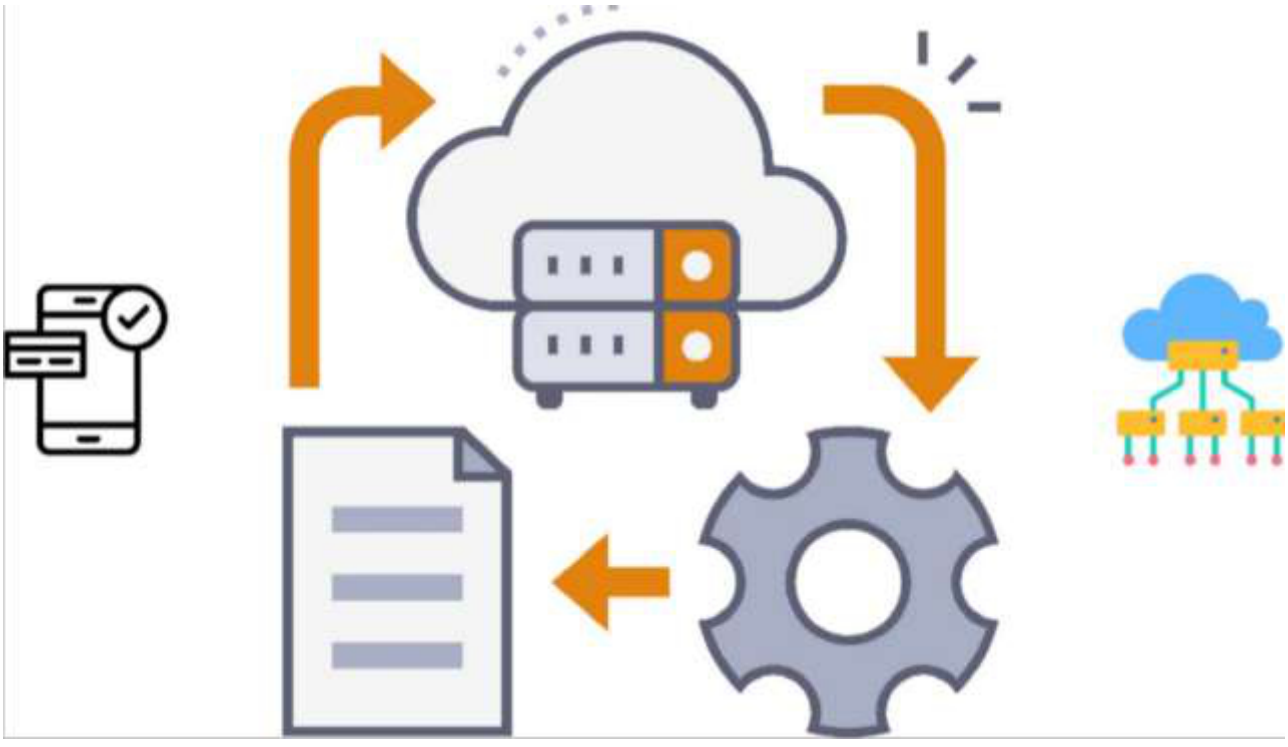
MODEL DEPLOYMENT PROCESS



Sweta Mohture

Overview

Goals

This document outlines the deployment process for the Ad Campaign Recommender application, developed as part of the capstone project. The application leverages machine learning models to predict user demographics (age and gender) based on mobile phone usage patterns, enabling personalized ad campaigns.

App Architecture

Frontend

The web application is built using Streamlit, providing an interactive interface for users to input data and receive predictions. Key components of the frontend include:

- Input fields for mobile phone usage data
- Dropdowns for selecting phone models, days of the week, and weeks of the month
- Sliders for app usage counts
- Map integration for geospatial location inputs

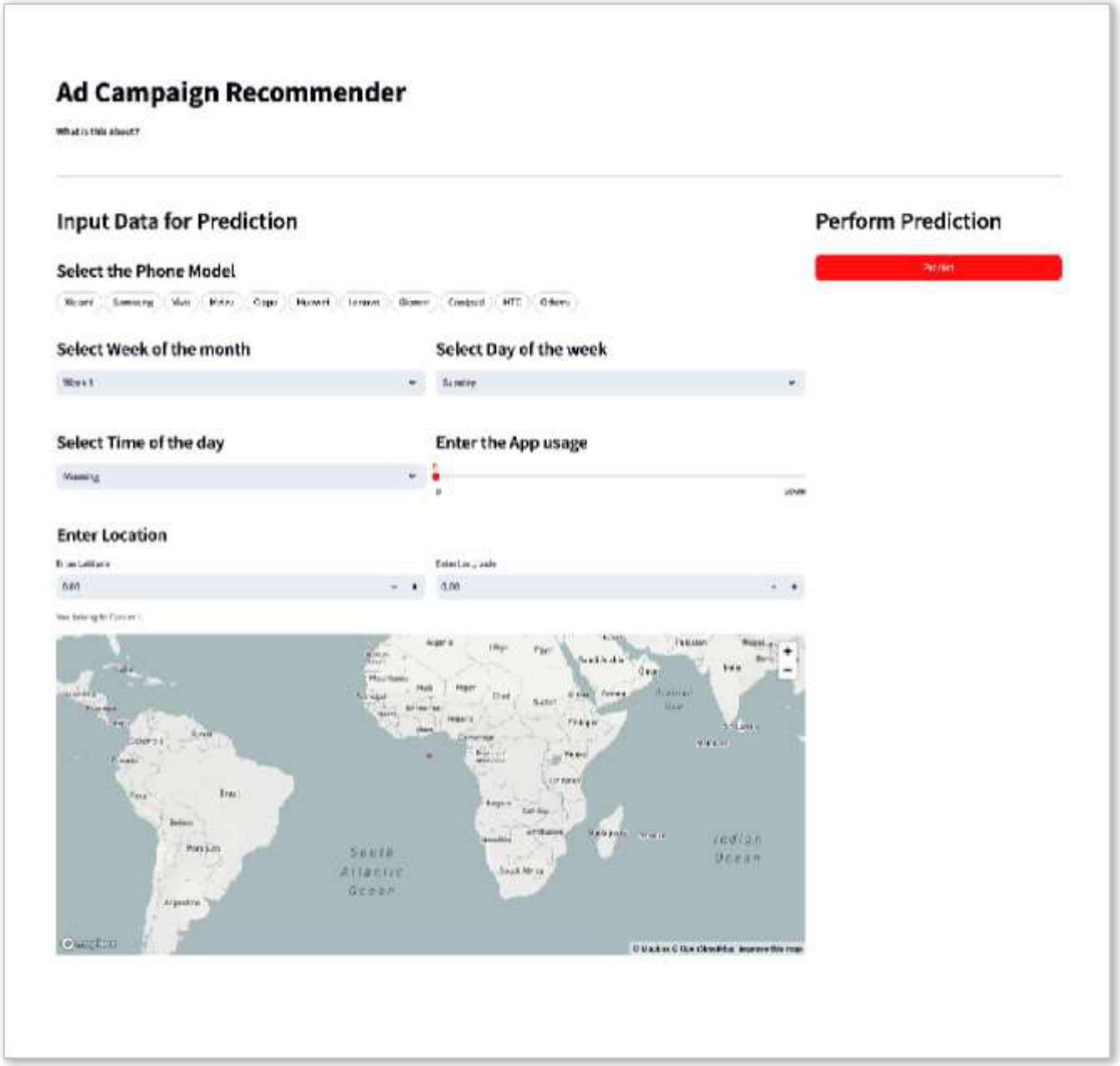
Backend

The backend includes:

- **Gender Prediction Model:**
  - **Input features:** Phone brand category, cluster data, day of the week, time of day, and app usage.
  - **Output:** Predicted gender (Male/Female).

- **Age Group Prediction Model:**
  - **Input features:** Similar to the gender model, with additional location-based clustering.
  - **Output:** Predicted age group (e.g., Less than 20, 20-24 years, etc.).

App Screenshot



Dockerfile

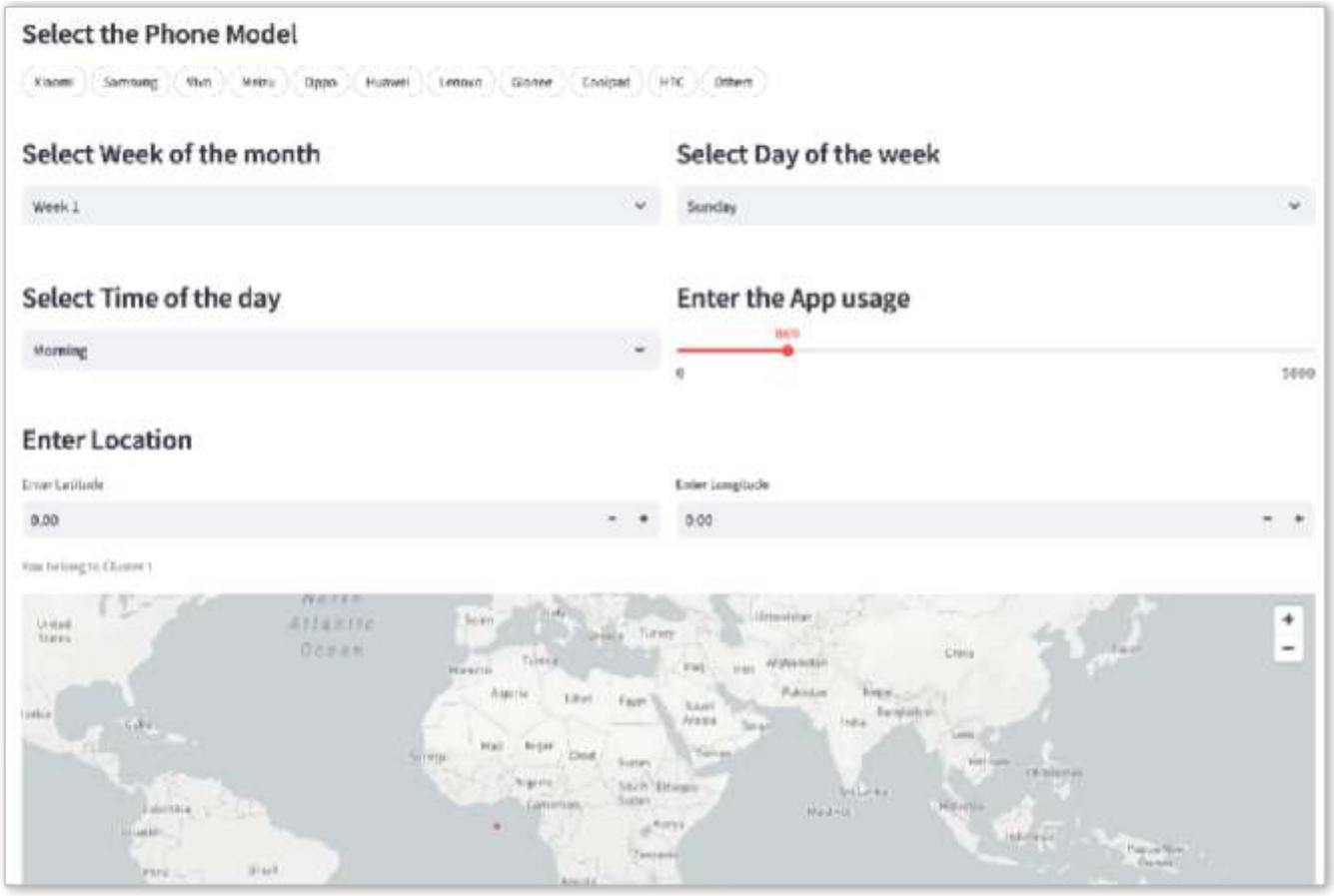
The backend includes:

- **Base image:** Python 3.9-slim
- **System dependencies:** Build-essential tools
- **Environment variables:** PYTHONPATH and PATH
- **Working directory:** /app

Key Features

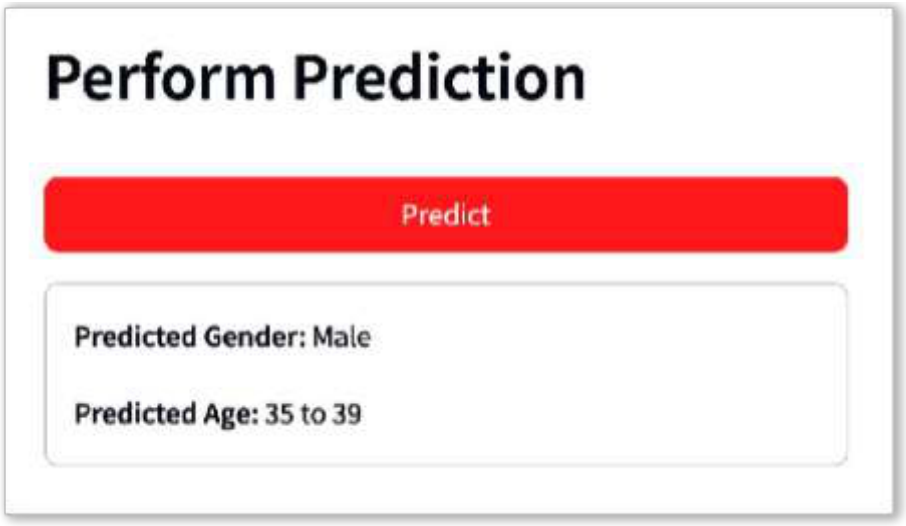
Input Data

- Phone model selection (e.g., Xiaomi, Samsung)
- Week of the month selection
- Day of the week selection
- Time of day selection
- App usage count
- Geospatial location data (latitude and longitude)



Output Predictions

- Predicted gender
- Predicted age group
- Geospatial clustering based on latitude and longitude



Deployment Features

- Containerized using Docker for portability
- Streamlit interface for user interaction
- BallTree algorithm for geospatial clustering
- Machine learning models loaded from serialized files

Source code

The code is published on GitHub at,
https://github.com/swetamohture17/Ad-campaign-predictor

Web App access

The web app can be accessed at,
https://ad-campaign-predictor-swetamohture.streamlit.app/

Campaign Mapping

Gender-Based Campaigns

- **Campaign 1: Fashion-related campaigns:** Target - Female users
- **Campaign 2: Cashback offers on special days (e.g., International Women's Day):** Target - Female users
- **Campaign 3: Personalized call and data packs:** Target - Male users

Age-Based Campaigns

- **Campaign 4: Bundled smartphone offers:** Target - Users aged <20 years
- **Campaign 5: Payment wallet offers:** Target - Users aged 24-32 years
- **Campaign 6: Privilege membership cashback offers:** Target - Users aged 24-32 years

Model Deployment Steps

Build Docker Image

Run the following command to build the Docker image:

```
dockerbuild-tad-campaign-recommender.
```

Run the Application Locally

Start the application using:

```
dockerrun-p8501:8501ad-campaign-recommender
```

Deploy on Cloud Platform (e.g., AWS EC2)

- Upload the Docker image to an S3 bucket.
- Launch an EC2 instance and attach it to the S3 bucket.

- Run the application on the EC2 instance using the Docker container.

Monitor and Scale

Use monitoring tools like CloudWatch (AWS) or Prometheus to track performance metrics. Scale horizontally by launching additional EC2 instances during peak load.

Conclusion

The Ad Campaign Recommender application is a fully functional, deployable solution that leverages predictive analytics to enhance marketing strategies in the telecom sector. By providing personalized ad campaigns based on user demographics, this application bridges the gap between data and business outcomes.