DATA SCIENCE ALLIANCE

DSA + UCSD Rady

Food Bank Project Onboarding

3.21.24

Agenda

Welcome and Introductions	5 minutes
Current Project Structure	25 minutes
Capstone Goals and Next Steps	10 minutes

Background

- Partnership with Feeding San Diego and the Jacobs & Cushman San Diego Food Bank
- The project aims to optimize food distribution efforts and promote data-driven decision-making
- DSA developed a model to predict food assistance in San Diego County
- In addition to the predictive model, DSA created a dashboard to provide a visual representation of the Food Banks' data to monitor "hunger hotspots" and other metrics.

Current Project Structure

PROJECT ELEMENTS

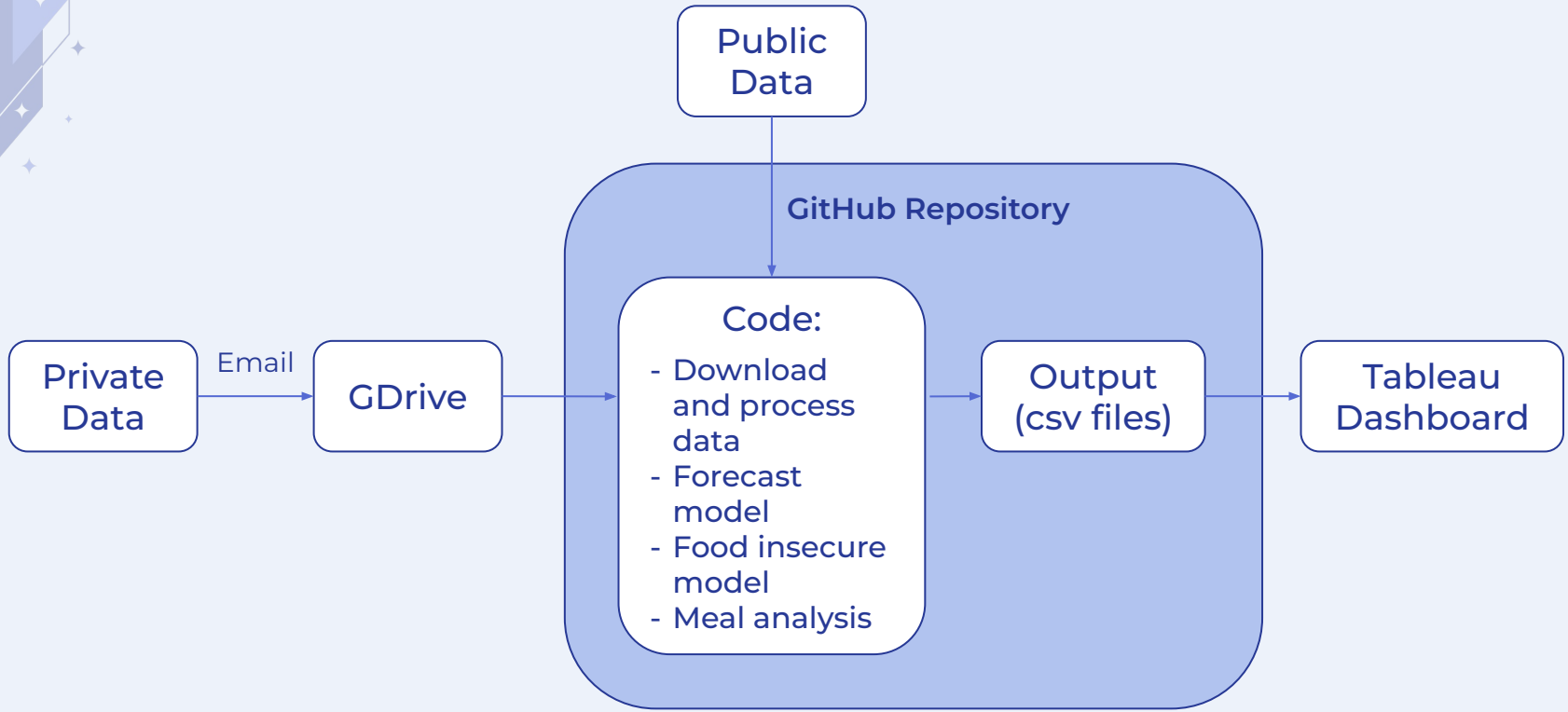
- Monthly updates
  - Refreshing data sources:
    - Food banks (food distribution)
    - Census (ACS)
    - SD county (CalFresh, CALPADS)
    - SDGE (LIHEAP)
    - SANDAG (local unemployment)
    - Zillow (rent)
    - BLS (unemployment, gas prices, electricity prices, CPI)
  - Private Dashboard (password: foodbankdashboard)
- Private GitHub repository

Current Project Structure

DASHBOARD MAIN FEATURES

- Historical food distribution data
- Food distribution forecast
- Hunger hotspots visualization
- Socioeconomic landscape

Data Workflow



Food Distribution Forecast Model

- Prophet Model (developed by Facebook)
  - Allows for exogenous variables
  - Takes seasonality into account
- Input:
  - Past food bank distribution data
  - County unemployment rate
  - Monthly inflation
- Training data starts in January 2018
- Time frequencies: Fiscal Year, Calendar Year, and Monthly forecasts
- Spacial ranges: County, congressional districts, cities, and zip codes forecasts
- Predicts 16 months out
- We only consider estimates with an R-squared higher than 0.5 and exclude locations with no food distribution in the past 12 months.

Food Distribution Forecast Model

- To account for external factors affecting food distribution, we tested multiple variables:
  - **Unemployment rate**
  - **Monthly inflation**
  - Rent prices
  - Electricity prices
  - Gasoline prices
  - **Food Banks' "Together Tour" (during the Covid pandemic)**
  - **"Farmers to Families Program" (during the Covid pandemic)**
- Prophet requires users to provide forecasts of exogenous variables. We use a 12-month moving average to forecast unemployment rate and monthly inflation.

Hunger Hotspots

- The dashboard displays the following measures to understand how food resources are being allocated to communities in need
  - **Average Number of Meals Received by Food Insecure Person**
    - Number of meals (1.2lbs) provided on average for a person who is FI in a location during a period of time (includes food banks distribution, CalFresh assistance, and student meals assistance)
  - **Average Number of Meals Received by Person in Poverty (150% FPL)**
    - Number of meals (1.2lbs) provided on average for a person who lives below 150% of the federal poverty line in a location during a period of time (includes food banks distribution, CalFresh assistance, and student meals assistance)

Hunger Hotspots

- **Goal:** Understand which communities are being underserved
- Calculate the number of meals from CalFresh assistance plus meals distributed by the food banks and free meals distributed to k-12 students
    - Raw CalFresh data is in dollars ($), raw food bank data is in pounds (lb), number of students eligible for free meals in each school
    - Calculations to convert $ and lb into meals comes from Feeding America's Map the Meal Gap
- Analysis divides number of meals by 'Food Insecure (FI) Population' and 'Population below 150% Federal Poverty Line'
- FI estimation is too conservative for a high-cost region like San Diego

Capstone Project

- Deliverable
  - Develop a model to estimate the demand for food assistance and forecast hunger hotspots at the zip code level

NEXT STEPS

DSA

- Share data, project documentation and resources

MSBA Students

- Sign the Pledge for Responsible Data Science
- Send profile photo, degree, and year of graduation
- Define cadence of check-in meetings