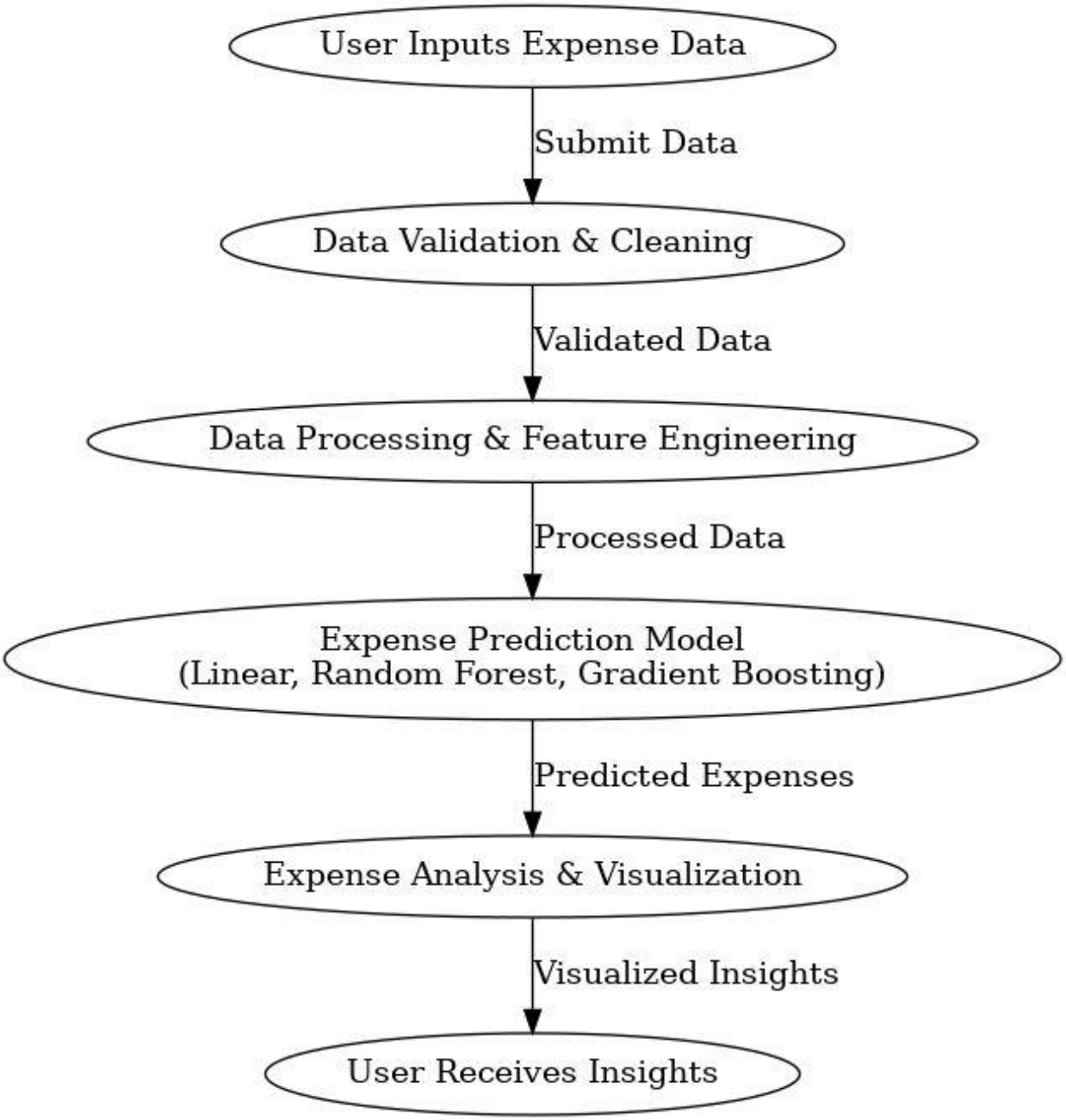
Process Flow Diagrams:



User Stories and Use Cases

User Story 1

As a user, I want to input my monthly expenses to track and analyze my spending trends.

User Story 2

As a user, I want to visualize my spending categories to identify areas where I can save money.

User Story 3

As a user, I want to receive predictions for my future monthly expenses based on my past spending data.

Use Cases

Use Case 1: Expense Data Input

Actors: User

Precondition: User has accessed the expense input interface.

Description: User enters monthly expense data into the tracker.

Postcondition: Data is stored, validated, and ready for processing.

Success Condition: Data is successfully inputted and categorized.

Failure Condition: Invalid data is detected, prompting the user to re-enter.

Use Case 2: Expense Analysis and Visualization

Actors: User

Precondition: User has inputted expense data for the past month.

Description: User selects an option to view visualized data insights, such as monthly expense breakdowns and category-wise spending.

Postcondition: Visualized insights are displayed to the user.

Success Condition: User sees a clear breakdown of expenses by category.

Failure Condition: Error in visualization due to incomplete data.

Use Case 3: Predictive Insights

Actors: User

Precondition: Sufficient historical data is available for accurate predictions.

Description: User requests predictions for upcoming expenses based on historical data.

Postcondition: System displays predicted monthly expenses for future **planning.**

Success Condition: User receives reliable expense predictions.

Failure Condition: Insufficient data prevents accurate prediction.

Functional Decomposition Documents

This document outlines the major functionalities of the Personal Expense Tracker and breaks them down into sub-functions to clarify how each part contributes to the overall process.

1. Data Collection and Validation

Data Input: User inputs monthly expenses or uploads data files.

Data Validation: System checks for completeness, valid date formats, numerical values, and category assignments.

Error Handling: Prompts user to correct any invalid data entries.

2. Expense Categorization

Category Assignment: Automatically or manually categorizes expenses (e.g., Food, Rent, Utilities).

Custom Categories: Allows users to define new categories if needed.

Re-categorization: Provides options to reassign expenses to different categories.

3. Data Processing and Feature Engineering

Data Cleaning: Removes duplicates, handles missing values, and formats data for processing.

Feature Engineering: Creates additional fields (e.g., monthly averages, seasonal adjustments) for predictive accuracy.

Data Transformation: Prepares the data for modeling, including normalization or scaling if required.

4. Expense Prediction Model

Model Selection: Chooses a model (e.g., linear regression, random forest) based on user preference or data suitability.

Model Training: Uses historical expense data to train the prediction model.

Model Evaluation: Evaluates the model's accuracy and adjusts parameters as needed.

5. Expense Analysis and Visualization

Dashboard Creation: Builds visual dashboards to show spending summaries, trends, and categorized expenses.

Interactive Charts: Provides interactive elements for users to explore data (e.g., filters by date range or category).

Summary Reports: Generates monthly and yearly summaries for easy comparison.

6. Predictive Insights and User Notifications

Prediction Output: Displays expected future expenses based on past data.

Alert System: Notifies users of high spending trends or budget exceedances.

Insights and Recommendations: Provides insights on saving potential in specific category.