Student Dropout Analysis – Final Report

1. Problem Statement & Hypotheses

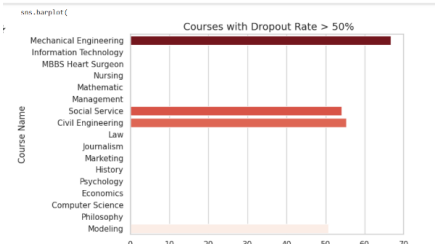
Many students discontinue their academic journey, impacting institutional success. This project investigates key factors behind student dropout.

Hypotheses:

- Students with unpaid tuition fees are more likely to drop out.
- Lower academic performance in early semesters leads to higher dropout rates.
- Specific courses (e.g., Mechanical Engineering) have significantly higher dropout rates.

2. Key Descriptive Insights

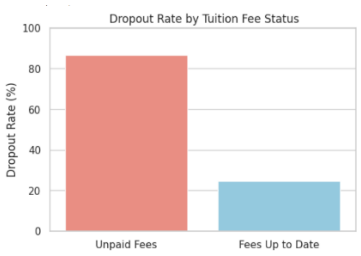
- **Dropout Distribution:**
  Majority of students either graduate or drop out early. A large number of dropouts come from engineering and social science programs.
- **High-Risk Programs (Dropout Rate > 50%):**
  - Mechanical Engineering
  - Civil Engineering
  - Modeling
  - Social Service

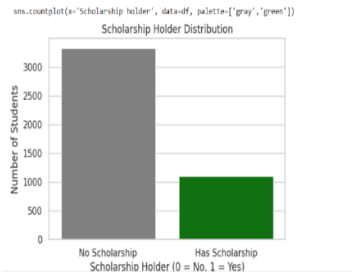


- **Financial Risk Factor:**

Students with unpaid tuition fees have an **86.6%** dropout rate compared to **24.7%** for those who paid on time.

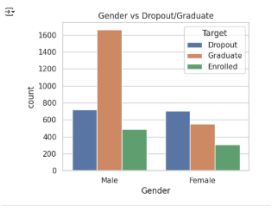
- **Scholarship Impact:**
  A significant portion of students who dropped out **did not receive scholarships**.





Gender-Based Dropout Analysis

- **Insight: Dropout Count vs Dropout Rate by Gender**
- **In absolute numbers**, more **male students (720)** dropped out compared to female students (701).
- However, **dropout rates tell a different story**:
- **Male Dropout Rate**: 720 / 2868 ≈ **25.1%**
- **Female Dropout Rate**: 701 / 1556 ≈ **45.1%**

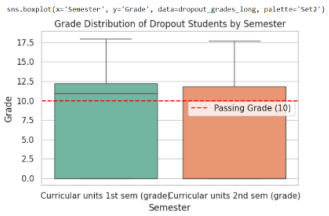


Interpretation:

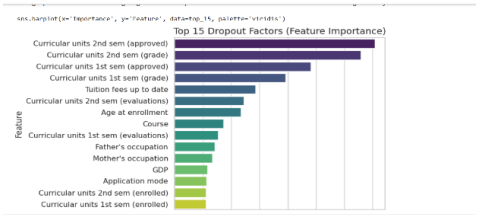
While male students have higher dropout counts due to greater enrollment, **female students are disproportionately affected** when considering their total enrollment. This suggests a **critical need for targeted support and engagement strategies** focused on female students.

3. Diagnostic & Predictive Findings

- **Academic Performance:**
  Students with **grades < 10** in 1st or 2nd semesters have a much higher dropout risk. Boxplots show a noticeable difference in median grades between semesters.



- **Top Dropout Predictors (via Feature Importance & SHAP):**
  - 2nd semester grades and approved units
  - Tuition status
  - Evaluation participation
  - Age at enrollment



- **Model Performance:**
  - Accuracy: 85%
  - Precision: 86%
  - Recall: 70%
  - F1-Score: 77%

4. Prescriptive Recommendations

- Target financial aid or fee payment support for students in financial distress.
- Implement early intervention for students with poor academic performance in the first semester.
- Re-evaluate curricula or support systems in high-risk programs (e.g., Mechanical, Civil).

5. Conclusion

- The analysis reveals that **academic performance, financial stress, and course structure** play vital roles in student dropout. Institutions can reduce dropout rates through proactive academic support, scholarship programs, and improved curriculum engagement.