📑 Local Food Wastage Management System Project Report

1. Overview

Food wastage is a pressing global issue with significant social, economic, and environmental impacts. While millions suffer from hunger, a large portion of food is wasted daily due to inefficiencies in distribution and management. The **Local Food Wastage Management System** aims to provide a digital platform that collects, analyzes, and visualizes data related to food wastage at a local level. By integrating data cleaning, database management, and an interactive web application, this system helps in identifying wastage trends, enabling better decision-making and resource allocation.

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2. Problem Statement

This project aims to develop a Local Food Wastage Management System, where:

- Restaurants and individuals can list surplus food.
- NGOs or individuals in need can claim the food.
- SQL stores available food details and locations.
- A Streamlit app enables interaction, filtering, CRUD operation and visualization.

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3. Dataset Description

3.1 Providers Dataset :

The **providers.csv** file contains details of food providers who contribute surplus food to the system.

- **Provider_ID** (Integer) – Unique identifier for each provider.
- **Name** (String) – Name of the food provider (e.g., restaurants, grocery stores, supermarkets).
- **Type** (String) – Category of provider (e.g., Restaurant, Grocery Store, Supermarket).
- **Address** (String) – Physical address of the provider.
- **City** (String) – City where the provider is located.
- **Contact** (String) – Contact information (e.g., phone number).

3.2 Receivers Dataset:

The **receivers.csv** file contains details of individuals or organizations receiving food.

- **Receiver_ID** (Integer) – Unique identifier for each receiver.
- **Name** (String) – Name of the receiver (individual or organization).
- **Type** (String) – Category of receiver (e.g., NGO, Community Center, Individual).
- **City** (String) – City where the receiver is located.
- **Contact** (String) – Contact details (e.g., phone number).

3.3 Food Listings Dataset:

The **food_listings.csv** file stores details of available food items that can be claimed by receivers.

- **Food_ID** (Integer) – Unique identifier for each food item.
- **Food_Name** (String) – Name of the food item.
- **Quantity** (Integer) – Quantity available for distribution.
- **Expiry_Date** (Date) – Expiry date of the food item.
- **Provider_ID** (Integer) – Reference to the provider offering the food.
- **Provider_Type** (String) – Type of provider offering the food.
- **Location** (String) – City where the food is available.
- **Food_Type** (String) – Category of food (e.g., Vegetarian, Non-Vegetarian, Vegan).
- **Meal_Type** (String) – Type of meal (e.g., Breakfast, Lunch, Dinner, Snacks).

3.4 Claims Dataset:

The **claims.csv** file tracks food claims made by receivers.

- **Claim_ID** (Integer) – Unique identifier for each claim.
- **Food_ID** (Integer) – Reference to the food item being claimed.
- **Receiver_ID** (Integer) – Reference to the receiver claiming the food.
- **Status** (String) – Current status of the claim (e.g., Pending, Completed, Cancelled).
- **Timestamp** (Datetime) – Date and time when the claim was made.

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4. Tools & Technologies Used

- **Data Cleaning & Analysis**: Python (Pandas, NumPy, Jupyter Notebook)
- **Database**: SQLite
- **Backend**: Python, SQLAlchemy
- **Frontend**: Streamlit, Plotly
- **Deployment**: GitHub, Streamlit Cloud

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5. Methodology

5.1 Data Collection & Cleaning

- Used Jupyter Notebook (`.ipynb`) to load raw food wastage data.
- Performed **data preprocessing**: handling missing values, duplicates, inconsistent formats.
- Converted cleaned dataset into CSV format for database ingestion.

5.2 Database Setup (SQLite)

- Created a **SQLite database** (local_food_donation.db) for local storage.
- If the DB is empty, CSV files in clean_datasets are automatically loaded.
- Relational tables created: providers, receivers, food_listings, claims.
- Performed CRUD operations (insert, update, delete, select) to ensure schema integrity.

5.3 Backend Integration (app.py)

- Imported required libraries: `sqlalchemy`, `pandas`, `streamlit`, `plotly`.
- Connected Streamlit app to **SQLite database**.
- Added queries for fetching, filtering, and updating data dynamically.
- Implemented caching for performance.

5.4 Streamlit Application Development

- Added **page title and description**.
- Implemented filters (City, Provider, Food Type, Meal Type).
- Built **interactive dashboard** using Plotly:
    - Providers/Receivers per city
    - Top provider type by quantity
    - Top receiver by claims
    - City with most food listings
    - Most common food types
    - Most claimed meal type.
- Enabled **search and download options** for users.

5.5 CSV Fallback

- app automatically loads CSV files if the SQLite DB is empty.

5.6 Deployment

- Pushed project files to **GitHub repository**.
- Deployed Streamlit app using **Streamlit Cloud**.
- System accessible publicly anytime, anywhere.
- Make the final project accessible via a public web link.

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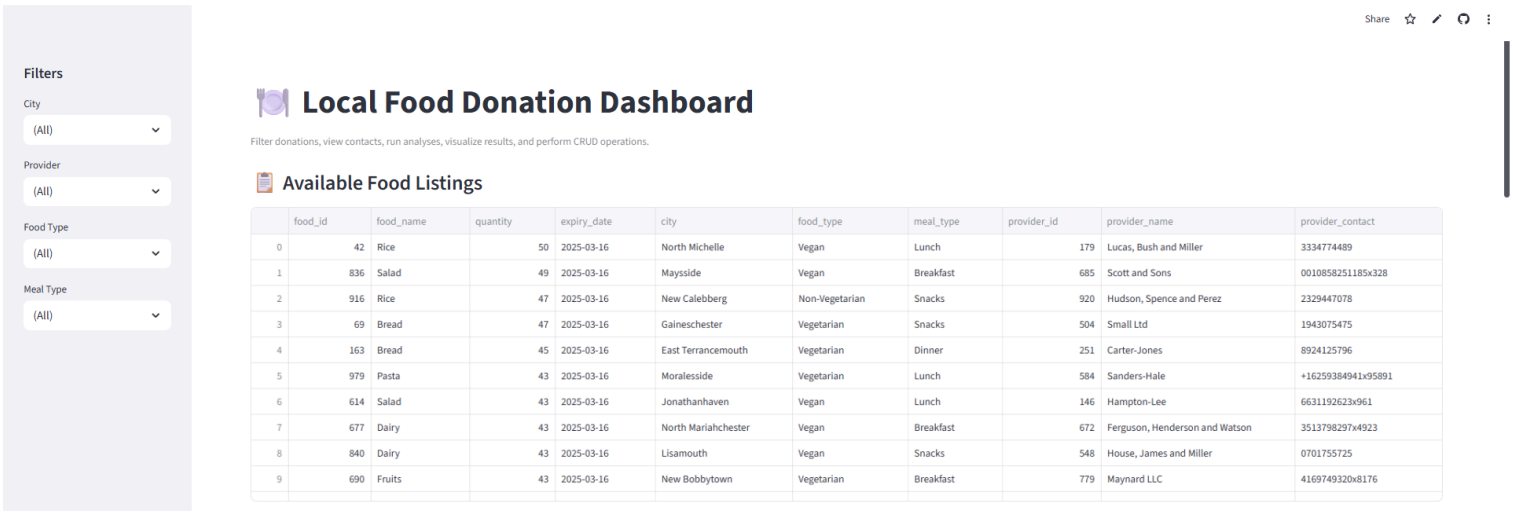
6. Local Food Donation Streamlit App Interface

Streamlite App (Local Food Donation Dashboard) consists of 5 sections - Available Food Listings,Contact Providers in Current View,SQL Analyses,CRUD Operations and Filters.

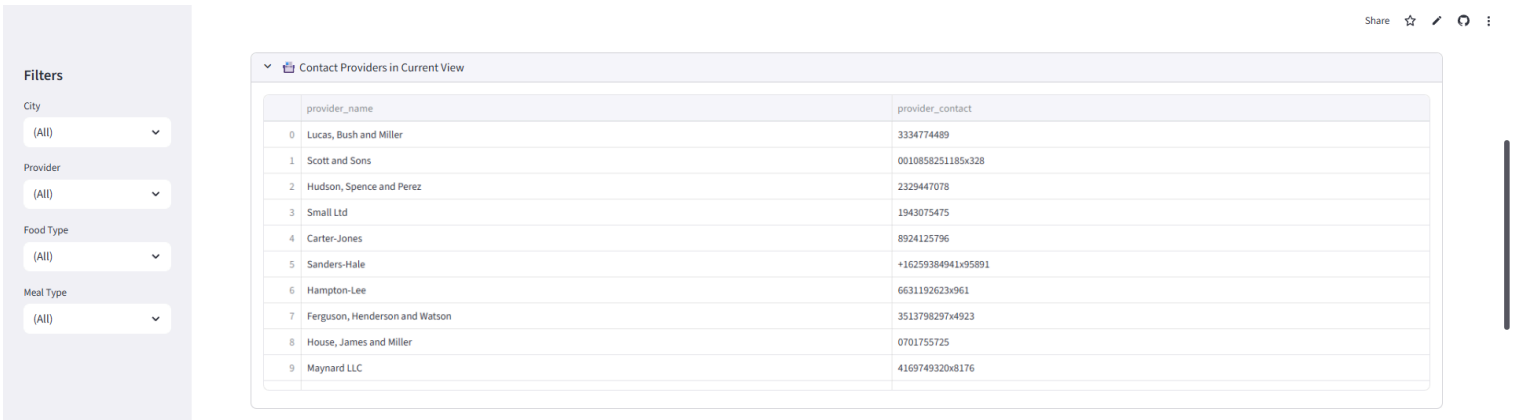
App Link : https://local-food-donation.streamlit.app/

SECTION 1 (📋Available Food Listings)



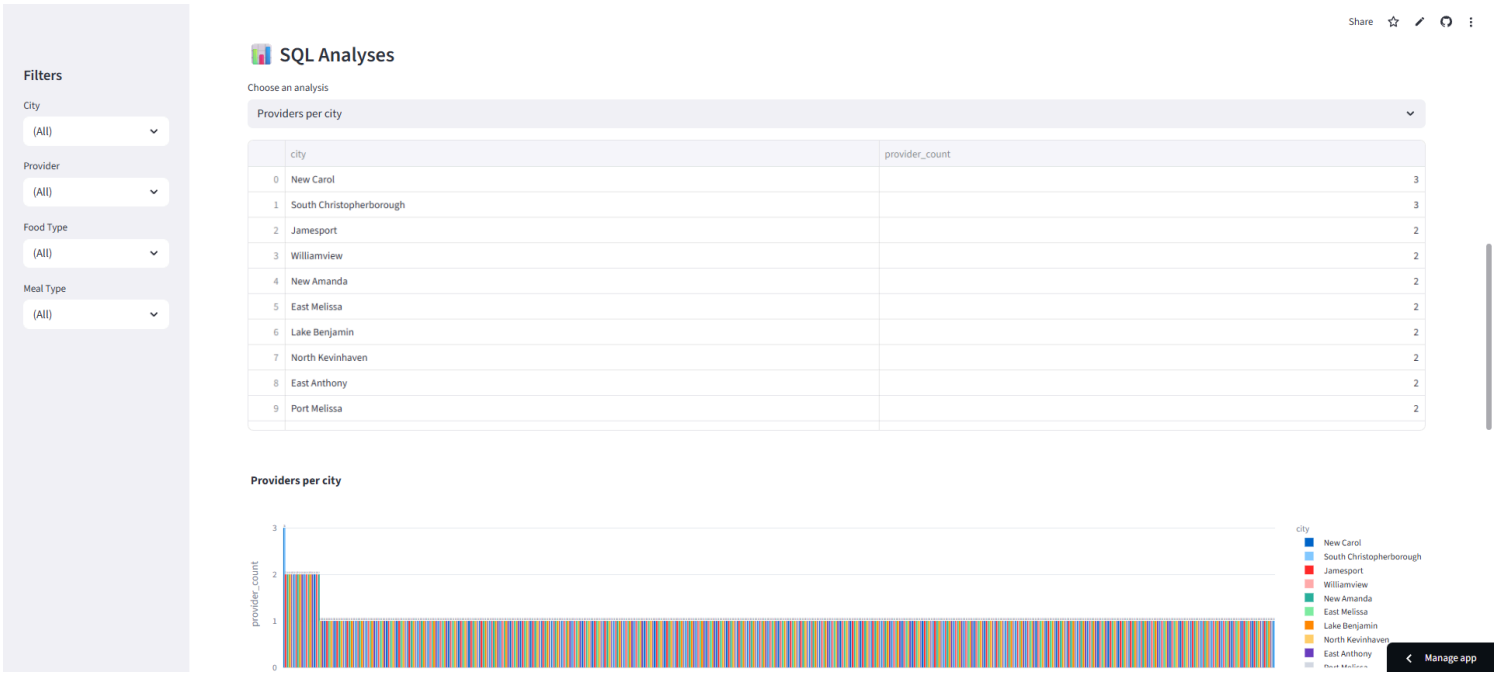
	food_id	food_name	quantity	expiry_date	city	food_type	meal_type	provider_id	provider_name	provider_contact
0	42	Rice	50	2025-03-16	North Michelle	Vegan	Lunch	179	Lucas, Bush and Miller	3334774489
1	836	Salad	49	2025-03-16	Maysside	Vegan	Breakfast	685	Scott and Sons	0010858251185x328
2	916	Rice	47	2025-03-16	New Calebberg	Non-Vegetarian	Snacks	920	Hudson, Spence and Perez	2329447078
3	69	Bread	47	2025-03-16	Gaineschester	Vegetarian	Snacks	504	Small Ltd	1943075475
4	163	Bread	45	2025-03-16	East Terrancemouth	Vegetarian	Dinner	251	Carter-Jones	8924125796
5	979	Pasta	43	2025-03-16	Moralesside	Vegetarian	Lunch	584	Sanders-Hale	+16259384941x95891
6	614	Salad	43	2025-03-16	Jonathanhaven	Vegan	Lunch	146	Hampton-Lee	6631192623x961
7	677	Dairy	43	2025-03-16	North Mariahchester	Vegan	Breakfast	672	Ferguson, Henderson and Watson	3513798297x4923
8	840	Dairy	43	2025-03-16	Lisamouth	Vegan	Snacks	548	House, James and Miller	0701755725
9	690	Fruits	43	2025-03-16	New Bobbytown	Vegetarian	Breakfast	779	Maynard LLC	4169749320x8176

SECTION 2 (📇 Contact Providers in Current View)



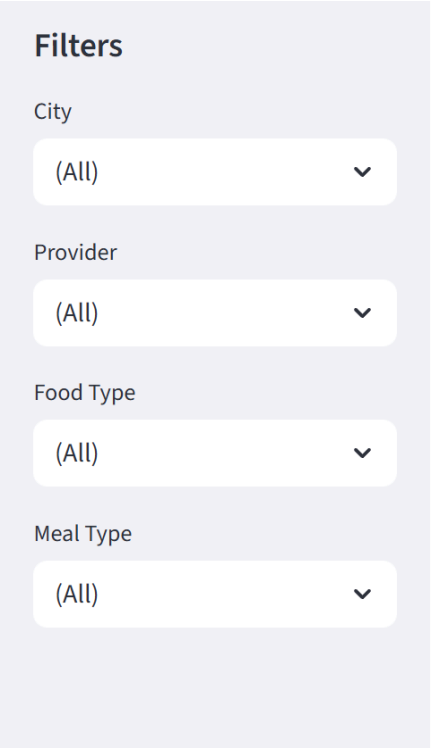
	provider_name	provider_contact
0	Lucas, Bush and Miller	3334774489
1	Scott and Sons	0010858251185x328
2	Hudson, Spence and Perez	2329447078
3	Small Ltd	1943075475
4	Carter-Jones	8924125796
5	Sanders-Hale	+16259384941x95891
6	Hampton-Lee	6631192623x961
7	Ferguson, Henderson and Watson	3513798297x4923
8	House, James and Miller	0701755725
9	Maynard LLC	4169749320x8176

SECTION 3 (📊 SQL Analyses)



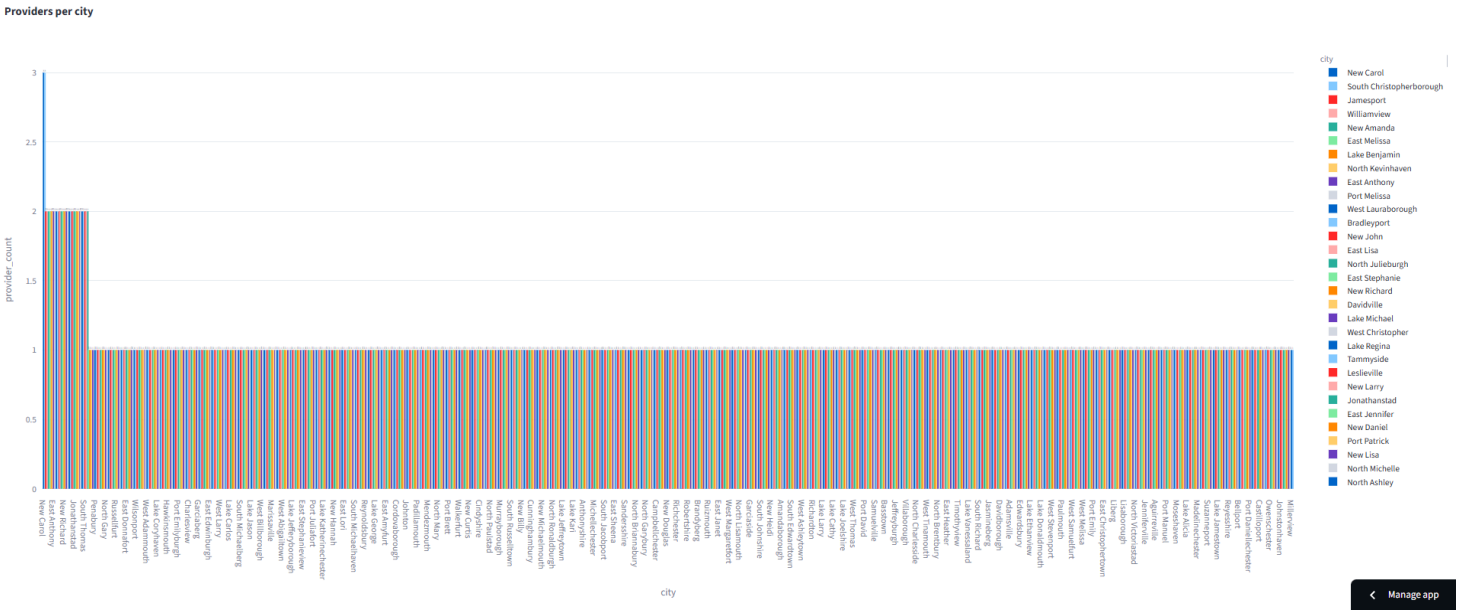
SECTION 4 (🛠️CRUD Operations)

SECTION 5 (Filters)



7. Analysis Insights

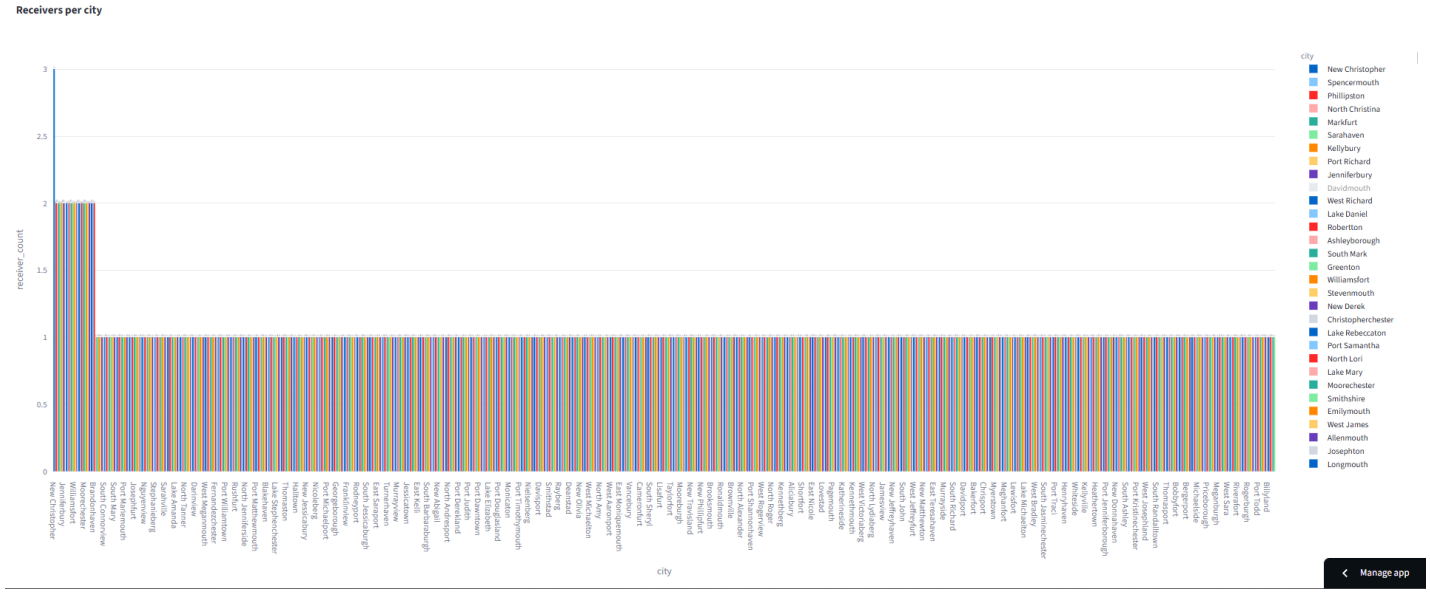
7.1 Providers per city



Insights:

Based on the bar chart, the majority of cities have a single provider, with a provider count of 1. Only two cities, **New Carol** and **South Christopherborough**, have more than one provider, each with a count of 2.

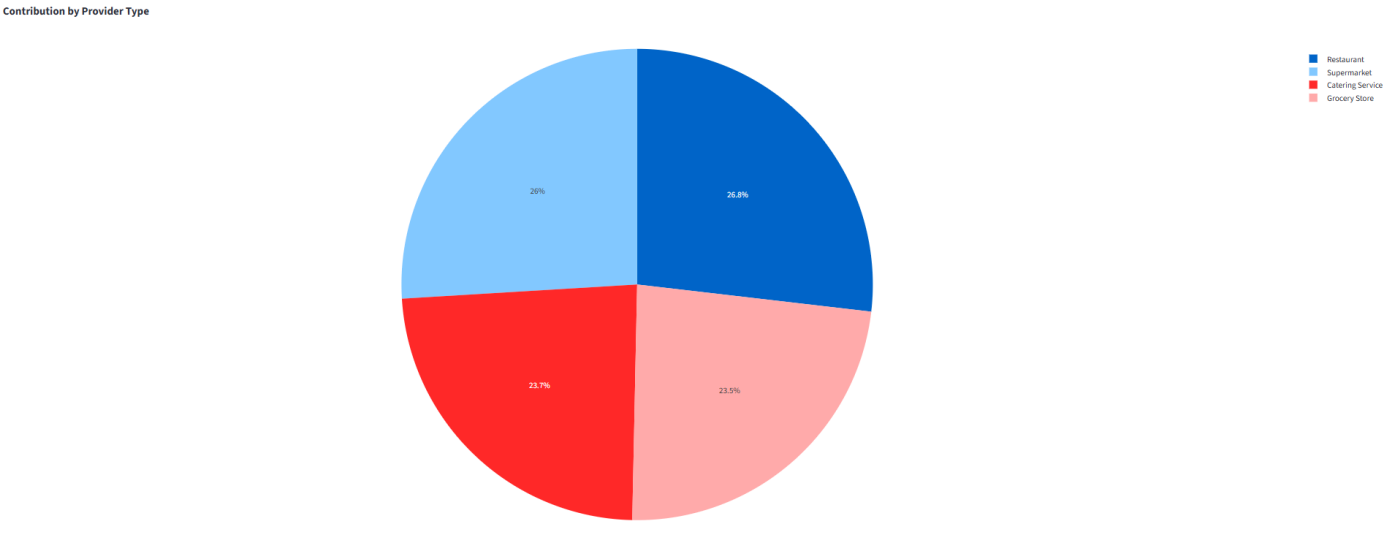
7.2 Receivers per city



Insights

Based on the plot, most cities have only one receiver, with a receiver count of 1. Only two cities, **New Christopher** and **Southmoor**, have more than one receiver, each with a receiver count of 2.

7.3 Top provider type by quantity



Insights

Based on the pie chart, **Restaurants** are the largest contributors, making up **36.6%** of the total. The other three provider types—**Supermarkets**, **Catering Services**, and **Grocery Stores**—have similar contributions, ranging from **21.7%** to **23.5%**.

7.4 Top receiver by claims

	receiver_id	name	total_claims
0	276	Scott Hunter	5

Insights

Based on the provided data, the receiver with the ID of **0**, named **Scott Hunter**, has made a total of **5** claims. This is a simple table showing a single entry for a receiver and their total number of claims.

7.5 Total available quantity

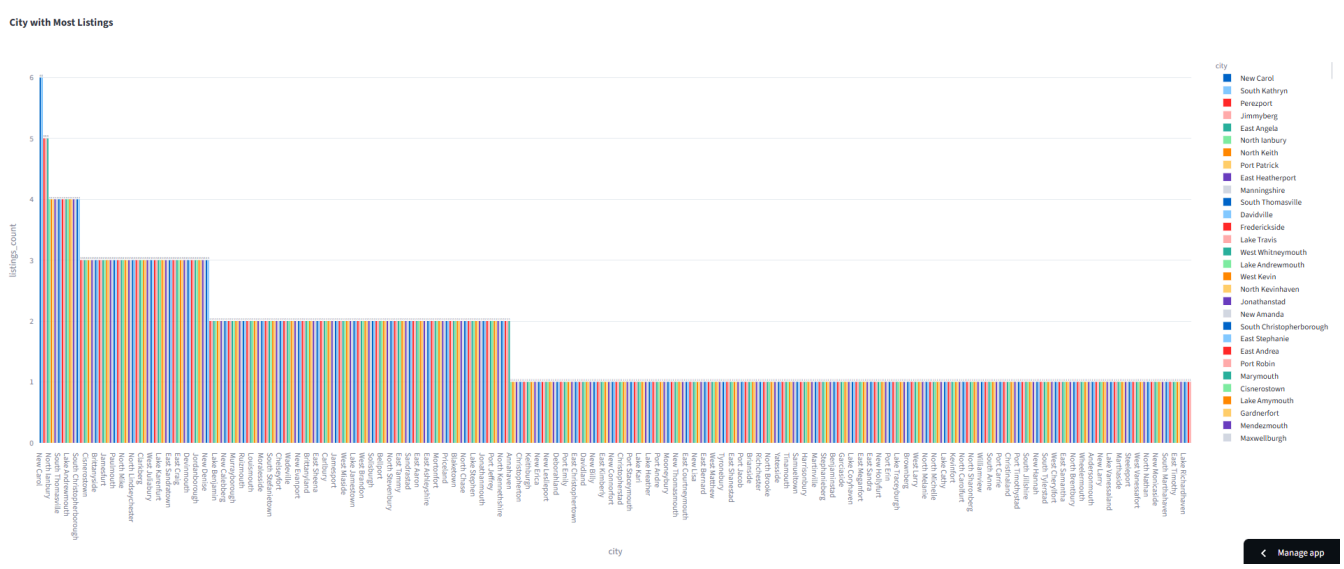
Total available quantity (not expired)

	total_available
0	25794

Insights

Based on the provided table, the total available quantity of non-expired items is **25,794**. The table presents a single, overall count, suggesting a high volume of available goods.

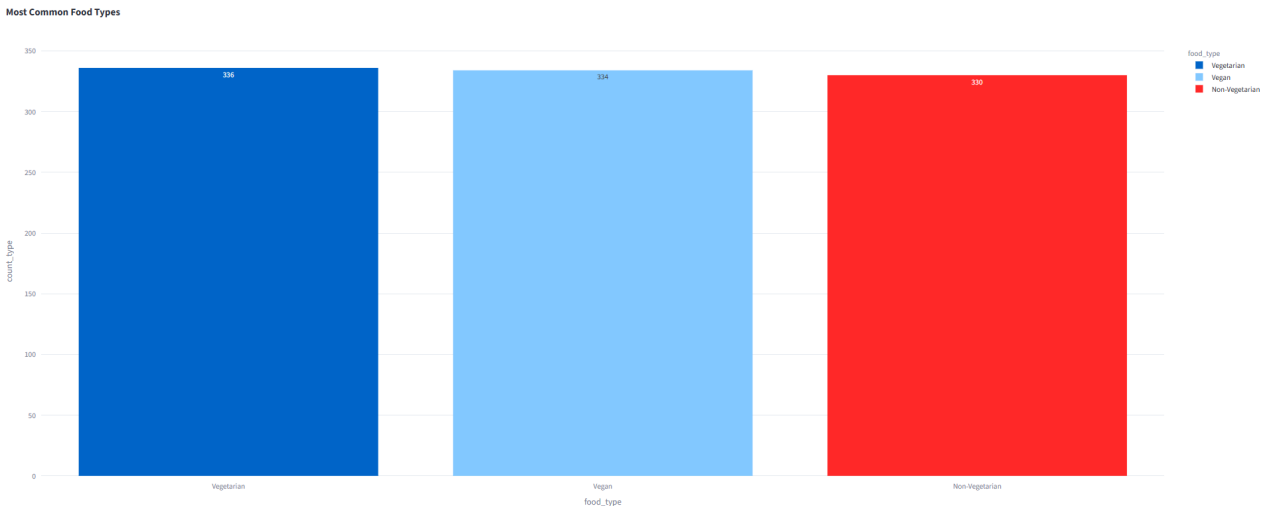
7.6 City with most Food Listings



Insights

Based on the plot, **New Carol** and **South Kathryn** have the highest number of listings, with 5 each. Several cities have 4, 3, 2, and 1 listings, with a large number of cities having only one listing. This suggests that a few cities have a high concentration of listings while many others have a lower number.

7.7 Most Common Food Types



Insights

Based on the plot, the three food types—**Vegetarian**, **Vegan**, and **Non-Vegetarian**—are nearly equally common. **Vegetarian** is the most frequent with a count of **336**, followed closely by **Non-Vegetarian** with **330**, and **Vegan** with **314**.

7.8 Claims per food item

Insights

Based on the plot, **Soup, Chicken, and Fish** are the most claimed food items, each with **8 claims** each. The remaining items— **Rice,Salad, Dairy and Vegetables**—all have a slightly lower claim count of **4** each.

7.9 Top provider by successful claims

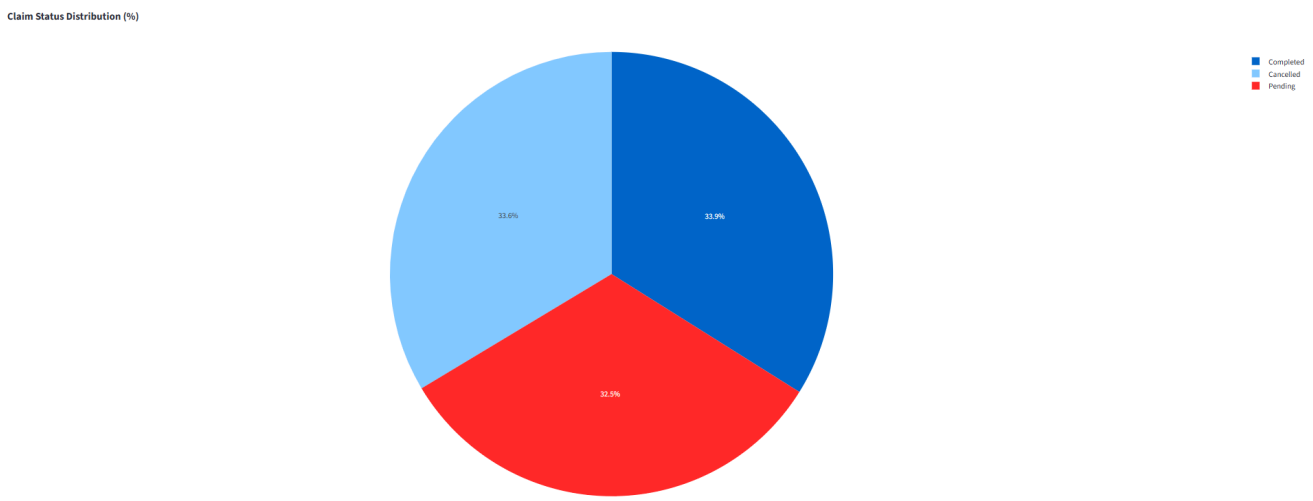
Top provider by successful claims

	provider_id	name	successful_claims
0	709	Barry Group	5
1	596	Barnes, Castro and Curtis	4
2	241	Harper, Blake and Alexander	4
3	752	Butler-Richardson	4
4	967	Miller Inc	4
5	262	Bradford-Martinez	3
6	916	Davis and Sons	3
7	993	Mckinney Ltd	3
8	538	Beck Inc	3
9	384	Rogers-Warren	3

Insights

Based on the provided table, **Barry Group** is the top provider with **5 successful claims**. The next nine providers listed, including **Barnes, Castro and Curtis**, **Harper, Blake and Alexander**, and others, each have a total of **3 or 4 successful claims**.

7.10 Percentage of claim statuses



Insights

Based on the pie chart, the distribution of claim statuses is almost equally split. **Completed** claims make up the largest portion at **33.9%**, followed closely by **Pending** claims at **33.3%**. **Cancelled** claims account for the remaining **32.8%**.

7.11 Average quantity claimed per receiver

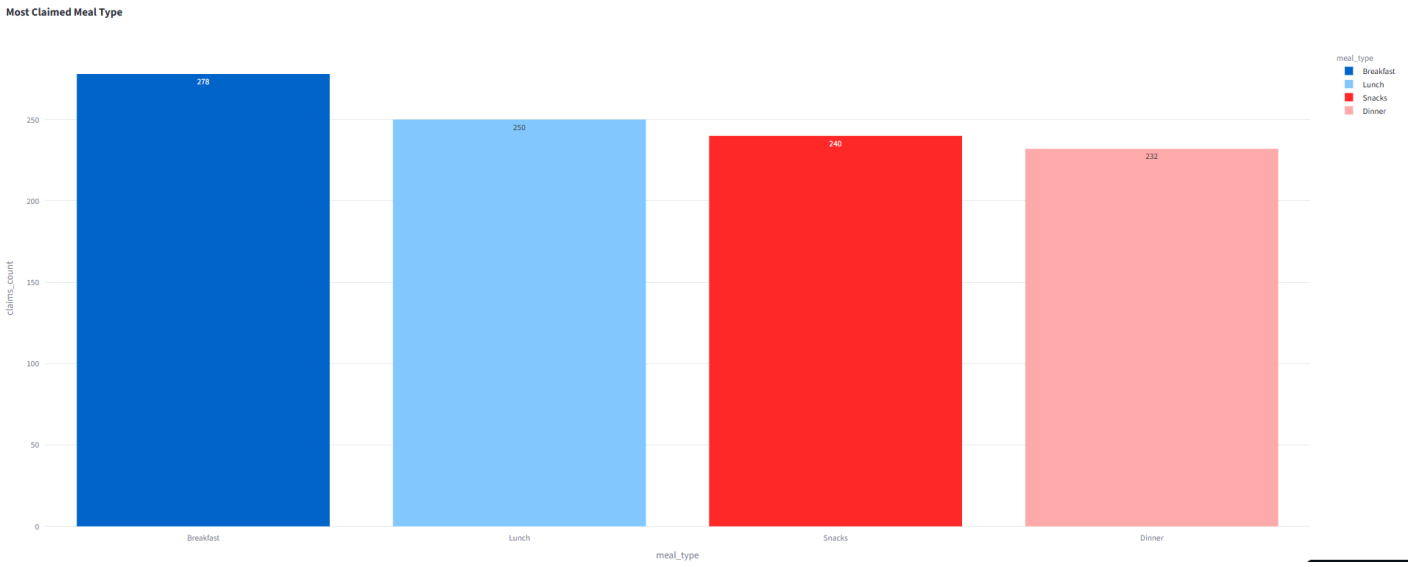
Average quantity claimed per receiver

	receiver_id	name	avg_quantity
0	567	Peggy Knight	50
1	429	Daniel Williams	50
2	99	Nancy Silva	50
3	739	Nancy Jones	50
4	282	Lisa Pitts	50
5	616	Christopher Wright	50
6	982	Thomas Villanueva	50
7	279	Angela Wyatt	49
8	772	Cassandra Yoder	49
9	69	Scott Brown	49

Insights

Based on the provided table, the average quantity claimed is consistently high for all listed receivers. The top seven receivers, including **Peggy Knight** and **Daniel Williams**, have an average claimed quantity of **50**. The bottom three, including **Angela Wyatt** and **Cassandra Yoder**, have an average of **49**.

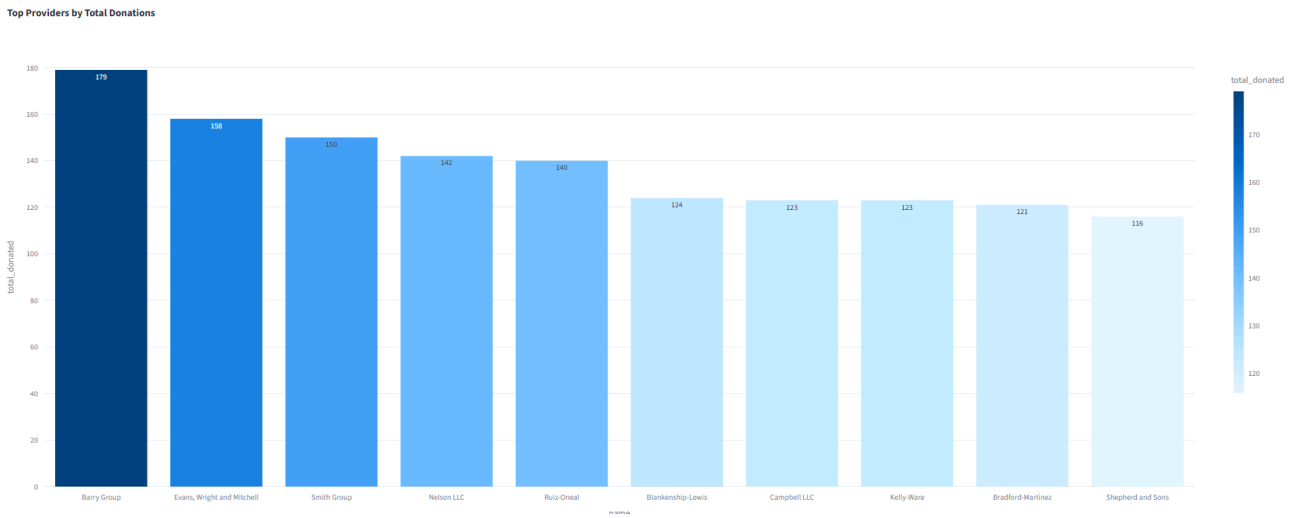
7.12 Most claimed meal type



Insights

Based on the bar chart, **Breakfast** is the most claimed meal type, with a claim count of **278**. The other three meal types—**Lunch**, **Snacks**, and **Dinner**—have similar claim counts, ranging from **232** to **250**.

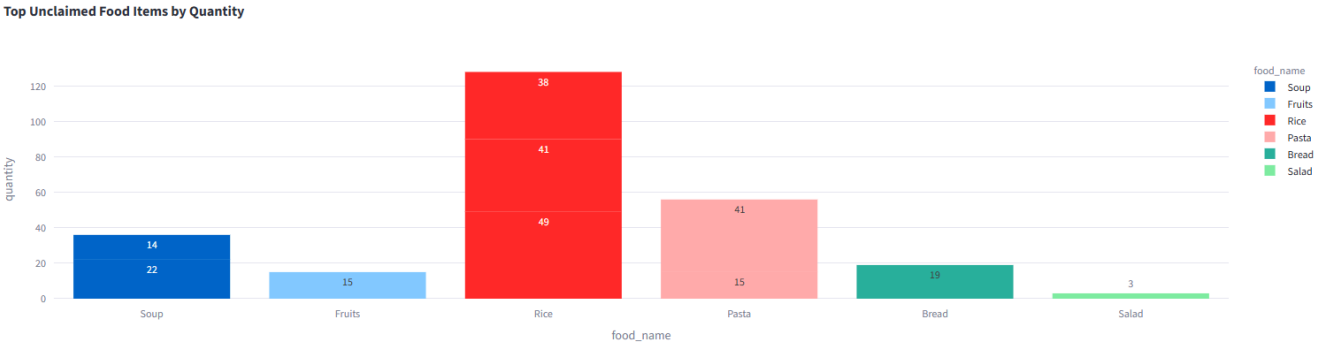
7.13 Total quantity donated by each provider



Insights

Based on the plot, **Barry Group** is the leading provider by a significant margin, with **179** total donations. The next two providers, **Evans, Wright and Mitchell** and **Smith Group**, have **158** and **150** donations, respectively. The remaining providers on the chart have fewer total donations.

7.14 Expired but unclaimed food items



Insights

Based on the bar chart, **Rice** has the highest quantity of unclaimed items, with a total of **128**. **Pasta**, **Soup**, and **Bread** also have a high quantity of unclaimed items, ranging from **56** to **19**. **Fruits** and **Salad** have the lowest quantities of unclaimed items.

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8. Results

- Successfully cleaned and loaded local food wastage dataset.
- Built a **SQLite database** with multiple linked tables.
- Developed a Streamlit dashboard with filters, CRUD, and visualizations.
- Users can monitor real-time food donation patterns and download reports.
- Deployment ensures the system is fully functional without relying on external DBs.

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9. Conclusion

The Local Food Wastage Management System demonstrates how **data science and cloud technologies** can address real-world social challenges.By combining **CSV data ingestion**, **SQLite database management**, and **interactive Streamlit visualizations**, the project provides a scalable, accessible, and effective tool for minimizing food wastage and improving local food distribution.