Brain Disease Prdiction System by using Machine Learning

**SEPM Practical no :-01**

Problem Statement :

To study SDLC and identifying requirements for Brain Disease Prdiction System .

**Requirements for Brain Disease Prediction System**

1. Patient data collection (age, medical history, symptoms, lifestyle factors).
2. Integration of neuroimaging data (MRI, CT scans, EEG reports).
3. Data preprocessing (handling missing values, normalization, feature extraction).
4. Implementation of AI/ML models for disease prediction.
5. Prediction of brain diseases such as Alzheimer's, Parkinson's, brain tumors, and strokes.
6. Confidence score and probability-based diagnosis.
7. User-friendly interface for data input and result display.
8. Secure storage and encryption of medical data.
9. Integration with hospital databases and Electronic Health Records (EHR).
10. Scalability to support large datasets and future updates.

**Categorization of Requirements for Brain Disease Prediction System**

**1. Functional Requirements (What the system should do)**

* Data collection (patient history, symptoms, medical imaging).
* Data preprocessing (cleaning, normalization, feature extraction).
* Disease prediction using AI/ML models.
* Generation of reports with probability scores.
* User interface for input and result display.
* Integration with hospital databases and EHR.

**2. Non-Functional Requirements (How the system should work)**

* Performance (fast prediction time, high accuracy).
* Security (data encryption, compliance with HIPAA/GDPR).
* Scalability (support large datasets and future updates).
* Usability (easy-to-use interface for doctors and researchers).
* Reliability (consistent and error-free predictions).

**3. Technical Requirements (Technology and infrastructure)**

* Use of **Machine Learning (Random Forest, XGBoost, SVM)** for tabular data.
* Use of **Deep Learning (CNN, Transfer Learning)** for medical imaging.
* Cloud storage and computing (Google Cloud, AWS, or on-premise).
* Programming languages: **Python (TensorFlow, Scikit-learn, Flask/Django for web app)**.

**4. Business Requirements (High-level goals and objectives)**

* Improve early diagnosis of brain diseases.
* Reduce misdiagnosis and human error.
* Provide decision support for doctors and healthcare professionals.
* Ensure cost-effectiveness and accessibility for hospitals and clinics.

**Software Requirements Specification (SRS)**

**1. Introduction**

* **Purpose**: AI-powered system for predicting brain diseases like **Alzheimer’s, Parkinson’s, tumors, and strokes** using patient data and medical imaging.
* **Scope**: Collects patient history, analyzes MRI/CT scans, predicts diseases, and generates reports for healthcare professionals.
* **Constraints**: Must comply with **HIPAA/GDPR**, support real-time predictions, and require high-quality medical datasets.

**2. Overall Description**

* **Product Functions**:
  + Data collection (manual and automated).
  + AI-based disease classification.
  + Medical report generation.
  + Role-based access control and EHR integration.
* **User Roles**: **Doctors, patients, and administrators**.
* **Assumptions**: Requires internet connectivity and high-performance computing for AI models.

**3. Specific Requirements**

* **Functional**: AI-based prediction, real-time report generation, and secure user authentication.
* **Performance**: Predictions in **≤5 seconds**, **≥90% accuracy**, and support for **1000+ users**.
* **Security & Compliance**: **Data encryption, access control, HIPAA/GDPR compliance**.
* **Technology**: **Python (TensorFlow, Scikit-learn, Flask/Django), AWS/Google Cloud**.