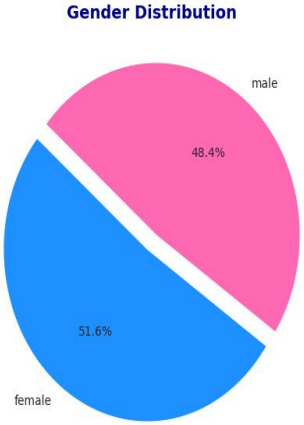
Analysis of Visualizations' Insights Certain parts of the analysis of student performance are made simpler by each of the script's visualizations. The type of analysis that each visualization aids with is explained below.

```
Available Columns: ['gender', 'race/ethnicity', 'parental_level_of_education', 'lunch', 'test_preparation_course', 'math_score', 'reading_score', 'writing_score', 'average_score']
All required columns exist! Proceeding with analysis...
```




```
<ipython-input-13-5d48e65cfed9>:59: FutureWarning:
```

Gender Distribution Pie Chart

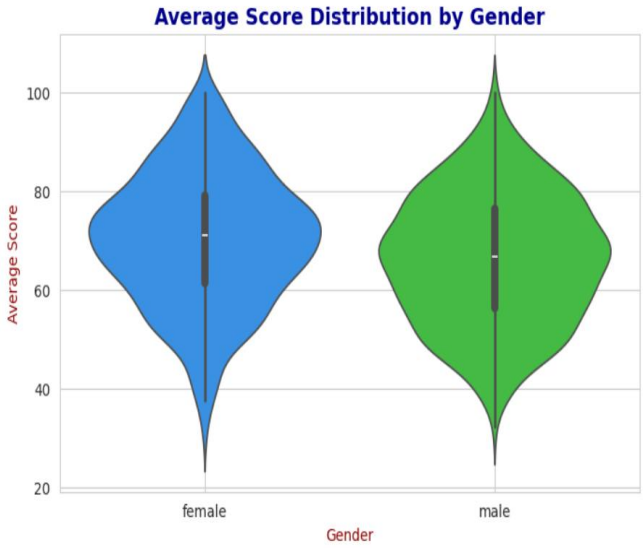
The percentage of male and female students in the dataset is shown in this chart.

Helps in understanding gender representation in the dataset.

If the dataset is uneven, it highlights potential bias in analysis.

Provides context for gender-based performance comparisons.

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```



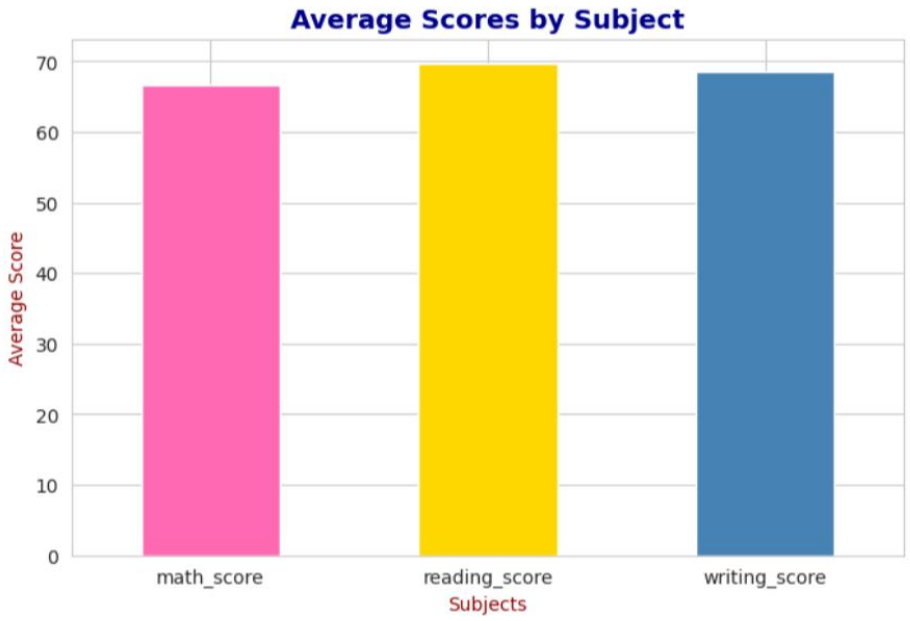
Violin Plot:

Comparing Scores Based on Gender

Score distribution, density, and shape for students who are male and female.

median values, interquartile range (IQR), and outliers.

Comparing the performance of male and female students is made simple. It also helps determine whether one gender performs consistently better than the other. Finally, it reveals outliers, or students who score abnormally high or low.



Bar Chart:

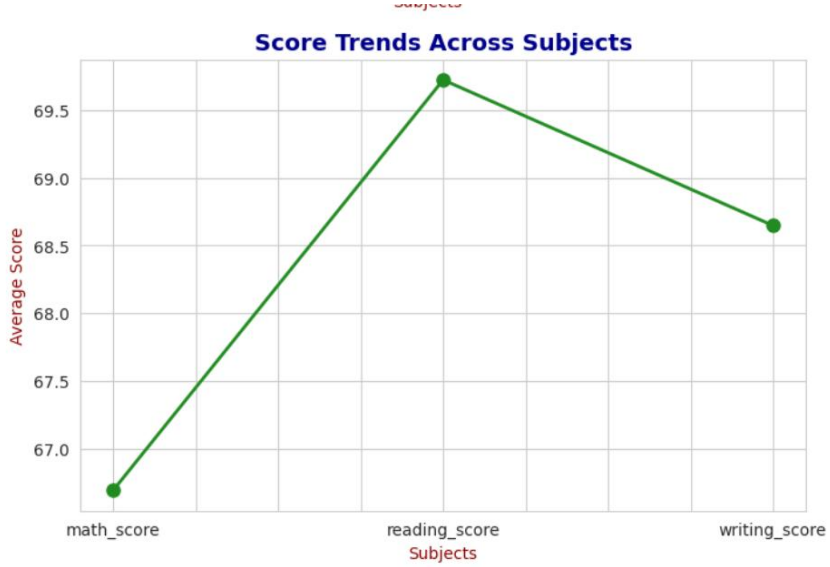
Comparison of Subject-Wise Scores

Average results for reading, writing, and math.

Determines the students' strongest and weakest subjects.

Assists in formulating educational policies—which areas require greater attention?

Helpful for educators to comprehend general performance patterns.



<ipython-input-13-5d48e65cfed9>:94: FutureWarning:

Line Chart:

Subject-by-Subject Score Trends

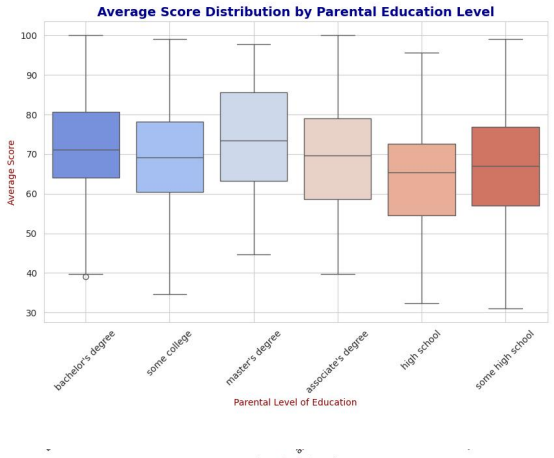
variations in the mean scores for several disciplines.

Draws attention to patterns in subject performance.

Interventions can be prepared if one subject's score is noticeably lower.

Determines which subjects students find most difficult.

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```




```
Parental Level of Education
✅ Data Analysis & Visualizations Completed Successfully!
📁 Summary statistics saved at: Question_2/Analysis/summary_statistics.csv
📁 Gender distribution pie chart saved at: Question_2/Visualizations/gender_distribution_pie_chart.png
📁 Gender average score violin plot saved at: Question_2/Visualizations/gender_average_score_violin_plot.png
📁 Subject average score chart saved at: Question_2/Visualizations/subject_average_scores.png
📁 Score trends line plot saved at: Question_2/Visualizations/score_trends_line_plot.png
📁 Parental education vs score boxplot saved at: Question_2/Visualizations/parental_education_vs_score_boxplot.png
📁 Gender performance analysis saved at: Question_2/Analysis/gender_performance_analysis.txt
```

Boxplot

Distribution of Scores by Educational Level of Parents

It illustrates the connection between student achievement and parental education. differences in pupil performance according to the educational attainment of the parents.

Aids in figuring out whether better pupil performance is a result of parents having more education.

It can be used to create policies for students from less educated backgrounds.

If the disparities are significant, it indicates that parental education has a significant impact on student success.