National College of Ireland

Developing a symptom-based disease prediction system using machine learning and explainable AI (XAI), with an AI agent for interactive diagnosis assistance

MSc Research Project
MSc Data Analytics

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MSc Project Submission Sheet

School of Computing

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Programme:	MSc Data Analytics **Year:** 2024-2025
Module:	Research Practicum
Lecturer:	Muslim Jameel Syed
Submission Due Date:	11-08-2025
Project Title:	Developing a symptom-based disease prediction system using machine learning and explainable AI (XAI), with an AI agent for interactive diagnosis assistance
Word Count:	1073 **Page Count:** 6

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1 System Requirements

Component	Requirement
Operating System	Windows, macOS, or Linux
Python	Version 3.7 or higher
RAM	Minimum 8 GB
Disk Space	Minimum 1 GB of free space for the dataset and libraries

2 Python Dependencies

Core Libraries:

Bash

pip install pandas scikit-learn xgboost tensorflow scikeras matplotlib

Additional Libraries for XAI and advanced models:

Bash

pip install lime

pip install pytorch-tabnet

pip install catboost

3. Model I/O Configuration

- **Task**: Multi-class classification to predict diseases from symptoms.

- **Input**: A dataset of symptoms (Final_Augmented_dataset_Diseases_and_Symptoms.csv).
- **Output**: Predicted disease with a confidence score and an explanation of contributing symptoms.

4. Data Pipeline

- **Dataset**: Final_Augmented_dataset_Diseases_and_Symptoms.csv.
- **Preprocessing**: The data is preprocessed by removing duplicates, cleaning column names, and encoding the target variable (diseases). The data is then split into training and testing sets.

5. Training Configuration

The notebook trains and evaluates several models including:

- **Logistic Regression**
- **Decision Tree Classifier**
- **Random Forest Classifier**
- **MLP Classifier**

The models are trained on the preprocessed data and evaluated based on accuracy and a classification report.

6. Execution Instructions

To run the system, execute the cells in the

disease_prediction.ipynb notebook sequentially.

- **Cells 1-7**: Install and import all necessary libraries.
- **Cell 8**: Loads the dataset.
- **Cells 9-22**: Perform Exploratory Data Analysis (EDA) and data preprocessing.
- **Cells 23-52**: Train and evaluate the machine learning models.
- **Cells 53 onwards**: Set up and demonstrate the use of the prediction and explanation tool.

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