**SEPM Practical no-02**

**Project Estimation of Brain Disease Prediction System**

**Aim of the Experiment**

The aim of this experiment is to develop an AI-powered system for predicting brain diseases using medical imaging and patient data. The system will assist in early diagnosis, improve treatment planning, and support healthcare professionals in decision-making by leveraging machine learning and deep learning models.

**Introduction**

Brain diseases, including Alzheimer’s, Parkinson’s, brain tumors, and strokes, are critical health conditions that require timely and accurate diagnosis. Traditional diagnostic methods involve manual interpretation of MRI and CT scans, patient history analysis, and symptom assessment. However, these methods are time-consuming, prone to human error, and dependent on expert radiologists and neurologists.

**Theory: Brain Disease Prediction System Estimation**

Project estimation for the **Brain Disease Prediction System** involves predicting:

1. **Cost:** The financial resources required for data collection, model development, cloud computing, and deployment.
2. **Effort:** The human resources, including data scientists, AI engineers, and healthcare experts, along with the work hours needed for model training, testing, and integration.
3. **Duration:** The total time required from dataset preprocessing to model deployment and validation in real-world applications.

**COCOMO Model for Brain Disease Prediction System**

The **Constructive Cost Model (COCOMO)** is a widely used software cost estimation model that predicts **effort, cost, and time** based on the project size and complexity.

1. **Project Classification in COCOMO**

COCOMO classifies projects into three categories:

* **Organic:** Simple projects with small teams and well-defined requirements.
* **Semi-Detached:** Moderate complexity, requiring mixed expertise.
* **Embedded:** Complex, real-time, or highly regulated systems.

Since a **Brain Disease Prediction System** involves **AI, medical data, and regulatory constraints**, it falls under the **Semi-Detached or Embedded** category.

**2. Effort Estimation Formula**

The basic COCOMO equation:

E=a(KLOC)bE = a(KLOC)^bE=a(KLOC)b

where:

* **E** = Effort (in person-months)
* **KLOC** = Thousands of Lines of Code
* **a, b** = Constants based on project type

For a **Semi-Detached Project**, the values are:

E=3.0(KLOC)1.12E = 3.0 (KLOC)^{1.12}E=3.0(KLOC)1.12

**3. Time Estimation Formula**

T=c(E)dT = c(E)^dT=c(E)d

where:

* **T** = Time required (in months)
* **E** = Effort from the above equation
* **c, d** = Constants for project type

For **Semi-Detached projects**,

T=2.5(E)0.35T = 2.5 (E)^{0.35}T=2.5(E)0.35

**4. Application to Brain Disease Prediction System**

* **Dataset Processing & Model Development:** AI models require large-scale data preprocessing and feature extraction, increasing effort.
* **Software Complexity:** The need for deep learning, medical image processing, and cloud integration affects estimation.
* **Regulatory & Ethical Considerations:** Compliance with medical data laws (e.g., HIPAA, GDPR) adds extra development time.

**References**

1. Deep Learning for Medical Image Analysis – Elsevier
2. Machine Learning in Healthcare – Springer
3. IEEE Transactions on Medical Imaging