Student Marks Analysis - Storytelling Report

Introduction

In today's data-driven world, analyzing student performance has become critical for identifying trends, weaknesses, and areas for improvement. This project explores a dataset containing students' marks in various subjects and draws meaningful insights using data visualization and statistical methods.

Our goal is to:

- Understand student performance patterns
- Explore relationships between variables
- Derive actionable insights for educators and students.

Methods Used

- Data Cleaning: Handling missing values, checking for anomalies
- Exploratory Data Analysis (EDA): Using descriptive statistics and visualizations
- Visualization Tools: Matplotlib, Seaborn
- Statistical Methods: Correlation analysis.

Exploratory Data Analysis (EDA)

We begin by checking the structure of the data: rows, columns, and basic statistics.

Key observations:

- No missing values
- Columns include scores across subjects
- Numeric, structured data ready for analysis.

Distribution of Marks

Histograms show how student marks are spread across different ranges. A normal distribution indicates balanced performance, while skewness hints at anomalies. Clustering toward lower marks suggests tougher assessments.

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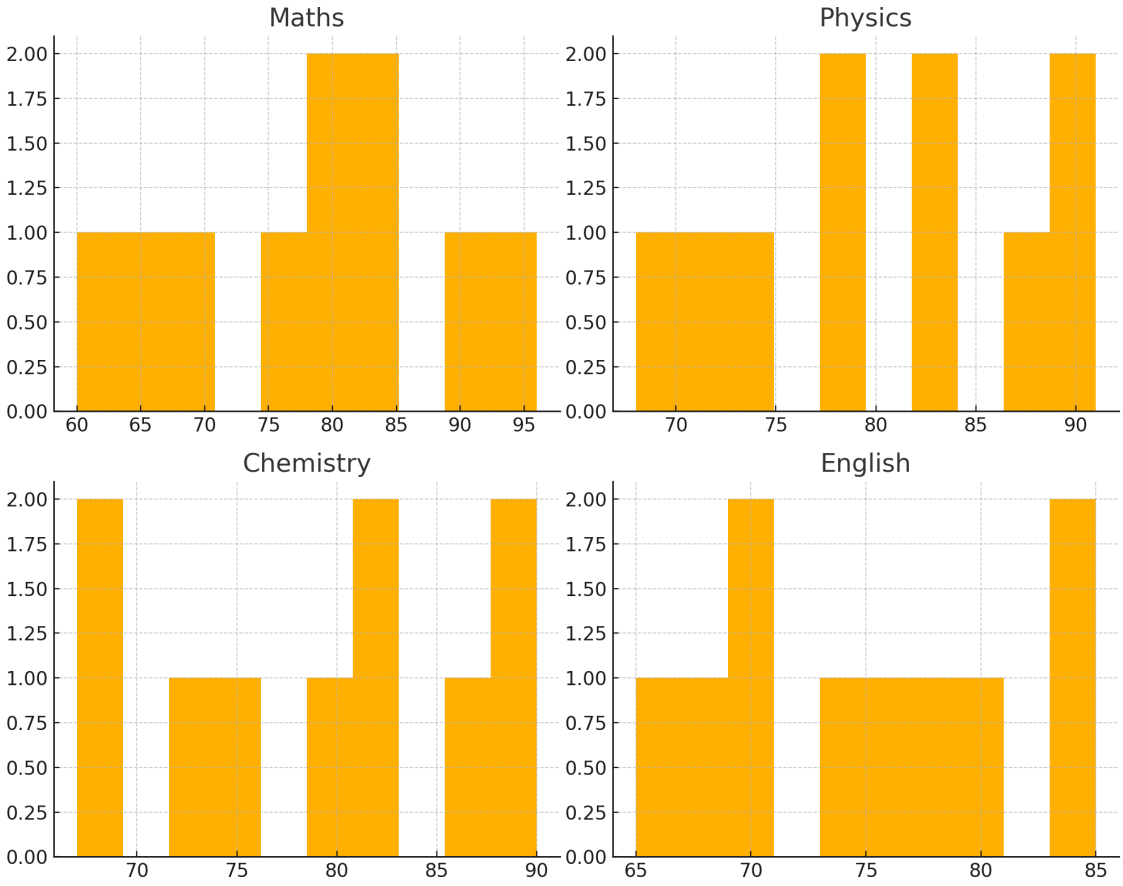

Box Plot Analysis

Box plots reveal the spread and skewness of marks. Outliers (students who scored exceptionally high or low) are visible. The median position within the box provides insights into general student performance.

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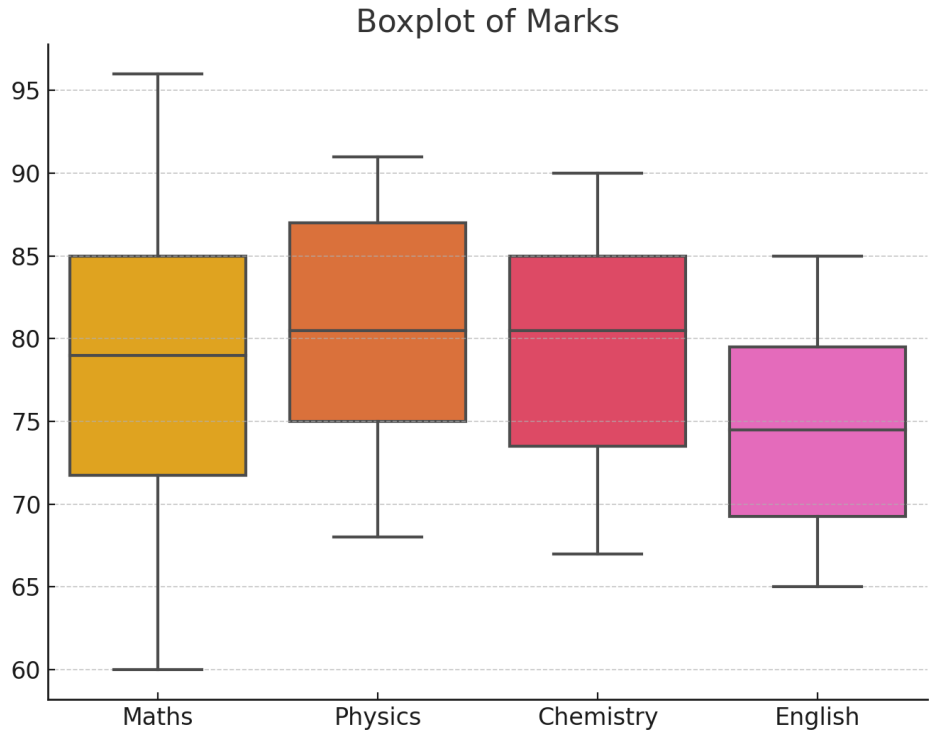

Correlation Heatmap

Correlation measures the strength of relationships between subjects. Strong correlations (e.g., between Maths and Science) suggest skills transfer between subjects.

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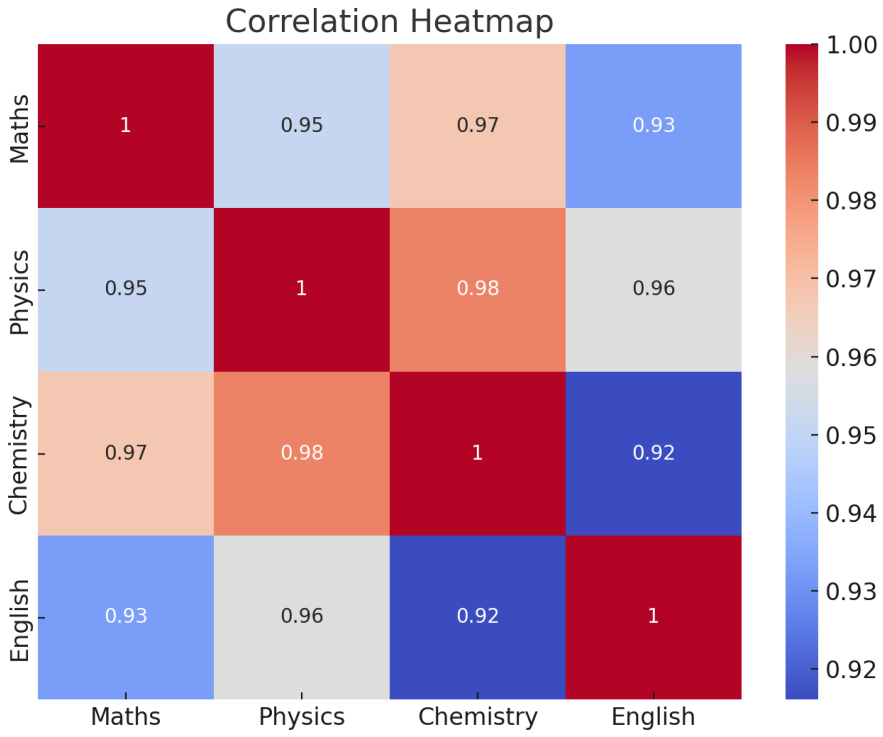

Scatter Plot - Study Hours vs Marks

Each point represents a student. A positive trend indicates that more study hours generally result in better marks. Flat trends might indicate quality of study matters more than quantity.

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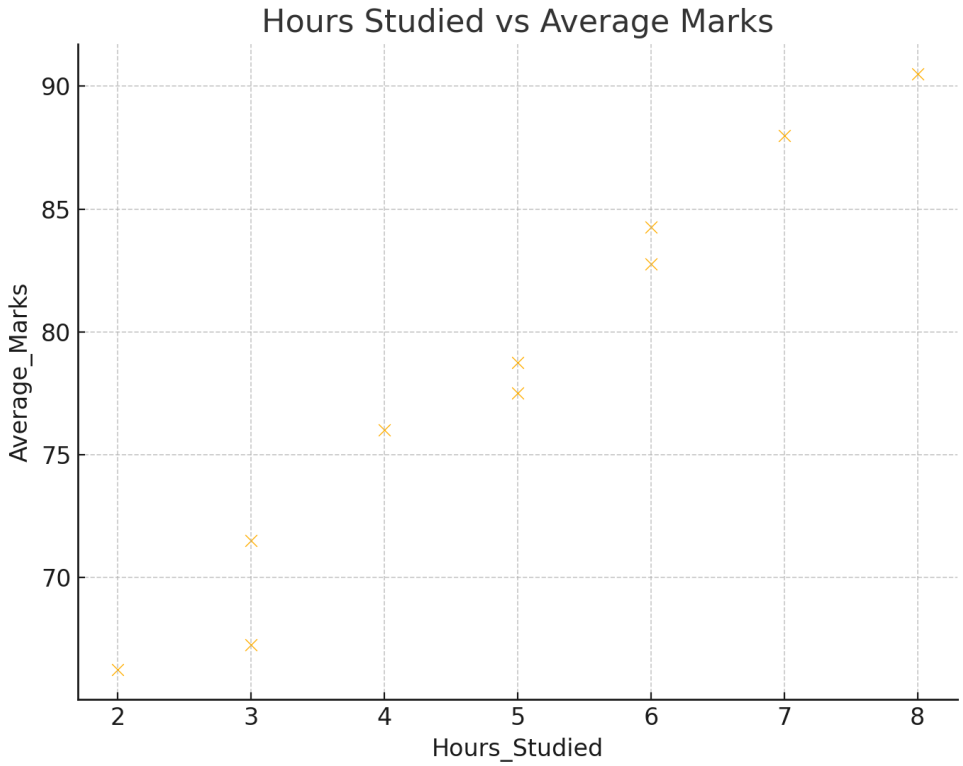

Pair Plot

Pair plots allow a multi-variable comparison, revealing clusters of high-performing students or unexpected relationships.

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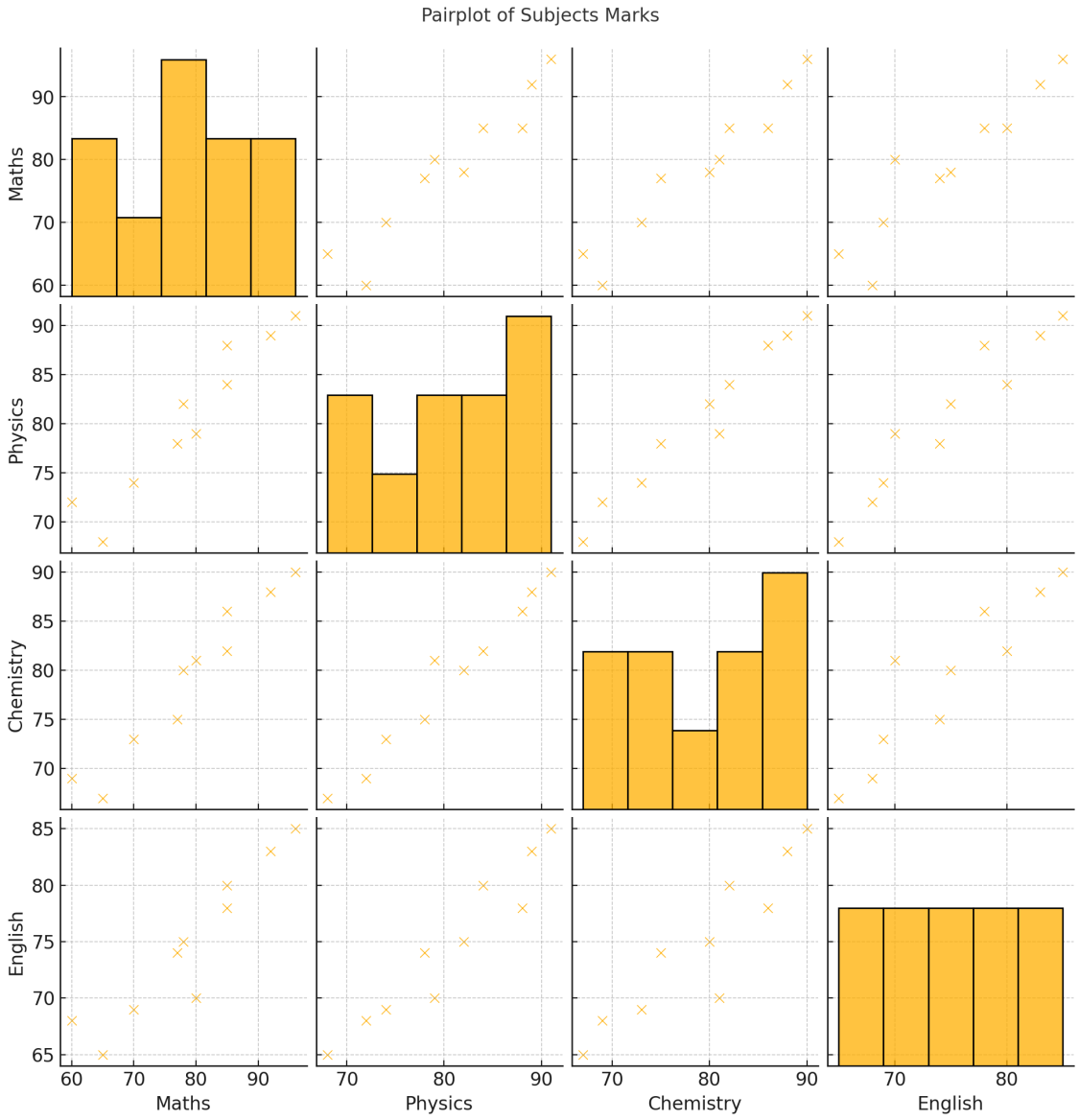

Key Findings

- More study hours generally result in better performance.
- Maths and Physics show strong correlation.
- Some students are clear outliers needing special attention.
- Most students perform within an average range.

Conclusion

Data visualization and statistical analysis provide powerful tools to understand and improve student performance. Educators can adapt teaching strategies, and institutions can refine curriculums based on such analysis.

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Future Scope:

- Predict student marks using machine learning.
- Analyze external factors like attendance and extracurriculars.

Tools Used

- Python
- Pandas
- Matplotlib
- Seaborn
- NumPy.