STUDENTS PERFORMANCE FACTORS DATA

1. Detailed Description of the Student Performance Factors Dataset

The **Student Performance Factors** dataset contains three interconnected tables, each with unique columns that offer insights into student profiles and academic outcomes:

i. Student_Demographics Table

- **Purpose**: Holds core demographic data, serving as the primary table with each student identified by a unique Student_ID.

- **Key Columns**:

    o   Student_ID: Unique identifier.

    o   Gender, Family Income, Parental Education Level, Distance From Home.

- **Usage**: Analyzes correlations between demographics (like family background) and academic outcomes.

ii. Academic_Info Table

- **Purpose**: Details students' academic performance, linking it to demographics via Student_ID.

- **Key Columns**:

    o   Student_ID, Hours_Studied, Attendance, Previous_Scores, Exam_Score, Sleep_Hours, Extracurricular_Activites and Tutoring_Session.

- **Usage**: Analyzes academic performance by connecting exam scores with demographics, attendance, and past performance.

iii. Personal_Factors Table

- **Purpose**: Captures behaviors and characteristics that may influence academic results, connected to demographics via Student_ID.

- **Key Columns**:

    o   Student_ID, Parental_Involvement, Motivation Level, Internet_Access, Family_Income, Teacher_Quality, School_Type, Peer_Influence, Physical Activity, Learning_Disabilities and Access to Resources.

- **Usage**: Examines how lifestyle and resources impact academic outcomes, identifying potential areas for support.

2. Setting Up Relationships in Power BI for the Student Performance Dataset

To efficiently analyze the dataset in Power BI, we established relationships between tables using Student_ID:

i.   **Connecting Student_Demographics and Academic_Info Tables**

    o   **Relationship**: Links **Student_ID** in Student_Demographics to **Student_ID** in Academic_Info.

- **Cardinality**: One-to-Many (each student has unique demographics but may have multiple academic records).

- **Purpose**: Combines demographic data with academic performance to explore how student backgrounds affect outcomes.

ii. **Connecting Student_Demographics and Personal_Factors Tables**

- **Relationship**: Links **Student_ID** in Student_Demographics to **Student_ID** in Personal_Factors.

- **Cardinality**: One-to-Many (unique demographics per student, but personal factors may vary).

- **Purpose**: Enables analysis of personal factors, such as motivation, in relation to demographic details.

Benefits

These relationships allow us to:

- Filter, aggregate, and compare demographic, academic, and personal factors.

- Analyze the impact of factors like motivation and study hours on performance by demographic.

- Identify trends for targeted student support based on demographics and personal characteristics.

3. i. Report Page : Student Performance Insights

This page focuses on visualizing how demographic factors and study habits affect exam scores.
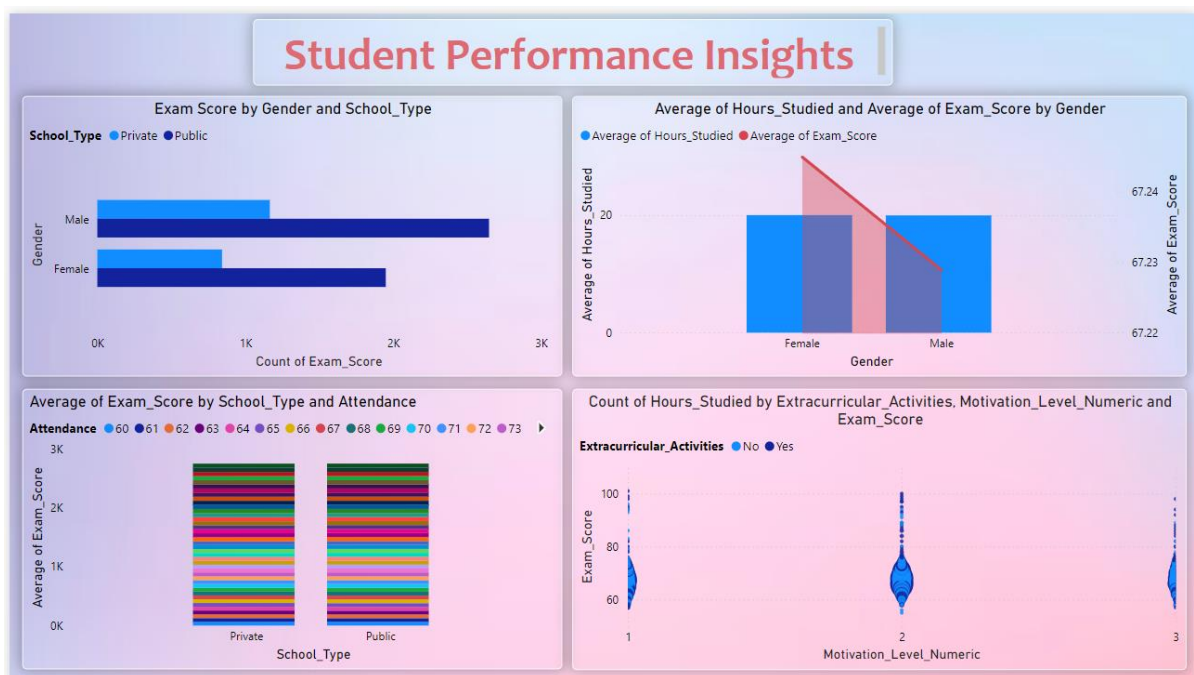
a. **Bar Chart: Average Exam Score by Gender and School Type**

   o **Purpose**: Show how average scores vary between genders and types of schools (public/private).

This chart allows us to see trends in performance based on demographics, highlighting whether certain types of schools or genders perform differently.

b. **Stacked Column Chart: Exam Score by Attendance and School Type**

   o **Purpose**: Compare exam scores based on students' attendance levels across different school types.

This shows how consistent attendance correlates with performance, indicating the importance of attendance in academic success.

c. **Line and Clustered Column Chart: Hours Studied vs. Exam Score by Gender**

   o **Purpose**: Examine the effect of study hours on exam performance, segmented by gender.

This chart illustrates whether increased study hours correlate with higher scores and if this varies by gender.

d. **Scatter Chart: Motivation Level and Extracurricular Activities vs. Exam Score**

   o **Purpose**: Identify the relationship between motivation, participation in extracurricular activities, and exam performance.

The scatter chart helps to see if motivated students who engage in extracurricular activities also perform well academically.

ii. Report Page : Influences on Academic Achievement

This page explores broader academic factors that impact student performance, like motivation, parental influence, and well-being.
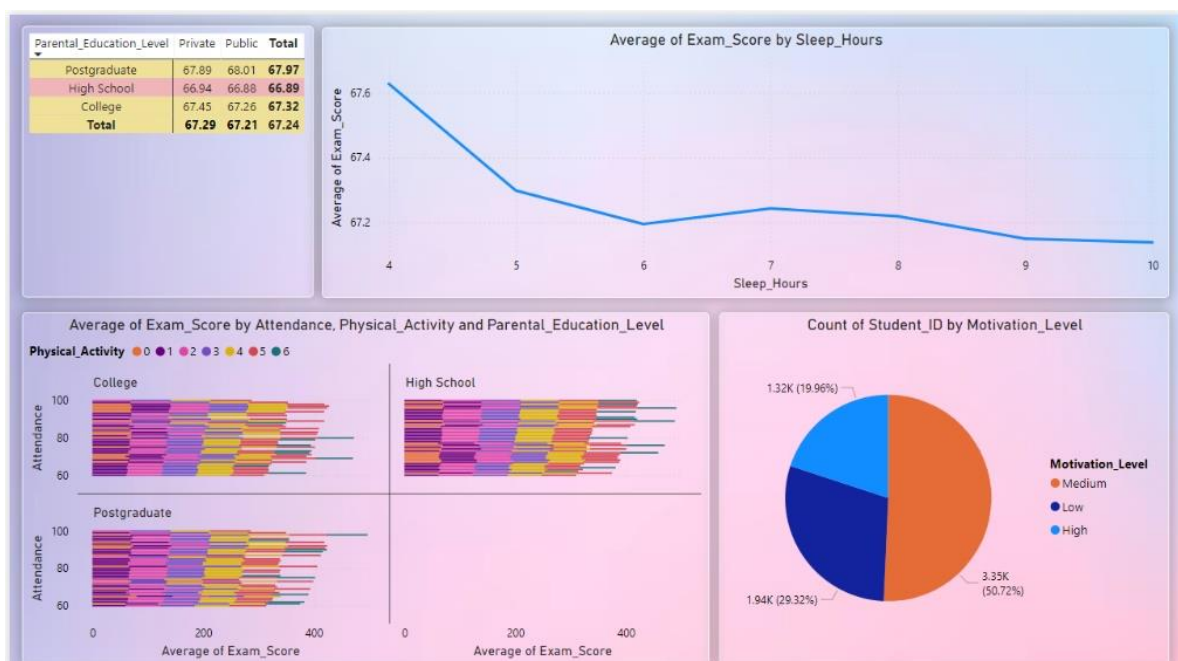
a. **Pie Chart: Distribution of Students by Motivation Level and Gender**

- o **Purpose**: Display the distribution of motivation levels across genders.

By visualizing motivation, this chart highlights potential differences in motivation across gender groups.

b. **Matrix: Average Exam Score by Parental Education Level and School Type**

- o **Purpose**: Compare average scores by parental education and school type.

This matrix shows if students from different backgrounds (e.g., parents' education) perform differently in varied school settings.

c. **Line Chart: Impact of Sleep Hours on Exam Score**

- o **Purpose**: Analyze how sleep duration affects academic performance.

It allows us to see if more sleep correlates with higher scores, underlining the importance of sleep for academic success.

d. **Stacked Bar Chart - Attendance and Physical Activity vs. Exam Score**

- o **Purpose**: Display the relationship between physical activity, attendance, and exam performance.

This chart can show if active, consistently present students have higher scores, stressing the benefits of physical health and attendance.

iii. Report Page: Access and Score Breakdown

This page provides insights into students' access to resources and how different score ranges are distributed.
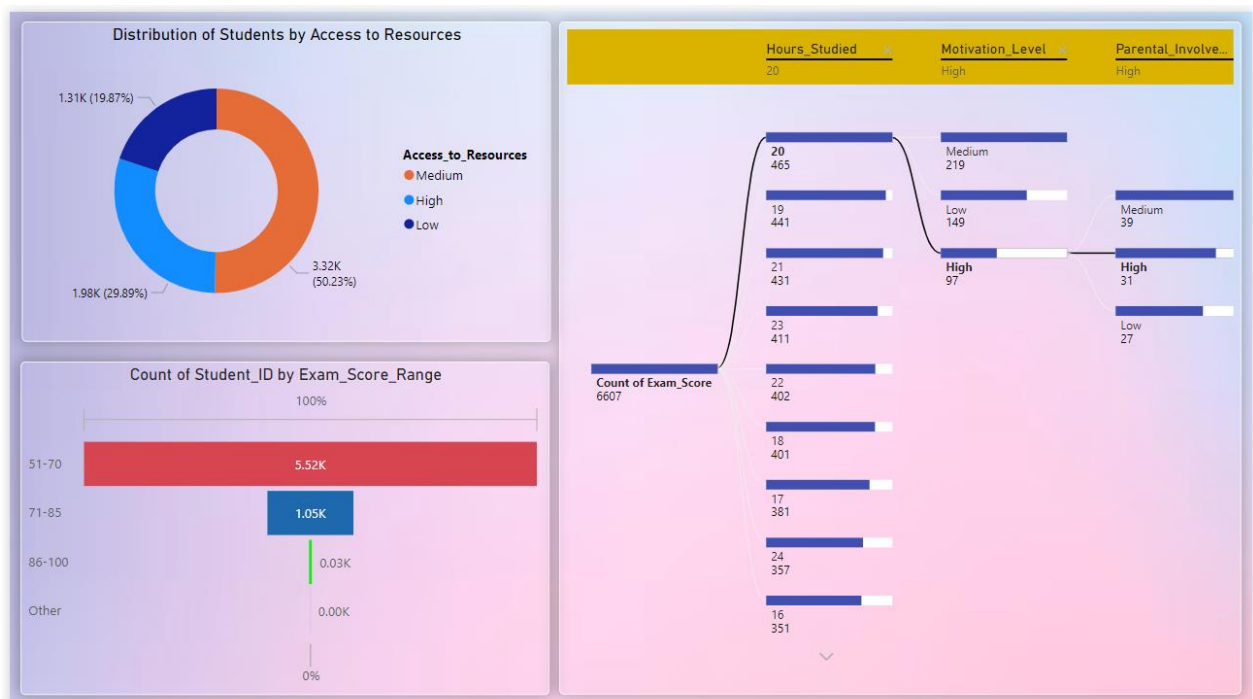
a. **Donut Chart: Students' Access to Resources**

   o **Purpose**: Show proportions of students with access to various learning resources (internet, tutoring, etc.).

   Access to resources is essential for academic success, and this chart highlights the distribution of these factors.

b. **Funnel Chart: Student Count by Exam Score Ranges**

   o **Purpose**: Visualize the distribution of students across various exam score ranges.

   The funnel chart shows where most students fall within scoring categories, revealing score trends in the data.

c. **Decomposition Tree: Factors Affecting Exam Scores**

   o **Purpose**: Identify the top factors influencing exam scores by breaking down components like motivation, parental involvement, and hours studied.

   This AI-driven analysis allows for detailed exploration, providing actionable insights on improving academic outcomes by focusing on key areas that impact scores.

iv. Report Page: Access and Score Breakdown

This report page highlights factors influencing exam scores, focusing on income level, gender, score changes, and performance comparison to a target score.
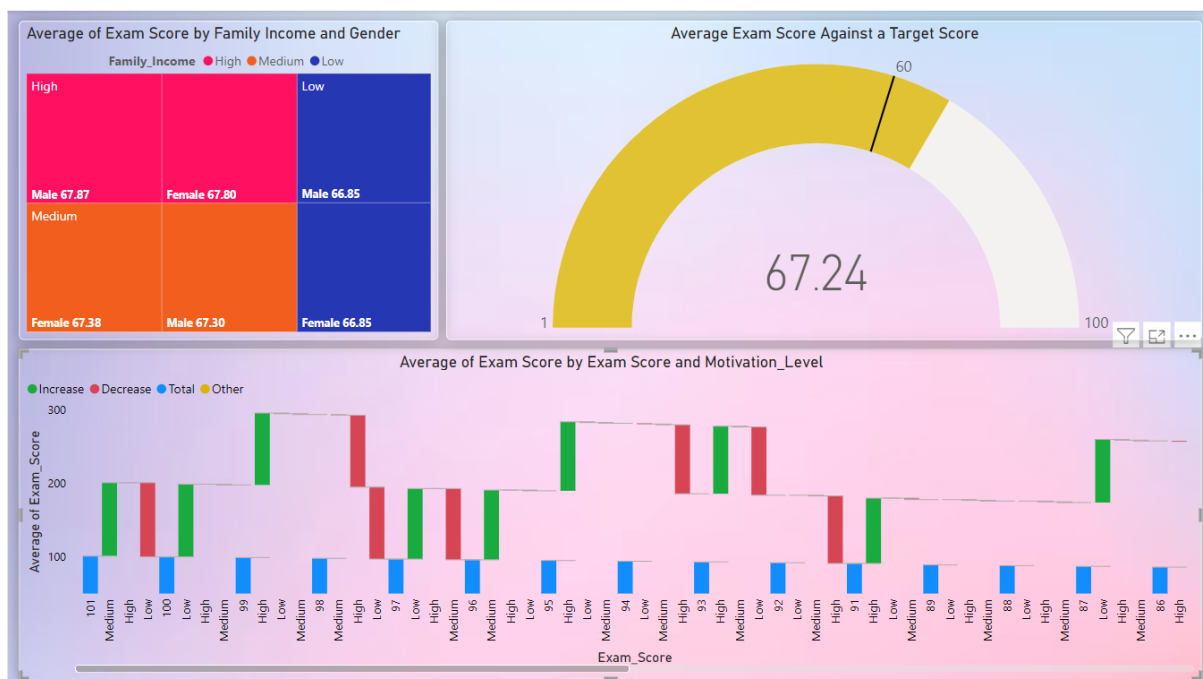
a. **Treemap:** Exam Scores by Family Income and Gender Shows how family income and gender relate to exam performance, with boxes representing income levels and gender, where size indicates frequency and color reflects average scores.

b. **Waterfall Chart:** Exam Score Impact of Key Factors Illustrates the net impact of factors like attendance and study hours on exam scores, highlighting which elements positively or negatively affect performance.

c. **Gauge Chart:** Average Exam Score Against a Target Score Compares the average score to a target (e.g., 60), helping viewers quickly assess whether the average meets or falls short of the target.

Conclusion

The Power BI report reveals valuable insights into the factors influencing student performance, highlighting the impact of demographics, personal habits, and access to resources on exam scores.

i. **Student Performance Insights**: Gender, school type, study hours, and motivation play key roles in shaping academic outcomes. Students who study more and are motivated, especially those involved in extracurriculars, tend to perform better.

ii. **Influences on Academic Achievement**: Broader factors like parental education, sleep, and physical activity also affect performance. Students from more educated families, who sleep adequately and stay physically active, show improved academic success.

iii. **Access and Score Breakdown**: Resource access (e.g., internet, tutoring) is essential for higher scores. The data shows score distributions and emphasizes the benefits of parental support and study habits.

Key Takeaways

- Encourage structured study routines, attendance, and balanced lifestyles for students.

- Foster motivation through extracurricular activities and a supportive school environment.

- Provide resources like tutoring and internet to underprivileged students to bridge performance gaps.