Term Project Proposal: Artificial intelligence Machine Learning Implementation and Data Cleaning

Course: Artificial Intelligence

Project Title:

Implementing intelligent agents and Machine Learning Implementation and Data Preprocessing on a Selected Dataset

Project Description:

In this project, students will explore the fundamental steps in artificial intelligence, machine learning, including implementing an artificial agent, data cleaning, preprocessing, or implementing a machine learning algorithm on a chosen dataset.

The goal is to understand:

1- How to implement an artificial agent (if you choose to implement artificial agent such as an intelligent game, demonstrating AI decision-making and problem-solving techniques. (no data set is needed)
2- how to implement the date preprocessing techniques (if you want to work with data cleaning, data imputation or outlier removal)
3- How to implement ML algorithms to gain hands-on experience with supervised or unsupervised learning algorithms.

Project Objectives:

- To select and analyze a real-world dataset.
- To design and implement an artificial agent for an intelligent game.
- To perform data cleaning, handling missing values, and data transformation.
- To implement and evaluate a supervised or unsupervised machine learning algorithm.
- To interpret and present the results effectively.

Project Scope:

Each group will choose a dataset from online sources such as:

- Kaggle (https://www.kaggle.com/)
- UCI Machine Learning Repository (https://archive.ics.uci.edu/ml/index.php)
- Google Dataset Search (https://datasetsearch.research.google.com/)

Students will apply one of the following algorithms:

- **Supervised Learning:** Linear Regression, Decision Trees, Support Vector Machines, Neural Networks, etc.

- **Unsupervised Learning:** K-Means Clustering, Hierarchical Clustering, Principal Component Analysis (PCA), etc.
- Data cleaning, missing data imputation, outlier detection and removal.

<u>Students who choose to implement an artificial agent can:</u>

- Design a simple intelligent game (e.g., tic-tac-toe, maze solver, chess bot).

Project Phases:

1. **Dataset Selection, Cleaning and Preprocessing:**
2. **Model Implementation:**
3. **Evaluation and Interpretation:**
4. **Report Submission & Presentation (due to 25/03/2025):**
    - Submit a well-documented report explaining all steps, challenges, and conclusions.
    - Prepare a short presentation summarizing the findings.
5. **(For artificial agent groups) Artificial Agent Implementation:**
    - Develop a simple AI-based game or agent.
    - Apply relevant AI techniques for decision-making.
    - Test and evaluate agent performance.

Deliverables:

- **Project Report (PDF/Word):**
    - Introduction (Problem Statement & Dataset Description)
    - Algorithm Implementation
    - Results & Analysis
    - Conclusion and Future Work
- **Code Files (Python Notebook)**
- **Presentation Slides (PowerPoint, PDF, etc.)**

Evaluation Criteria:

- **Dataset Understanding, Algorithm Selection & Implementation (30%)**

- **Result Analysis & Interpretation (30%)**
- **Report Quality & Presentation (40%)**

Tools & Technologies:

- Python (Pandas, NumPy, Scikit-Learn, Matplotlib, Seaborn)
- Jupyter Notebook / Google Colab

Group Work Guidelines:

- Each group will consist of two to three students.
- Group members will collaborate on all aspects of the project and deliver the presentation together.
- Responsibilities must be distributed among group members to ensure equal participation and contribution.