

Personal Contribution Report - Amoye Peter

Student Academic Performance Prediction : Final Machine Learning Project - ITAI 1371 – December 2025.

1. Introduction

The objective of this project was to develop machine learning models capable of predicting student academic performance based on available features such as attendance, study habits, prior grades, and other relevant indicators. By applying multiple classification algorithms, the project aimed to evaluate which model delivers the most accurate and reliable predictions. This personal report summarizes my individual contributions to the team project: Student Academic Performance Prediction.

2. Methodology:

Decision Tree Classifier

I took responsibility in collaboration with my team for training the Decision Tree model to classify student performance into predefined categories. This model was chosen for its interpretability and ability to handle both numerical and categorical data. The tree structure provided insights into the most influential factors affecting academic outcomes.

K-Nearest Neighbors (KNN) Model

Also a KNN model was implemented to predict student performance by analyzing the similarity between students. Various values of k were tested to identify the optimal neighborhood size. The model relied on distance metrics to match students with similar profiles and infer their performance.

Naive Bayes Classifier

A Bayesian model (Naive Bayes) was applied to evaluate how well probabilistic assumptions could classify student performance. This algorithm was selected due to its efficiency, simplicity, and strong performance in classification tasks involving independent features.

3. Model Evaluation and Comparison

After training each model, performance metrics such as accuracy, precision, recall, and final score were calculated. The results were compiled into a Model Comparison Matrix, allowing a clear assessment of each algorithm's strengths and weaknesses. The matrix helped determine which model performed best overall and under which conditions.

4. Conclusion

The project successfully implemented and compared three machine learning approaches—Decision Tree, KNN, and Naive Bayes—for predicting student academic performance. By

evaluating each model and summarizing results in a comparison matrix, valuable insights were gained regarding model suitability, interpretability, and predictive effectiveness. These findings can support further development of academic performance prediction tools and guide future model improvements.