**Student Performance Analysis - Summary Report**

**1. Introduction**

This report presents an analysis of student performance based on academic, social, and economic factors. The study explores how attendance, study habits, stress levels, and external influences impact students' grades.

**2. Data Cleaning & Preparation**

* Dropped unnecessary personal information (First Name, Last Name, Email).
* Handled missing values:
  + Numerical columns (Attendance (%), Assignments\_Avg) filled with mean.
  + Categorical column (Parent\_Education\_Level) filled with mode.
* Renamed "Stress\_Level (1-10)" to "Stress\_Level" for consistency.

**3. Key Findings & Insights**

**3.1 Descriptive Statistics & Data Understanding**

* **Mean Scores:** Midterm (70.33), Final (69.64), Total (75.12)
* **Age Distribution:** Most students are between 18-24 years, with **21 years** being the most common.
* **Department Statistics:**
  + **CS (2022 students)** has the highest enrollment.
  + **Business students study the most** (17.91 hours/week), while Mathematics students study the least (16.96 hours/week).

**3.2 Academic Performance Analysis**

* **Correlation Analysis:** No strong correlation between Total Score and any specific feature.
* **Attendance & Final Scores:** No strong relationship; some low-attendance students still performed well.
* **Extracurricular Activities:** Students who participate perform slightly better (75.25 vs 75.07), but the difference is minimal.
* **Study Hours & Performance:** No clear pattern; high scores are achieved even with fewer study hours.

**3.3 Social & Economic Factors**

* **Parent Education Level:** Minimal impact on student scores.
* **Internet Access at Home:** Students without internet access (75.69) scored slightly better than those with access (75.06), indicating possible distractions.
* **Family Income Level:** Low-income students (75.49) performed slightly better than medium (75.16) and high-income (74.35) students.
* **Sleep & Performance:** Most students sleep between 5-9 hours; no significant impact on scores found.

**3.4 Stress & Health Impact**

* **Stress vs Final Scores:** No strong correlation (-0.00045).
* **Less than 5 hours of sleep:** Students performed slightly better (75.49 vs 75.03), indicating minimal impact.
* **High-stress, high-performing students:**
  + Study around **17.4 hours/week**.
  + Have moderate attendance (~75%).
  + Maintain strong academic scores despite high stress.

**3.5 Visual Insights**

* **Boxplot:** Shows score distribution across departments.
* **Heatmap:** Reveals weak correlations between variables.
* **Scatter plots:** Attendance vs Final Score, Study Hours vs Total Score show no strong relationships.
* **Gender Distribution:** Balanced representation.

**4. Conclusion**

* Academic success is **not heavily dependent on a single factor** but rather a combination of attendance, study habits, and personal resilience.
* **Stress and sleep do not significantly affect performance**, though balanced habits are recommended.
* **Extracurricular activities do not harm academic results**, and students with structured study habits perform well.

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