ATOMCAMP

PROJECT 03: ML Assignment

Model Performance Summary: Naive Bayes, KNN, and Decision Tree

In this classification task, the objective was to predict whether a user would purchase a product based on their age and estimated salary. Three machine learning algorithms were evaluated: Gaussian Naive Bayes, K-Nearest Neighbors (K=3, 5, 7), and Decision Tree classifiers using Gini and Entropy criteria.

1.1 Naive Bayes

Gaussian Naive Bayes achieved a high accuracy of 93% and excellent precision (0.94), indicating it made few false positives. Its recall (0.86) was slightly lower than KNN, meaning it missed a few actual purchasers. Naive Bayes is effective for its simplicity and is a strong baseline model.

1.2 K-Nearest Neighbors (K=3, 5, 7)

KNN outperformed all models overall, especially at K=7, achieving:

- Accuracy: 93%
- Recall: 0.95 (highest among all models)
- F1 Score: 0.91 (best balance of precision and recall)

1.3 Decision Tree (Gini & Entropy)

Both variants of the Decision Tree underperformed with only 83% accuracy and lower precision, recall, and F1 scores. These models may have overfit the training data or require parameter tuning. Despite their interpretability, they were less suitable for this dataset.
