# ****Practical: Modeling UML Use Case Diagram and Capturing Use Case Scenarios****

### ****Objective:****

**To demonstrate how to identify actors, define use cases, draw a UML use case diagram, and document use case scenarios for the **Brain Disease Prediction System**, which uses machine learning to predict brain diseases from medical data.**

### ****1. Project Overview****

The **Brain Disease Prediction System** is a machine learning-based application that helps in diagnosing brain-related diseases such as brain tumors, Alzheimer’s, and Parkinson’s from input data like MRI scans and patient history. The system interacts with various users including doctors, patients, and administrators to provide disease predictions, manage user data, and generate reports.

### ****2. Identifying Actors****

Actors are external entities (users or systems) that interact with the system. For this project, the identified actors are:

| **Actor** | **Description** |
| --- | --- |
| **Doctor** | Uploads patient data, views disease predictions, and uses the system for diagnosis. |
| **Patient** | Views personal reports and predictions, optionally uploads personal health info. |
| **Admin** | Manages user accounts, monitors system usage, and updates the model or system settings. |
| **ML Model** (System Actor) | The machine learning model that processes data and returns predictions. |

### ****3. Identifying Use Cases****

Use cases describe the functionalities provided by the system to the actors. For this project:

| **Use Case ID** | **Use Case** | **Description** |
| --- | --- | --- |
| UC1 | Register/Login | Allow users to register or authenticate into the system. |
| UC2 | Upload Patient Data | Doctors upload MRI scans and health records. |
| UC3 | Predict Brain Disease | The system uses the ML model to analyze data and predict disease. |
| UC4 | View Prediction Report | Doctors/Patients can view diagnosis results and reports. |
| UC5 | Manage Users | Admin creates, deletes, or updates user accounts. |
| UC6 | Train/Update Model | Admin uploads new data and retrains the ML model. |
| UC7 | View Usage Statistics | Admin views system logs and usage analytics. |

### ****4. UML Use Case Diagram****

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| Admin |

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| UC5 | | UC6 | | UC7 |

+-----+ +----------+ +-------------------+

+--------------------+

| Doctor |

+--------------------+

/ | \

/ | \

+--------+ +------------+ +----------------+

| UC1 | | UC2 | | UC4 |

+--------+ +------------+ +----------------+

|

v

+-----------+

| UC3 |

+-----------+ ---> [ML Model]

+---------------------+

| Patient |

+---------------------+

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+--------+ +-----------+

| UC1 | | UC4 |

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### ****5. Use Case Scenarios****

#### ****Use Case: UC3 – Predict Brain Disease****

**Actor:** Doctor, ML Model

**Precondition:** Patient data is uploaded.

**Main Flow:**

Doctor selects a patient record.

System sends the data to the ML model.

ML model analyzes the data and returns predictions.

System stores the prediction and notifies the doctor.

**Postcondition:** Prediction report is generated and available for viewing.

#### ****Use Case: UC1 – Register/Login****

**Actor:** Doctor, Patient, Admin

**Precondition:** The user has not logged in.

**Main Flow:**

User provides credentials.

System validates credentials.

If valid, the user is logged in and redirected to the dashboard.

**Postcondition:** Session is started; user can access authorized features.

#### ****Use Case: UC4 – View Prediction Report****

**Actor:** Doctor, Patient

**Precondition:** Prediction has been generated.

**Main Flow:**

User selects a patient or personal record.

System fetches the latest prediction report.

User views diagnosis, confidence scores, and suggested actions.

**Postcondition:** Report is displayed; user may download it.

### ****6. Tools for Drawing the Diagram****

You can draw the UML Use Case Diagram using:

**Lucidchart** (Online)

**Draw.io / Diagrams.net**

**StarUML**

**Microsoft Visio**

**Pencil Project**

### ****7. Conclusion****

By identifying actors, use cases, and modeling their interactions through a UML Use Case Diagram, we can effectively represent the functional requirements of the Brain Disease Prediction System. Capturing these scenarios allows for better system design, communication among stakeholders, and smoother implementation.