Course Project Guidelines: Introduction to Artificial Intelligence CS366

Project Title: Applications of Machine Learning in Solving Real-world Problems

Introduction: The course project is a fundamental component of your Introduction to Artificial Intelligence course. It provides you with an opportunity to apply the concepts and techniques you've learned throughout the semester to solve a real-world problem using machine learning. This project will allow you to gain hands-on experience in problem formulation, data acquisition, preprocessing, model building, and evaluation.

Project Objectives: The primary objectives of this project are as follows:

1. **Problem Selection:** Choose a real-world problem or task that can be addressed using machine learning techniques. It could be related to any domain (e.g., healthcare, finance, natural language processing, image recognition, etc.).
2. **Data Acquisition:** Identify and gather a dataset suitable for solving your chosen problem. Ensure that the dataset is publicly available and well-documented.
3. **Data Preprocessing:** Clean, transform, and preprocess the dataset as needed to prepare it for machine learning. This may involve handling missing values, encoding categorical variables, scaling, or other data transformations.
4. **Model Building:** Apply appropriate machine learning algorithms to your preprocessed dataset to build predictive models. Experiment with different algorithms and hyperparameters to find the best model for your problem.
5. **Evaluation:** Evaluate the performance of your machine learning models using appropriate metrics (e.g., accuracy, precision, recall, F1-score, ROC AUC, etc.). Compare and analyze the results to draw meaningful conclusions.
6. **Documentation:** Prepare a detailed report of your project, including problem statement, data description, preprocessing steps, model selection, implementation details, and results analysis. Your report should be well-organized and include code snippets, visualizations, and references.

Project Milestones and Deadlines:

- **Project Proposal Submission:** By 3rd week, submit a brief proposal outlining your chosen problem, dataset source, and a rough plan for data preprocessing and model selection.
- **Data Acquisition and Preprocessing:** By 6th week, acquire the dataset and complete data preprocessing. Document any challenges encountered during this phase.

- **Model Building:** By 11th week, implement machine learning models, hyperparameter tuning, and cross-validation. Document the choice of models and why they were selected.
- **Results and Evaluation:** By 12th week, evaluate your models and present the results. Discuss any insights gained from the analysis.
- **Final Report Submission:** By 13th week, submit the final project report, including all project components, results, conclusions, and future work.

Grading Criteria: Your project will be assessed based on the following criteria:

1. **Problem Selection (10%):** Is the chosen problem appropriate for the course and aligned with AI concepts?
2. **Data Acquisition and Preprocessing (20%):** How well did you handle data collection and preprocessing challenges?
3. **Model Building and Implementation (40%):** Did you implement and experiment with appropriate machine learning algorithms and techniques?
4. **Evaluation and Results (20%):** How effectively did you evaluate your models and interpret the results?
5. **Documentation and Presentation (10%):** Is your project report well-organized, clear, and informative?

Resources:

- Utilize course materials, textbooks, and online resources for guidance and reference.
- Seek help from the instructor or teaching assistants if you encounter difficulties during the project.

Important Notes:

- Plagiarism and academic misconduct are strictly prohibited. Properly cite all sources and collaborators.
- Keep regular communication with your instructor and seek feedback throughout the project.
- Aim to complete each milestone on time to ensure a smooth project progression.

This project is designed to enhance your practical skills in artificial intelligence and machine learning. Embrace the opportunity to learn, experiment, and apply your knowledge to solve real-world problems. Good luck with your Introduction to Artificial Intelligence course project!