**SEPM : Practical 1: Saloni Bhingardive (Preparation)**

***Problem Statement:***

To predict personality traits based on handwriting analysis using ML.

**Functional Requirements**

These define the core operations and expected functionalities of the system.

1. **Data Collection & Preprocessing**
   * Ability to accept handwritten text samples as input (scanned images or digital handwriting).
   * Preprocessing module for noise removal, binarization, and feature extraction.
2. **Feature Extraction**
   * Extraction of handwriting features like slant, pressure, spacing, loops, curves, etc.
   * Application of image processing techniques to identify key handwriting characteristics.
3. **Machine Learning Model**
   * Training a predictive model using labeled handwriting datasets.
   * Implementing classification/regression algorithms to predict personality traits.
   * Fine-tuning hyperparameters to improve accuracy.
4. **Prediction & Analysis**
   * Input: Handwriting sample from the user.
   * Processing: Model analyzes handwriting features.
   * Output: Predicted personality traits (e.g., introversion, extroversion, conscientiousness).
5. **User Interface (UI/UX)**
   * User-friendly interface to upload handwriting samples.
   * Display of analysis results in an easy-to-understand format.
6. **Result Interpretation & Report Generation**
   * Provide a downloadable/printable personality report based on handwriting.
   * Explainable AI (XAI) for users to understand predictions.
7. **Database Management**
   * Storage of handwriting samples and extracted features.
   * Secure handling of user data for future analysis.
8. **User Management & Access Control**
   * User authentication & authorization (optional, for personalized reports).
   * Role-based access for administrators and researchers.

**Non-Functional Requirements**

These define the **quality attributes** and constraints of the system.

1. **Performance**
   * Fast response time (prediction within a few seconds).
   * Efficient model execution without heavy computation requirements.
2. **Scalability**
   * System should handle multiple users simultaneously.
   * Model should be able to adapt as new handwriting data is added.
3. **Accuracy & Reliability**
   * Ensure a high accuracy rate (~80-90%) in personality predictions.
   * Reliable feature extraction to minimize false predictions.
4. **Security**
   * Secure storage of handwriting samples and user data.
   * Encryption of sensitive information.
5. **Usability**
   * Simple and intuitive UI/UX for non-technical users.
   * Clear visualization of results.
6. **Maintainability & Extensibility**
   * Easy to update with new handwriting features or ML models.
   * Modular design for integration with other psychological assessment tools.
7. **Portability**
   * Should work on web and mobile platforms.
   * Cross-browser and cross-device compatibility.
8. **Ethical & Legal Compliance**
   * Adherence to data privacy laws (e.g., GDPR, HIPAA).
   * Avoid bias in personality trait predictions.

**SRS: Software Requirement Specifications**

**Purpose;**

The purpose of this system is to analyze handwriting samples and predict personality traits using Machine Learning (ML). The system will extract handwriting features and classify individuals based on psychological attributes.

**Document Conventions**

* UML diagrams will be used for system design.
* Functional and non-functional requirements are structured per IEEE SRS standards.

**Intended Audience and Reading Suggestions**

This document is intended for:

* Developers and ML engineers
* Researchers in handwriting analysis
* End-users who want personality insights
* Psychologists who may use the tool

**Product Scope**

* Predict personality traits from handwriting samples using ML.
* Provide a user-friendly web or mobile interface.
* Generate reports based on handwriting analysis.

**References**

* Big Five Personality Traits Model
* Machine Learning for Psychological Analysis
* IEEE Software Engineering Standards