



# Predicting Student Success Using Machine Learning

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Date: [04/01/2025]

# The Challenge of Early Intervention

Predicting student performance is critical for providing timely support.

## Problem Statement

Early identification of at-risk students is essential.

## Objective

Develop a machine learning model to predict student success.

# Leveraging Machine Learning for Education

Building on existing research, we aim to enhance model interpretability and actionability.

## Existing Work

Decision Trees and Neural Networks have been applied.

## Our Approach

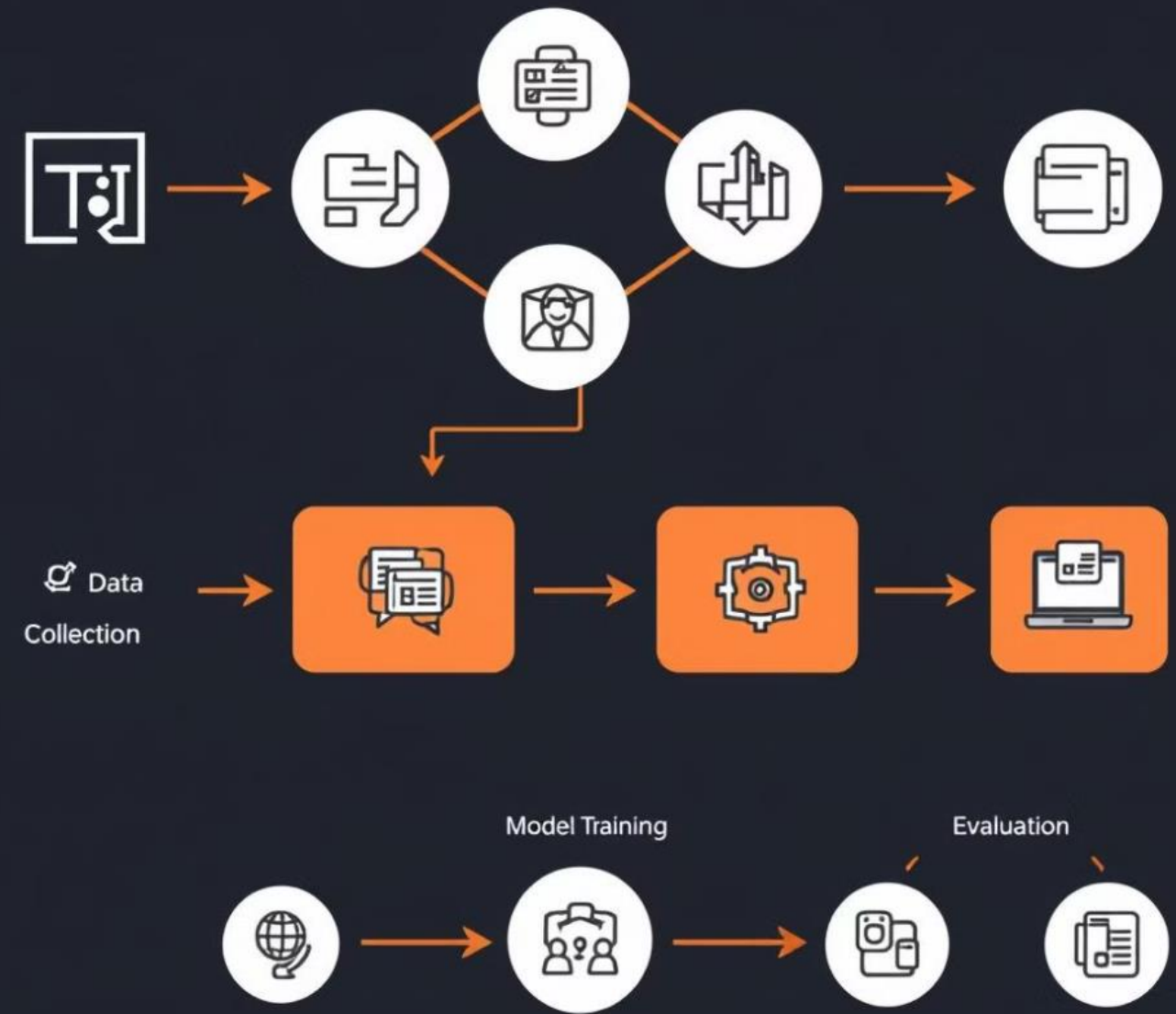
Focus on interpretable insights to guide interventions.

# System Design: A Comprehensive Workflow

From data collection to model evaluation, we ensure a robust and transparent process.

- 1 Data Collection
- 2 Preprocessing
- 3 Model Training
- 4 Evaluation

## Machine Learning workflow





# Methodology: Data and Model Selection

We utilize a diverse dataset and robust machine learning algorithms.

## Dataset Features

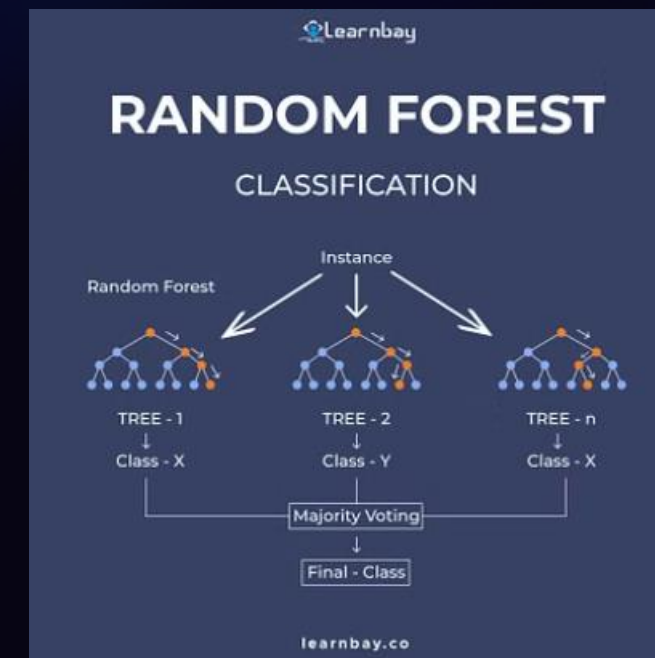
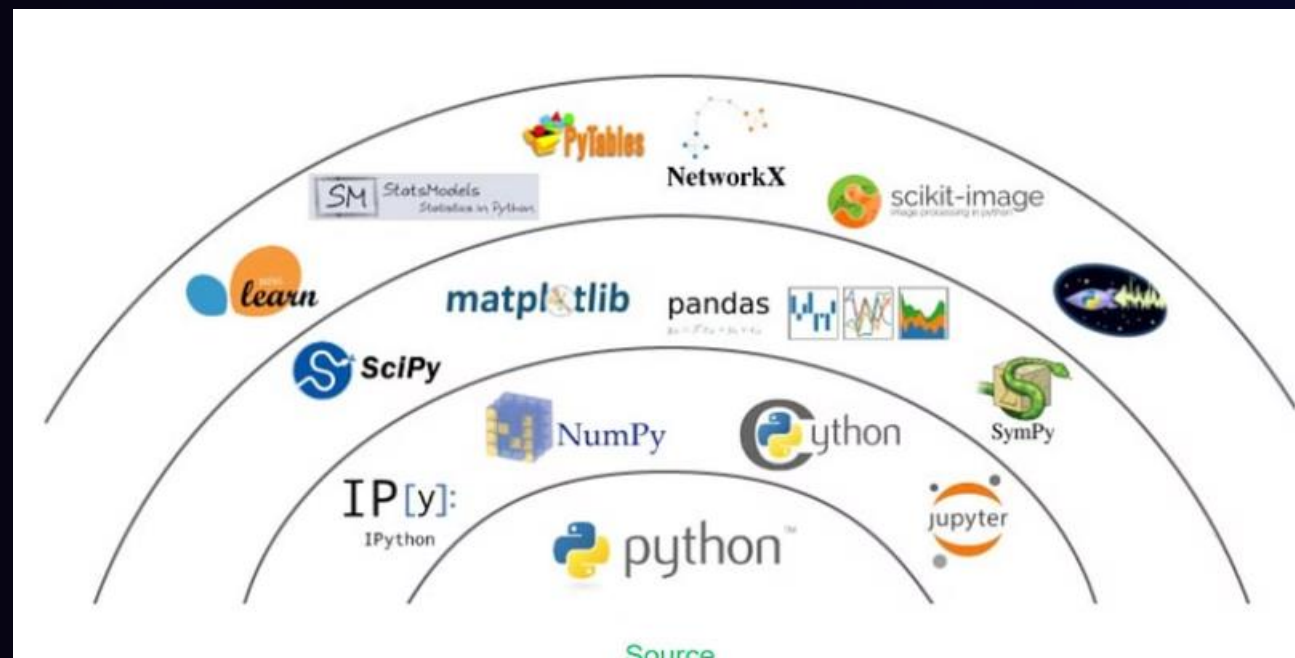
Attendance, grades, parental education, study habits.

## Models Used

Logistic Regression, Random Forest.

## Tools

Python, Scikit-learn, and Matplotlib are our tools of choice for data analysis, model building, and visualization.



# Testing and Results



## Inputs

Student details: academic performance, attendance records, and other relevant factors



## Outputs

Predicted performance category (e.g., "At Risk", "Moderate Risk", or "Low Risk")

# Implementation: A Powerful Predictor

Our model delivers accurate predictions for student performance.



## Metrics

We evaluate the model's performance using common metrics, including accuracy, precision, recall, and F1-score. These metrics provide a comprehensive assessment of the model's accuracy and effectiveness.



## Test Case

For a student with 75% attendance, our model predicts a "Moderate Risk" category. This suggests a potential need for additional support or interventions to ensure success.

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| Accuracy  | Accuracy | Areciam | Rrecard |
|-----------|----------|---------|---------|
| acuracy   | .30      | 76      | 40      |
| aplaticer | .30      | .15     | .60     |
| accisel   | 168      | .35     | .50     |
| preison   | 250      | .30     | .35     |
| recard    | .193     | .60     | .90     |
| F1-score  | .131     | .80     | .50     |

# Evaluation: Validating Our Model

Rigorous testing ensures the reliability and effectiveness of our predictions. Our model achieved an :

**92%**

**Accuracy**

High accuracy in identifying at-risk students.

**89%**

**Precision**

Minimizing false positives.

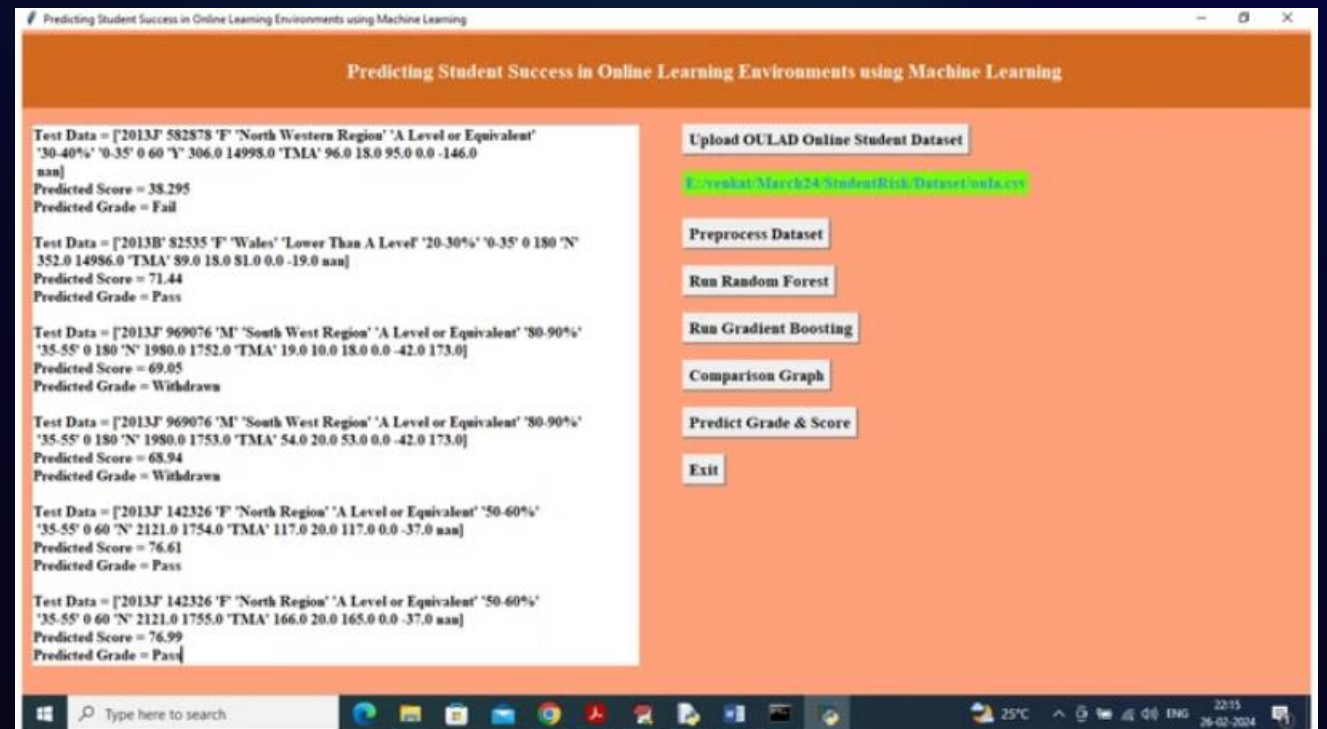
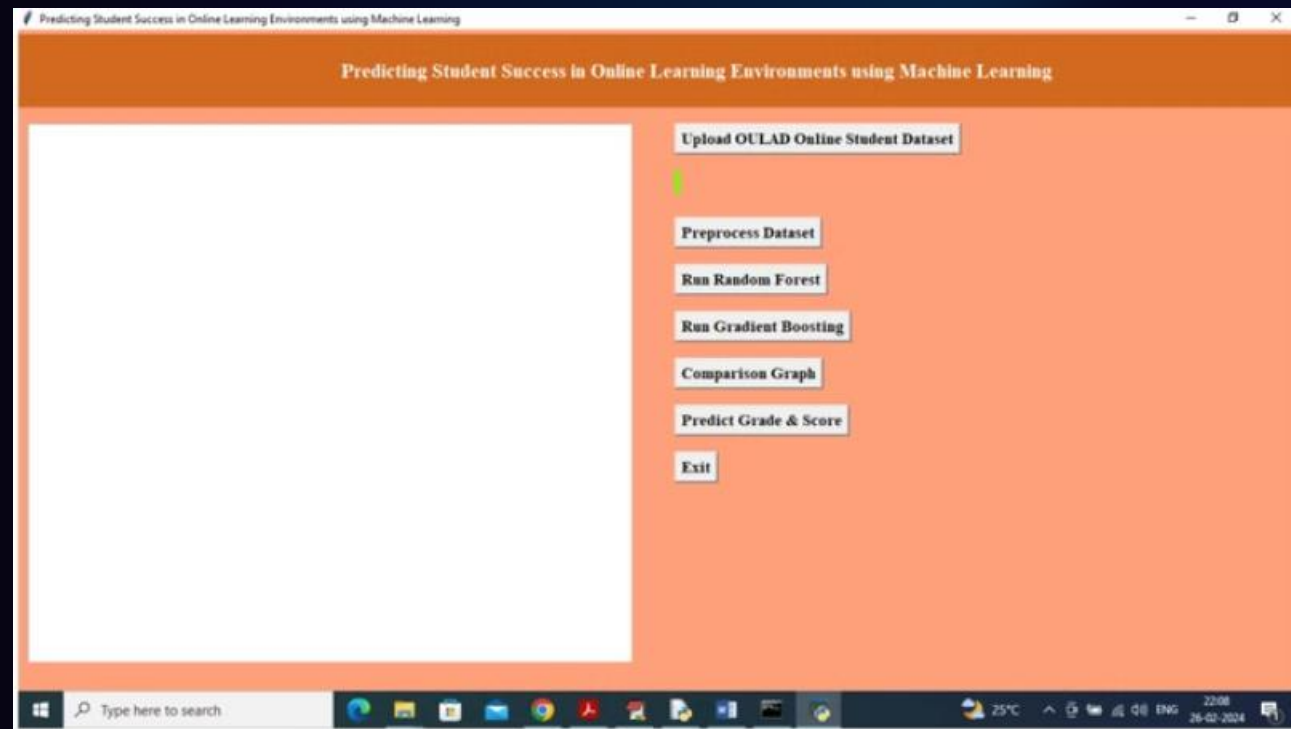
**91%**

**Recall**

Maximizing identification of at-risk students.

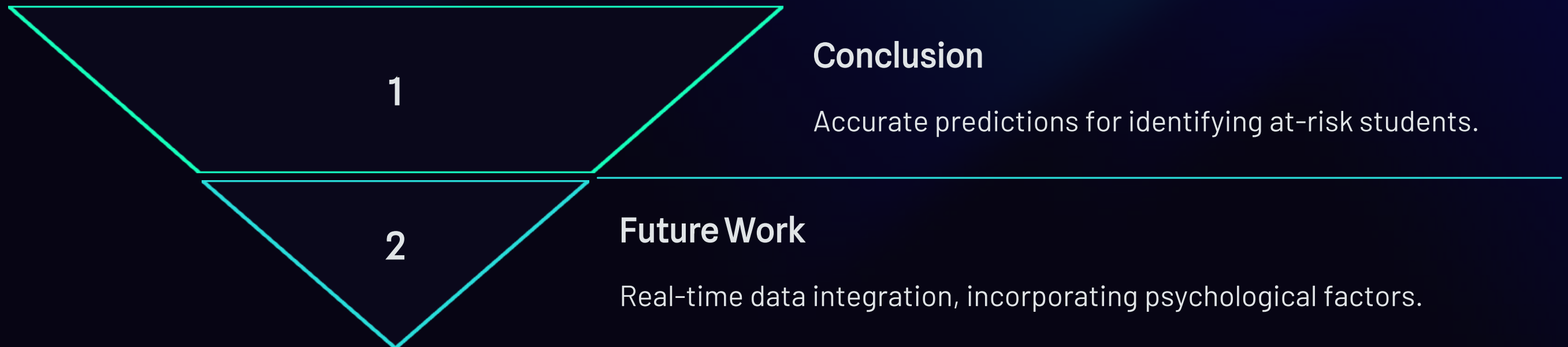






# Conclusion and Future Directions

Our model paves the way for improved student support and success.



# References

A strong foundation for our research.

- “Student Success Prediction Using ML,” Journal of Educational Data Mining.
- Scikit-learn documentation: <https://scikit-learn.org>.

