SEPM Lab Work

Practical No.01

AIM: Identifying the requirement for the Problem Statement.

Problem Statement: Prediction Of Personality trait based on Handwriting Analysis.

**Identifying the Requirements for the Problem Statement:**

**Prediction of Personality Traits Based on Handwriting Analysis**

The project aims to analyse handwriting samples to predict personality traits using machine learning. This involves handwriting recognition, feature extraction, model training, and result interpretation.

**1. Functional and Non-Functional Requirements**

**Functional Requirements (FRs):**

1. **User Input:** The system should allow users to upload a handwriting sample as an image or scanned document.
2. **Preprocessing:** The system should clean and enhance the handwriting image (e.g., noise removal, binarization).
3. **Feature Extraction:** Extract handwriting features such as slant, letter spacing, word spacing, pressure, and stroke style.
4. **Machine Learning Model:** The system should use trained ML models (e.g., CNN, SVM) to analyse handwriting patterns and predict personality traits.
5. **Personality Trait Prediction:** The system should classify personality traits based on handwriting analysis using psychological theories like Graphology or the Big Five Model.
6. **Result Interpretation:** Provide users with an easy-to-understand personality report based on their handwriting.
7. **User Authentication (Optional):** If the system includes a user dashboard, users should be able to register and log in to track their reports.
8. **Database Management:** Store previous handwriting samples and personality reports for future reference.
9. **Report Generation:** Allow users to download or view personality reports in PDF format.
10. **Admin Panel:** An admin interface to manage datasets, update models, and oversee system operations.

**Non-Functional Requirements (NFRs):**

1. **Performance:** The system should process handwriting images and provide predictions within a few seconds.
2. **Scalability:** The architecture should support multiple users simultaneously without performance degradation.
3. **Security:** User data, including handwriting samples and reports, should be stored securely using encryption.
4. **Accuracy:** The personality prediction model should achieve a high accuracy rate (e.g., above 85%) to ensure reliable predictions.
5. **Usability:** The system should have a simple and user-friendly interface for easy navigation.
6. **Compatibility:** The application should be accessible on different devices (PC, mobile, and tablets).
7. **Maintainability:** The system should allow easy updates for improving the ML model and adding new handwriting features.
8. **Availability:** The system should be available 24/7 for users to upload handwriting and receive predictions.

**2. Software Requirements Specification (SRS)**

**SRS 1: Introduction**

* **Purpose:** Develop an AI-based system that predicts personality traits from handwriting analysis.
* **Scope:** The system will accept handwriting samples, process them, extract features, and generate personality reports using machine learning.
* **Definitions, Acronyms, and Abbreviations:**
  + **ML:** Machine Learning
  + **CNN:** Convolutional Neural Network
  + **SVM:** Support Vector Machine
  + **FRs:** Functional Requirements
  + **NFRs:** Non-Functional Requirements
* **References:** Psychological studies on graphology, handwriting analysis research papers, and machine learning models for handwriting classification.

**SRS 2: Overall Description**

* **Product Perspective:** The system will be a web-based or mobile application allowing users to upload handwriting samples for personality assessment.
* **Product Functions:**
  + Image upload, preprocessing, feature extraction, ML-based prediction, report generation.
* **User Characteristics:**
  + Users include individuals, HR professionals, psychologists, and researchers interested in personality analysis.
* **Constraints:**
  + Requires a high-quality handwriting image for accurate predictions.
  + ML model performance depends on training data and preprocessing quality.

**SRS 3: Specific Requirements**

* **Functional Requirements:** As listed in the **Functional Requirements** section.
* **External Interfaces:**
  + **User Interface:** Web-based dashboard, mobile-friendly UI.
  + **Hardware Interface:** Supports image input from cameras and scanners.
  + **Software Interface:** API integration for cloud storage and ML models.

**SRS 4: Quality Attributes**

* **Efficiency:** The system should provide quick predictions with minimal processing time.
* **Reliability:** The system should have an uptime of 99.9% for continuous accessibility.
* **Security:** Data should be encrypted and protected against unauthorized access.
* **Modifiability:** The system should allow updates to the ML model for accuracy improvement.

**SRS 5: Assumptions and Dependencies**

* **Assumptions:**
  + The handwriting image is clear and legible.
  + The ML model has been trained on diverse handwriting samples.
* **Dependencies:**
  + Requires integration with cloud services for data storage.
  + Relies on open-source or custom-built ML models for personality prediction.

This structured requirement analysis will help in the successful development of the **handwriting-based personality trait prediction system**.