



Student Performance Insights Challenge – EDA

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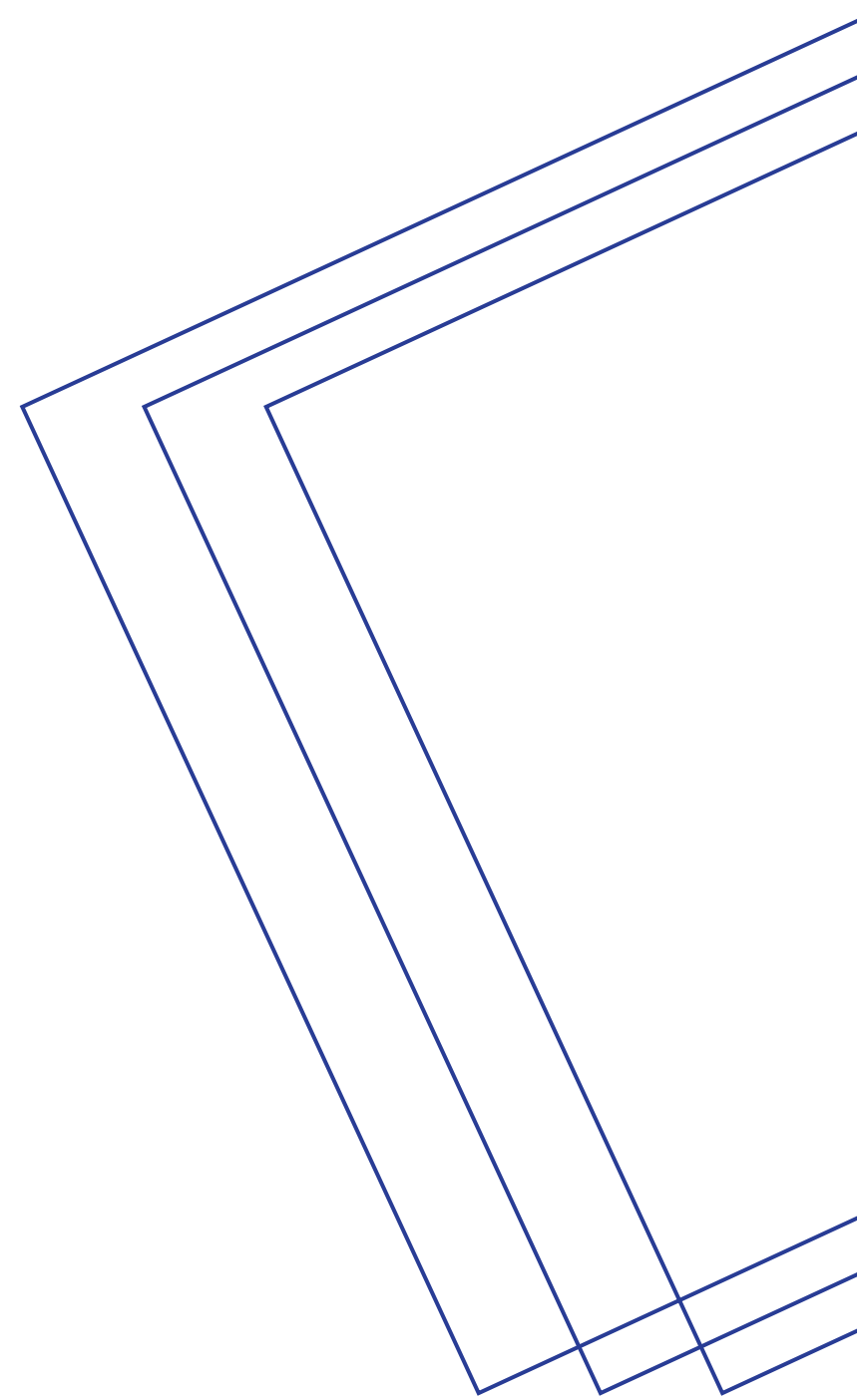
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01 Introduction

Student Performance Analysis

This project aims to analyze factors influencing student performance to provide actionable insights for improvement.

Key Questions

- What factors influence student performance?
- How can we help students achieve better academic results?

Methodology

- Data cleaning and preprocessing.
- Exploratory Data Analysis (EDA).
- Deriving actionable insights.

02 Dataset Overview

Data Source

This dataset is real data of 5,000 records collected from a private learning provider. [Dataset Link](#)

Challenges

- Missing values in Parent_Education_Level, Assignments_Avg, and Attendance (%).
- Imbalanced distributions in some departments.

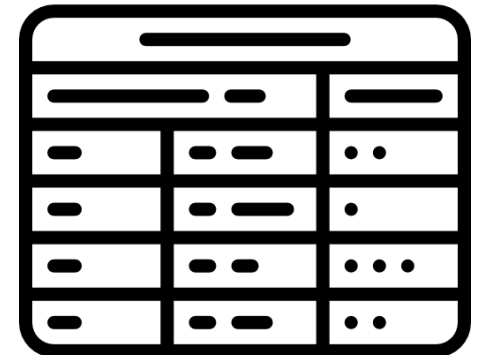
Key Features

- **Grade**: Final letter grade (A, B, C, D, F). *stions:*
- **Assignments_Avg**: Average assignment scores.
- **Total_Score**: Weighted sum of all grades.
- **Study_Hours_per_Week**: Average study hours per week.
- **Attendance (%)**: Student attendance percentage.

03 Data Cleaning and Preprocessing

Columns Manipulation

Removed the identifier columns that were unrevelant to the Analysis Email, Student_ID, First_Name and Last_Name



03 Data Cleaning and Preprocessing

Missing Values

32.88% of

Parent_Education_Level

Values were Missing, which was Handled by Introducing a new category called “Not Provided”

10.34% of

Assignments_Avg

Values were Missing, which was imputed using the Statistical Median

10.32% of

Attendance (%)

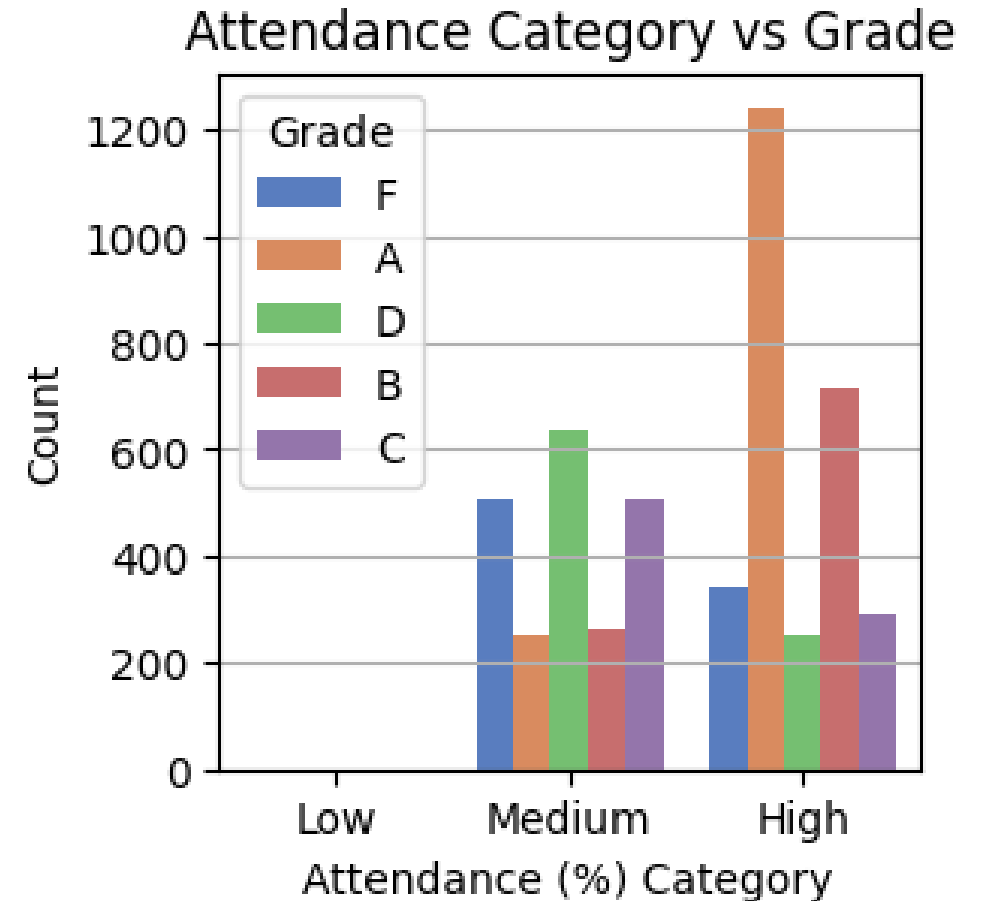
Values were Missing, which was also imputed using the Statistical Median

04 EDA Insights

Academic Performance

The analysis shows that students who achieve higher grades (A & B) have an average attendance of **81.5% to 85.4%**.

This suggests that maintaining a **higher attendance rate is beneficial** for academic performance.

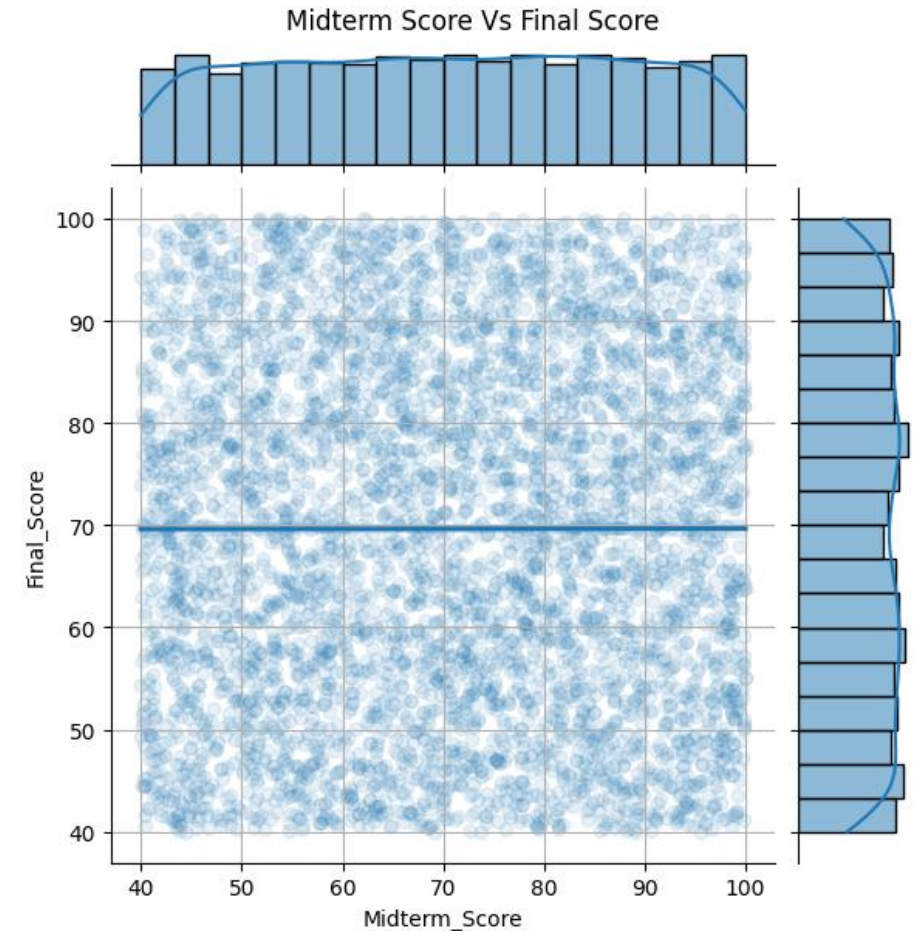


04 EDA Insights

Academic Performance

The analysis reveals that there is **no significant relationship** between **Final_Score** and **Midterm_Score**, with an almost negligible correlation of “0.000841”.

This suggests that a student's performance in the midterm does not necessarily predict their performance in the final exam



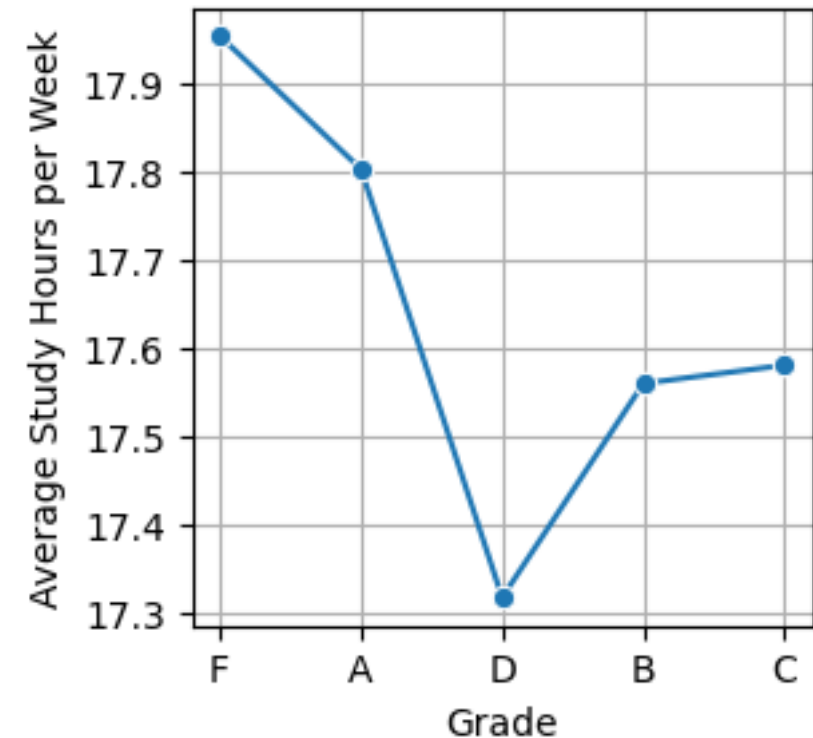
04 EDA Insights

Behavioral and Lifestyle Factors

Studying more hours doesn't necessarily lead to better grades. as

- **F Graders had the highest average study hours (~17.9 hours per week), which is unexpected.**
- **A Graders studied slightly less (~17.8 hours), followed by a sharp drop for students with D (~17.3 hours).**
- **Surprisingly, B and C Graders studied more than those with D, but still less than those with F or A.**

Average Study Hours per Week Across Grades



04 EDA Insights

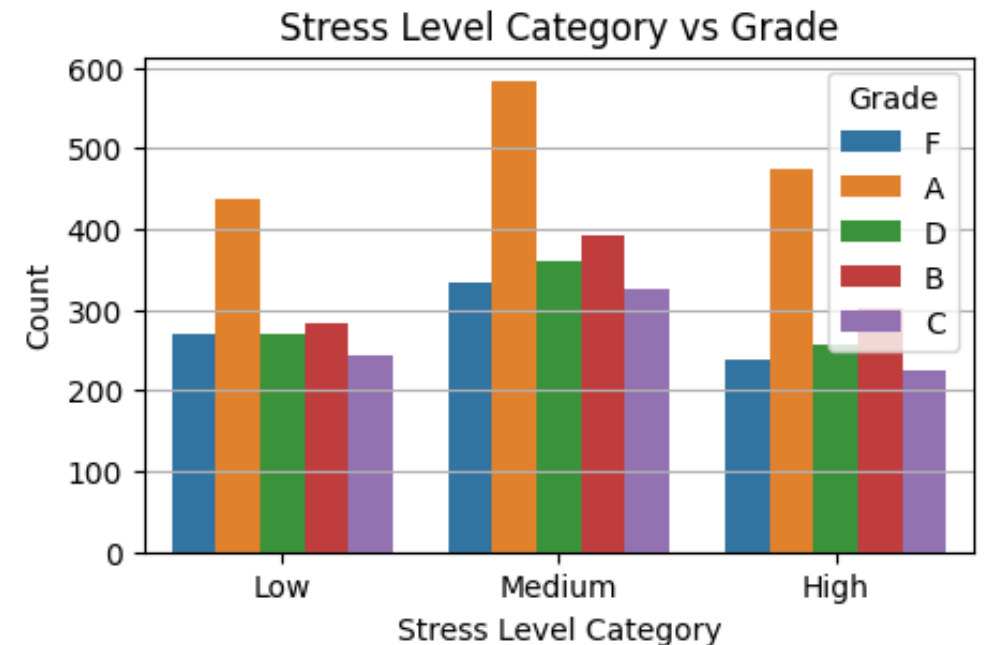
Behavioral and Lifestyle Factors

Students experiencing a medium stress level achieved the highest number of A and B grades, suggesting that a balanced level of stress may be linked to better academic performance.

- Low and Medium stress students are more likely to get better grades (A, B).
- High stress students are over-represented in lower grades like D and F.

59.3% of

The students Reported a stress level between 5 and 10

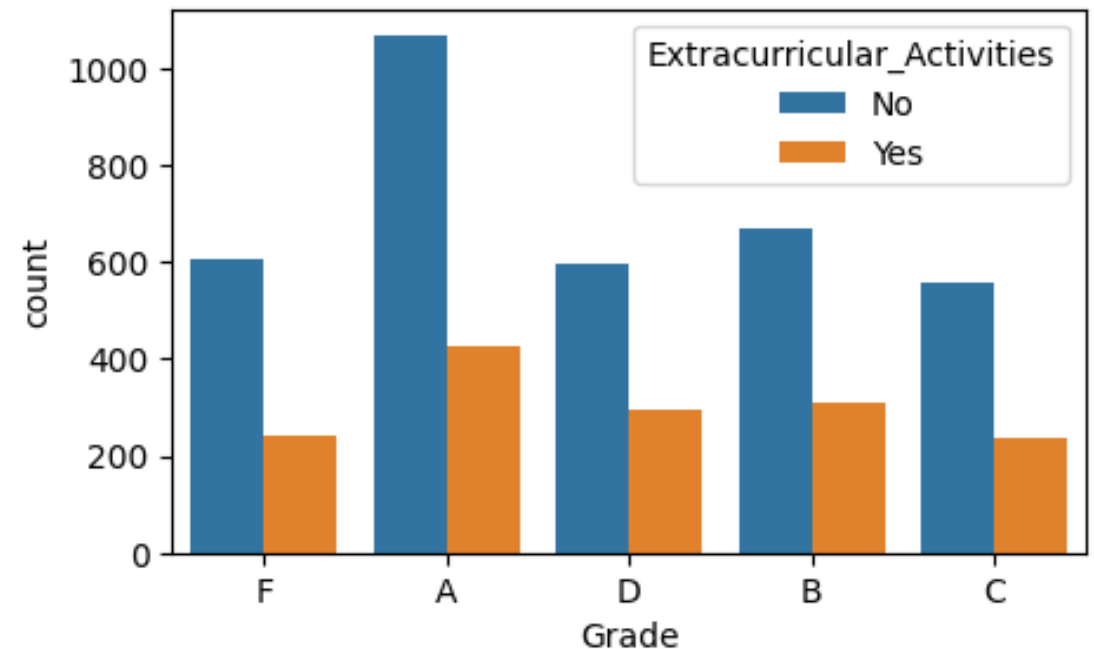


04 EDA Insights

Extracurricular and Environmental Factors

The Analysis shows that the **higher percentage of the A & B grade Students do not Participate in Activities.**

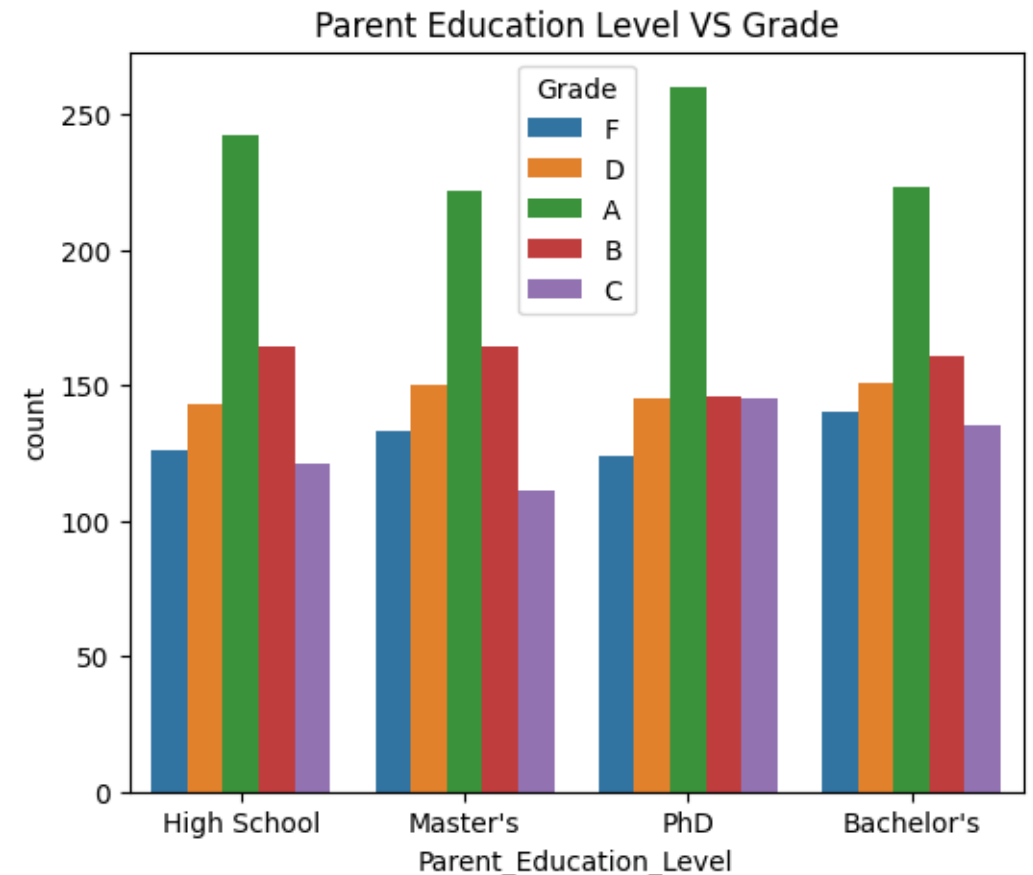
So, there Might Be a bad Influence on the performance For the students who Participated in Extracurricular_Activities!



04 EDA Insights

Parental and Socioeconomic Factors

The Higher the Parent Education Level may lead to a Higher student Grades!

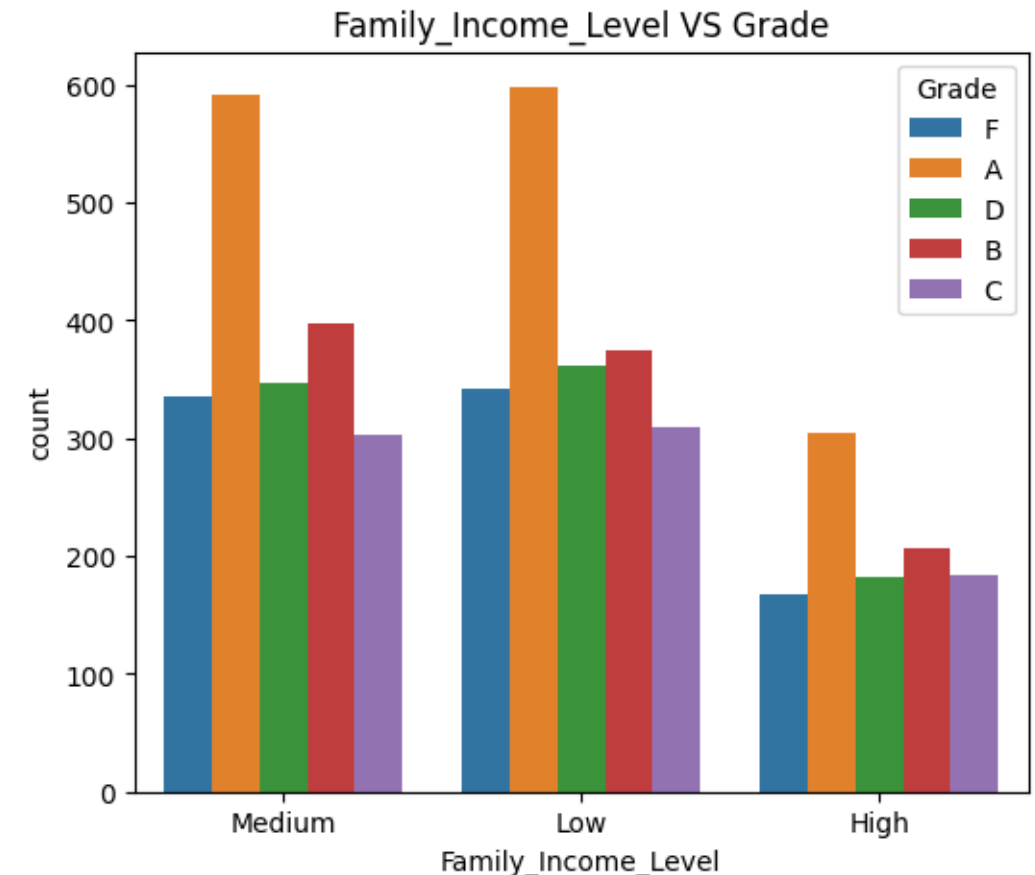


04 EDA Insights

Parental and Socioeconomic Factors

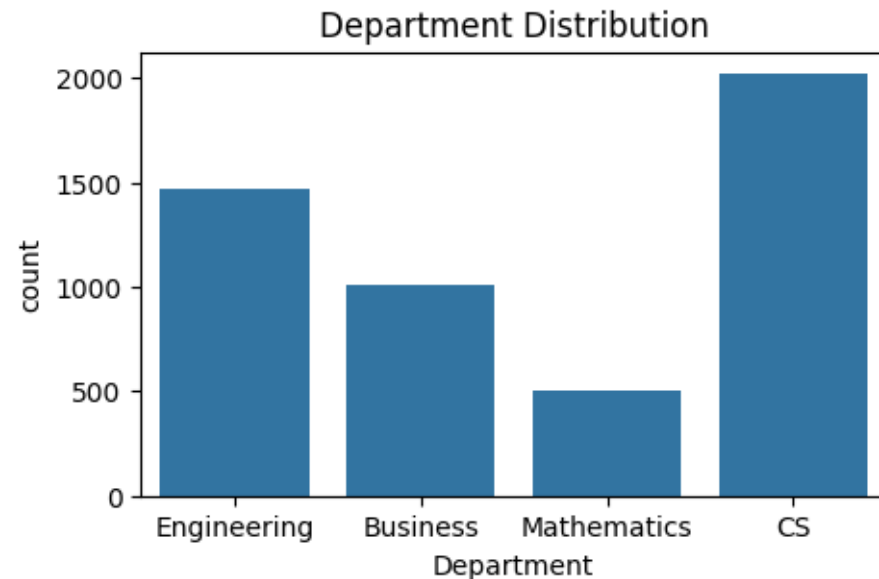
Students from medium and low - income Backgrounds Achieved the Highest Grades

Suggesting that the Income level may not be a limiting factor for academic success

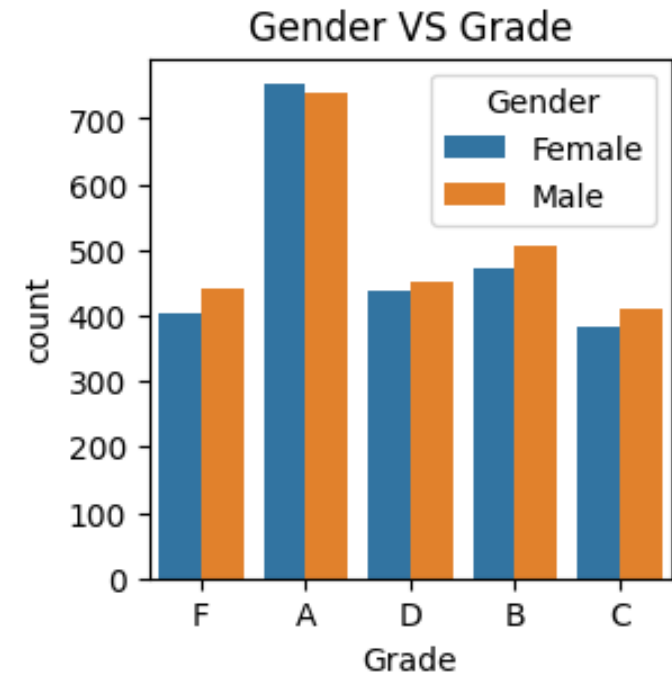


04 EDA Insights

Department and Demographic Factors



The Engineering Department has the highest percentage of students achieving top grades at 52.34%, followed by Business at 48.50%, and Computer Science closely behind at 48.46%.



Female students demonstrate a slightly better academic performance, with 50.02% achieving higher grades, compared to 48.92% of male students.

05 Actionable Insights

Academic Performance

- **Improve Attendance:** Track attendance and incentivize good attendance.
- **Focus on Quizzes:** Provide practice quizzes and study materials.
- **Review Grading System:** Ensure all components contribute meaningfully to the final grade.

05 Actionable Insights

Behavioral

- **Promote Effective Study Habits:** Teach time management and active learning techniques.
- **Manage Stress Levels:** Offer counseling and stress-relief workshops.
- **Encourage Healthy Sleep:** Educate students on the importance of sleep.

05 Actionable Insights

Parental, Socioeconomic and Extracurriculars

- **Support Students with Less Educated Parents:** Offer mentorship programs and parent workshops.
- **Address Income Disparities:** Provide scholarships and subsidized academic resources.
- **Balance Extracurriculars:** Ensure activities do not interfere with academics.

05 Actionable Insights

Departments and Demographics

- **Department-Specific Interventions:** Share best practices from high-performing departments.
- **Gender-Specific Support:** Offer tailored academic support for male students.

General Recommendations

- **Regular Performance Reviews:** Identify at-risk students early.
- **Enhance Student Engagement:** Use interactive teaching methods.
- **Collect Feedback:** Continuously improve based on student feedback

Questions

Thank You

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