High-Level Design (HLD) for Restaurant Rating Prediction System

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High-Level Design Overview

- **The High-Level Design (HLD) outlines the architecture and components of the Restaurant Rating Prediction System. It provides a visual representation of the system’s structure, interactions, and data flow between different modules.**

High-Level Design Components

Components:

User Interface (UI):

- **Login Page: Captures user credentials.**
- **Home Page: Provides navigation to other functionalities.**
- **Prediction Page: Collects input features for predictions.**
- **Results Page: Displays prediction results.**

Backend:

- **Flask Web Server: Handles HTTP requests and responses.**
- **Authentication Module: Validates user credentials.**
- **Prediction Module: Processes input features and generates predictions using the ML model.**

High-Level Design Components

Machine Learning Model:

- **Model Training: Trained on the Zomato dataset.**
- **Prediction: Uses the trained model to predict restaurant ratings.**

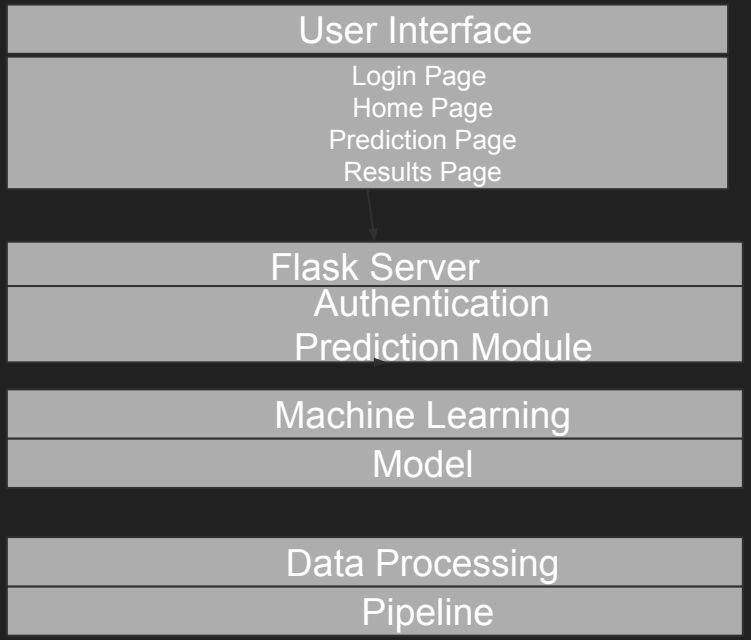
Database (if applicable):

- **User Data Storage: (optional) Stores user credentials and sessions.**

Data Processing Pipeline:

- **Data Preprocessing: Cleans and transforms raw data.**
- **Feature Engineering: Prepares data for model training.**

Diagram Layout



Component Descriptions

User Interface (UI):

- **Login Page:**
  - **Allows users to input their credentials for authentication.**
- **Home Page:**
  - **Displays options for users to navigate to prediction functionalities.**
- **Prediction Page:**
  - **Contains a form for users to input features like location, restaurant type, etc.**
- **Results Page:**
  - **Displays the predicted rating along with any relevant insights.**

Component Descriptions

2. Backend:

- **Flask Web Server:**
  - **Serves as the application framework, handling user requests and returning responses.**
- **Authentication Module:**
  - **Verifies user credentials to ensure secure access to the application.**
- **Prediction Module:**
  - **Processes user inputs and communicates with the ML model to generate predictions.**

3. Machine Learning Model:

- **Utilizes trained algorithms (e.g., XGBoost) to make predictions based on the processed input features.**

Component Descriptions

4. Data Processing Pipeline:

- **Data Preprocessing:**
  - **Handles cleaning, normalization, and encoding of input data.**
- **Feature Engineering:**
  - **Identifies and constructs relevant features from the dataset for model training.**

System Interaction

Description: This section describes how components interact with each other during user activities.

1. **User Login:**
    - **User inputs credentials on the Login Page, which are sent to the Authentication Module.**
    - **Successful authentication redirects the user to the Home Page.**
2. **Making Predictions:**
    - **User navigates to the Prediction Page and inputs required features.**
    - **These features are sent to the Prediction Module, which interacts with the Machine Learning Model to generate a rating.**
    - **The prediction result is displayed on the Results Page.**

Future Enhancements

Potential Future Enhancements:

- **Database Integration:**
  - **Implement a database for storing user sessions and data persistently.**
- **Containerization with Docker:**
  - **Containerize the application for easier deployment and scalability.**
- **Cloud Deployment:**
  - **Host the application on a cloud platform for wider accessibility and live usage.**
- **Enhanced Security Features:**
  - **Implement OAuth or JWT for improved authentication and user session management.**

Thank You