

Analysing Student Performance

This project uses data-driven methods to analyse student performance. Our aim is to identify key factors influencing academic success and provide insights for improved learning outcomes.

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Dataset Description

Our dataset encompasses crucial details such as student demographics, study habits, attendance records, and exam scores. These attributes are invaluable for accurately predicting student performance and outcomes.

Understanding these diverse data points allows for a holistic view of factors contributing to academic success.



Data Preparation



Data Cleaning

Handled missing values and removed inconsistencies to ensure data integrity.



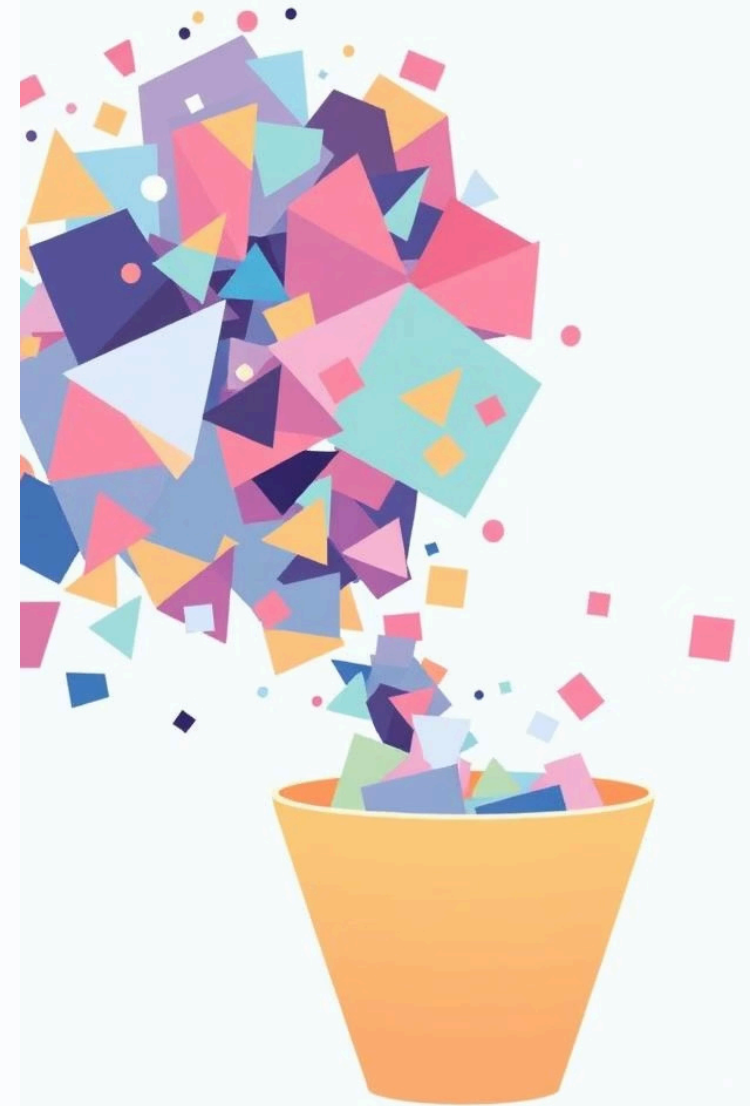
Feature Engineering

Created new features to enhance the predictive power of our models.



Normalization

Applied normalization techniques to prepare the dataset for effective modeling.



Exploratory Data Analysis

Exploratory Data Analysis (EDA) was conducted using various visualisations and statistical methods. This process helped us identify significant trends and uncover correlations between study habits, socio-economic factors, and overall academic performance.



Modeling Approach



We applied several machine learning models, including Decision Trees, Random Forest, and Logistic Regression. The primary objective was to accurately predict whether students would achieve good or poor academic performance.

These models were chosen for their effectiveness in classification tasks.



Model Evaluation Metrics

1

Accuracy

Overall correctness of predictions.

2

Precision

Proportion of true positive predictions.

3

Recall

Ability to identify all relevant instances.

4

F1-Score

Harmonic mean of precision and recall.

These metrics ensured a fair comparison and reliable measurement of each model's performance.



Results & Discussion

Study Time

A significant predictor of student success.

Parental Education

Strongly correlated with student outcomes.

Attendance

Crucial for consistent academic performance.

Our models identified these key factors. Random Forest demonstrated the best balance between predictive accuracy and generalisation capabilities.



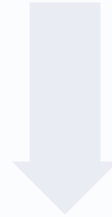
Conclusion

This study conclusively demonstrates that machine learning can effectively predict student outcomes. The insights gained can inform targeted interventions to support academic success.



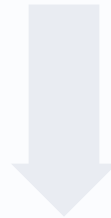
Expand Dataset

Include more diverse student populations and academic contexts.



Psychological Factors

Integrate data on student motivation, stress, and well-being.



Environmental Factors

Consider the impact of learning environments and resources.



References

- UCI Machine Learning Repository
- Research papers on Student Performance Prediction
- Python Libraries Documentation (Pandas, Scikit-learn, Matplotlib)