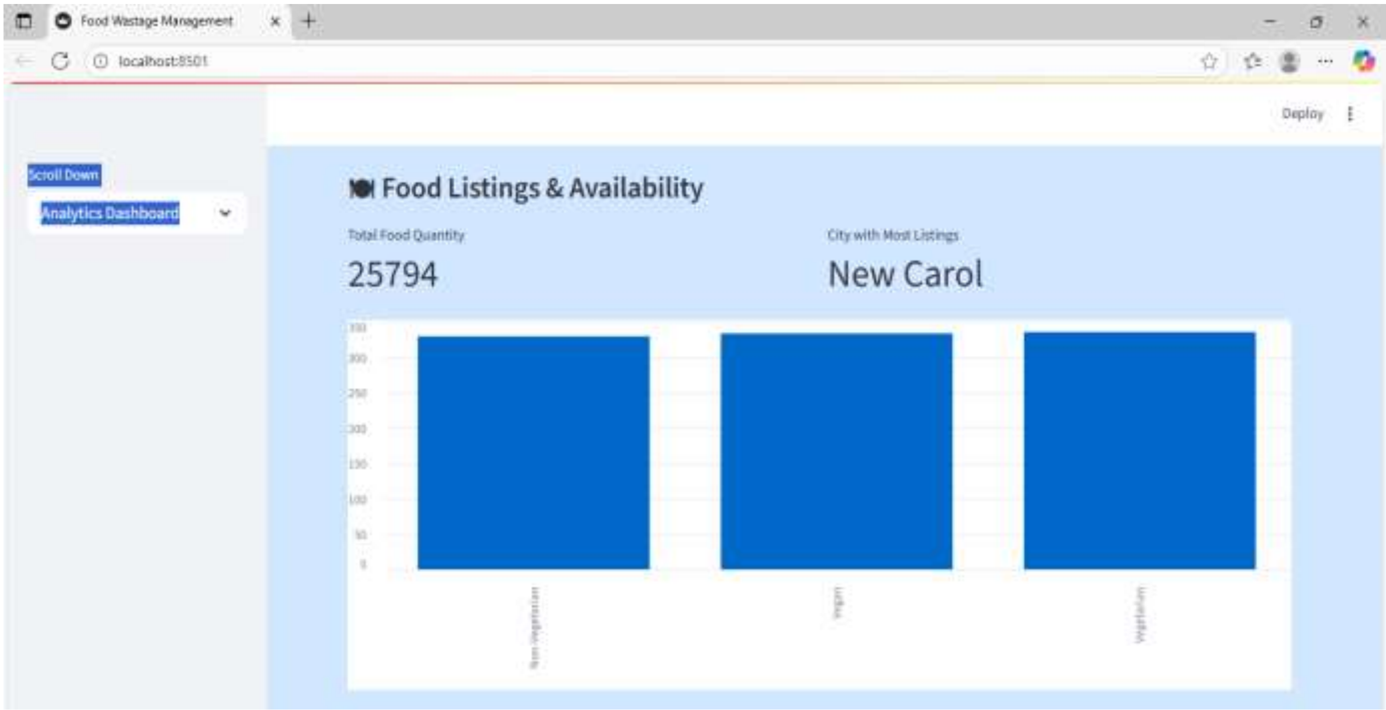
Analytics Dashboard

🍽 Food Wastage Management System

📊 Analytics Dashboard

Providers & Receivers



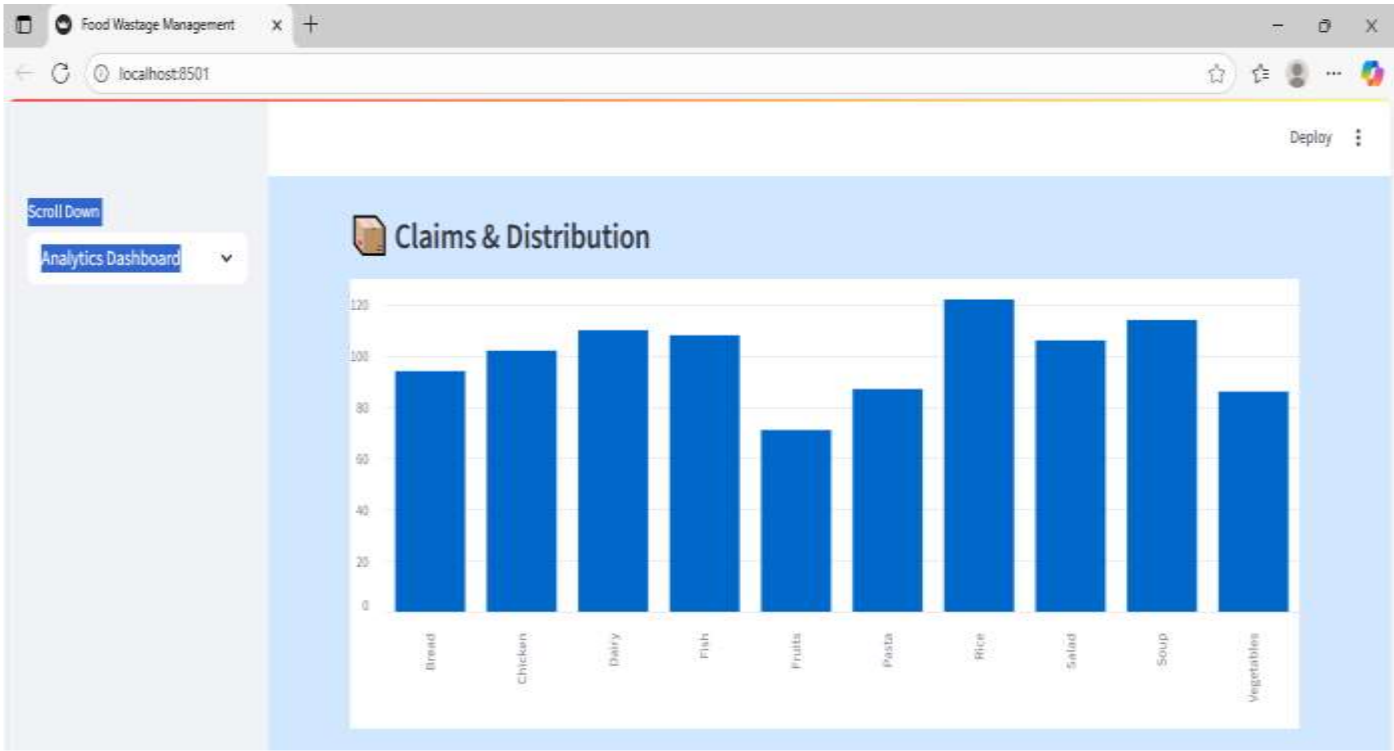
🍽 Food Listings & Availability

Total Food Quantity

25794

City with Most Listings

New Carol



📦 Claims & Distribution

Conclusion & Future Scope

The Food Wastage Management System provides a digital platform to tackle the pressing issue of food wastage. By connecting providers with receivers, the system reduces wastage and helps in feeding the needy. The analytics feature gives administrators valuable insights to monitor and improve the system.

Future scope includes:

- Developing a mobile application for better accessibility.
- Integrating AI/ML models for food demand prediction.
- Expanding the system to support donations and logistics integration.