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# Concepts and Technologies of AI

Assignment - I - Statistical Interpretation and Exploratory Data Analysis. (Exploring South Asia and Middle East Perspectives.)

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**Submitted on:19-12-2024**

Title - Analysis of the World Happiness Report: A Data-Driven Exploration of Global and Regional Trends.

## B. Introduction

- "One of the most significant tools for learning about the well-being of nations globally is the World Happiness Report. It covers a number of elements which impact happiness, including health, social support, and a steady income. Throughout the attempt to get insight into regional happiness, this study will analyse happiness scores across South Asia and the Middle East using descriptive data, productivity comparisons, and correlational analysis..."

**Problem 1: Preparing the Middle Eastern Dataset**

Top 10 Happiest Countries
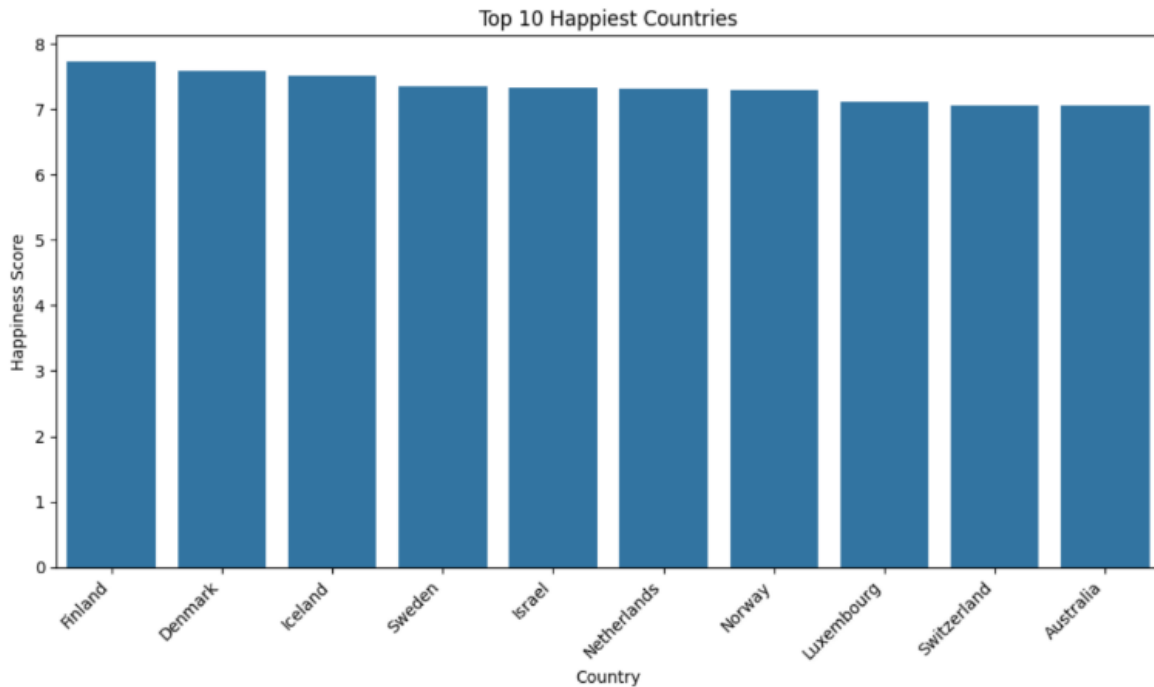
**Problem - 2 - Some Advance Data Exploration**
Task - 1 -Establishing up the South-Asia Dataset is the setup task.
Steps: 1. Provide a list of South Asian nations, such as:

Countries in South Asia = ["Afghanistan", "Bangladesh", "Bhutan", "India", "Maldives", "Nepal", "Pakistan", "Srilanka"]
2. Filter the dataset (i.e., get rid of matching datasets from the list) applying the list from step 1. 3. For later usage, save the filtered information frame as separate CSV files.

**Key Findings**

1. **Top 5 South Asian Countries by Composite Score**:

• The bar plot depicts the top 5 South Asian countries by Composite Score: Sri Lanka, Nepal, India, Pakistan, and Bangladesh.

• Using a Composite Score = 1.0739, Sri Lanka tops the ranking, followed by Bangladesh (0.6774), India (0.7874), Pakistan (0.7039), and Nepal (0.8159).

Top 5 South Asian Countries by Composite Score
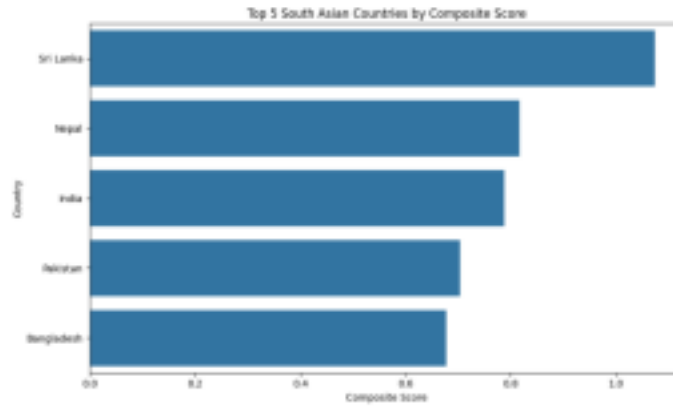
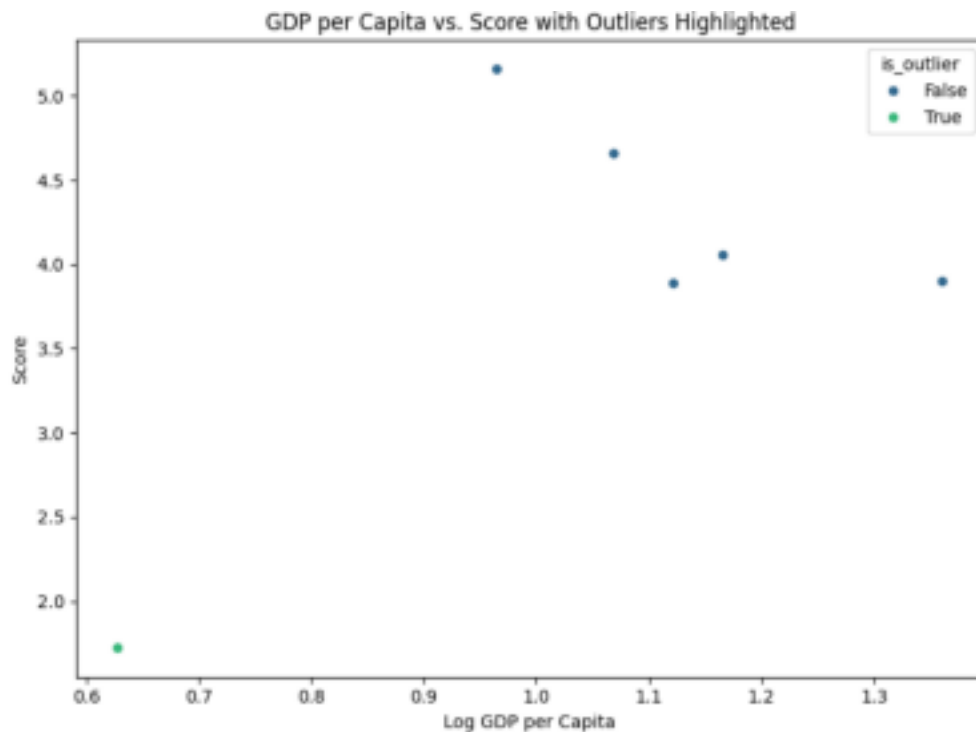1. **Relationship between Composite Score and Original Score**:
    • The connection between the Overall Score and the Synthesis Score for the South Asian
      nations appears in the scatter plot. However, there are some mistakes, as
      demonstrated by the various distances of the data points from the horizontal line,
      suggesting that the Composite Materials Score provides additional insights not clear
      to the Original Score. The plot illustrates an uptrend between the two scores, meaning
      that the Composite Score usually is coordinated with the Original Score.



Composite Score vs. Original Score for South Asian Countries

4

**Task - 3 - Outlier Detection: Tasks:**
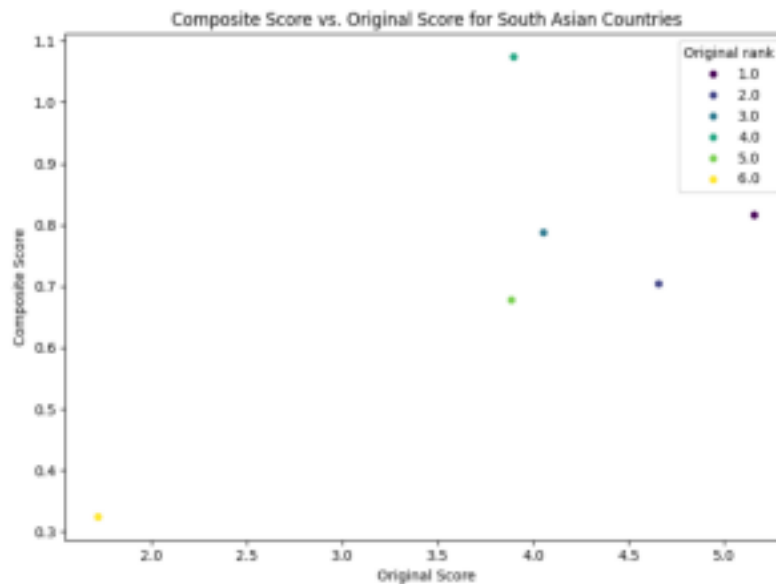
1. Determine which South Asian countries are exceptions based on their GDP per capita and score.

According to the Aggregate Score, the top five South Asian nations were chosen to be Sri Lanka (1.0739), Nepal (0.8159), India (0.7874), Pakistan (0.7039), and Bangladesh (0.6774). The link between the Origin Credit and the Synthesis Score was portrayed in a scatter map, which displayed a positive correlation showing alignment between the two. However, convinced data points departed from the centre line, revealing that the Combined Score gives further details.

Afghanistan was found as an essential outlier by outlier detection, indicating a significantly lower GDP per capita and enjoyment score, which could influence regional averages and opinions on overall happiness. The outcomes indicate that despite rankings based on Composite Scores usually reflect Original Scores, the Composite Score provides deeper insight on well-being; for example, Bangladesh's lower Composite Score implies potential challenges with economic and social support measures, while Sri Lanka's higher Composite Score indicates strong performance across the rated issues.



GDP per Capita vs. Score with Outliers Highlighted

5

**Task - 4 - Exploring Trends across Metrics:** Tasks:

1. Calculate the Pearson correlation between two metrics (e.g., Freedom to Make Life Choices and Generosity) and the South Asian countries' scores.

The results of the investigation showed significant relationships between a number of variables and overall happiness ratings. A significant positive correlation of 0.8005 was discovered between happiness and the freedom to make life decisions, suggesting that nations with more individual liberties typically have happier citizens. Although it was marginally weaker than that of freedom, generosity also showed a positive correlation (0.8745), indicating that it has a minor but significant impact on happiness. The results highlight that while charity is good, it could not have as much of an impact on general well-being as increasing personal liberties, which could significantly raise happiness levels in South Asian nations.

## Task - 5 - Gap Analysis:

Task 1. Create a new column called GDP-Score Gap, which is the gap between each South Asian nation's score and GDP per capita.

In order to determine whether economic status and happiness levels are correlated, the gap analysis computed a new column called the GDP-Score Gap, which calculates the difference between GDP per capita and happiness scores for each nation. Notably, there were notable positive discrepancies between GDP per capita and happiness scores in nations like India (-2.888), Pakistan (-3.588), and Nepal (-4.193).On the other hand, negative gaps were seen in Bangladesh (-2.764), Sri Lanka (-2.537), and Afghanistan (-1.093), indicating lower GDP per capita in relation to their happiness ratings. According to descriptive data, the Middle East had a higher mean happiness score of 5.41 with a standard deviation of 1.57, while South Asia had a mean score of 3.90 with a standard deviation of 1.18. South Asia's top three performers were Bhutan (6.62), Sri Lanka (5.87), and Nepal (5.16), while the Middle East's top three performers were Israel (7.34), Kuwait (6.95), and the United Arab Emirates (6.73). In South Asia, the worst-performing countries were Afghanistan (1.72), Pakistan (4.66), and India (4.05); in the Middle East, they were Lebanon (2.71), Yemen (3.56), and Jordan (4.19).



Top 3 Countries with Largest Positive and Negative GDP-Score Gap
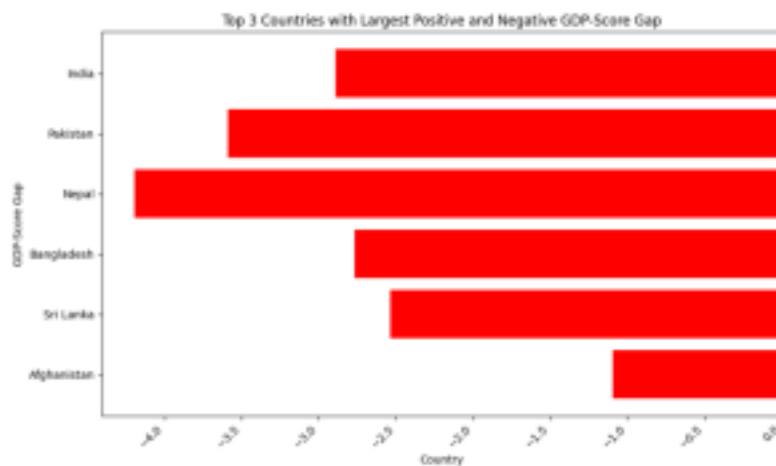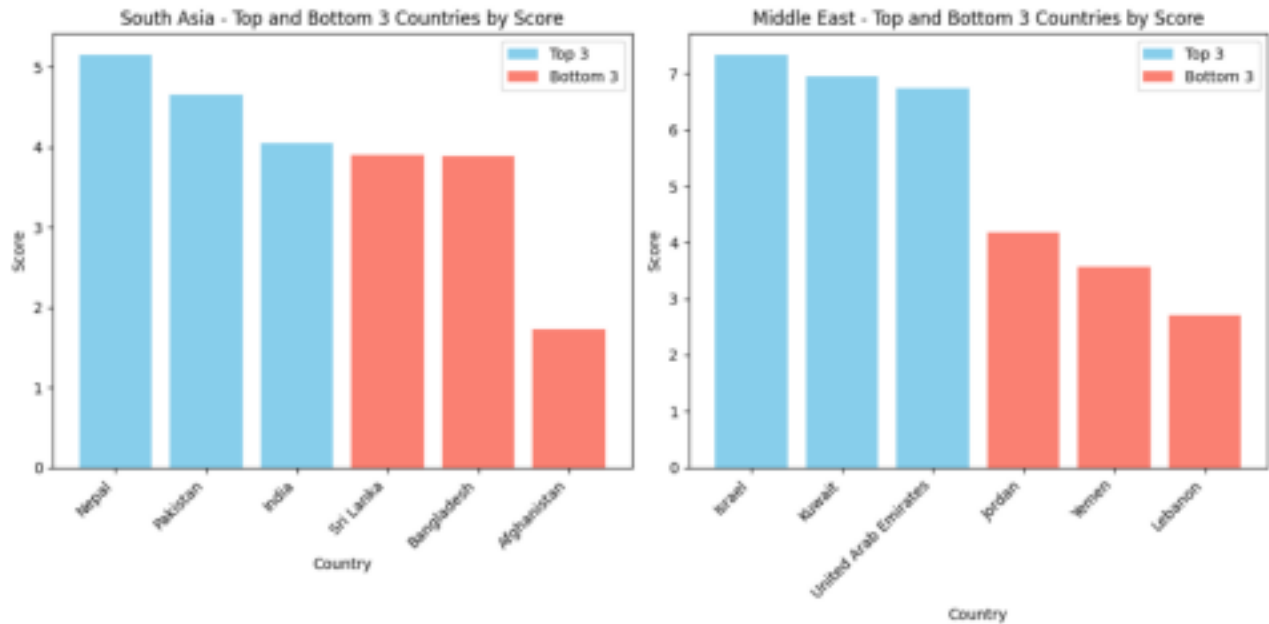
### 3.3 Problem - 3 - Comparative Analysis: Task - 1 - Setup Task - Preparing the Middle Eastern Dataset:

Task 1. Make a data frame from Middle Eastern nations, just like in Task 1 of Problem 2. Use the following list as a guide:

"Bahrain," "Iran," "Iraq," "Israel," "Jordan," "Kuwait," "Lebanon," "Oman," "Palestine," "Qatar," "Saudi Arabia," and "Syria" are examples of Middle Eastern nations.

"United Arab Emirates", "Yemen"]

Several important conclusions about the region's economic indicators and level of happiness were drawn from the investigation. There were notable disparities in well-being, with Israel having the highest happiness score (7.341) and Lebanon having the lowest (2.707). With Yemen following at 0.671 and the United Arab Emirates leading at 1.983, the Log GDP per capita showed significant variance in terms of economic performance, pointing to a possible relationship between happiness and economic circumstances. Furthermore, Kuwait and Israel had exceptionally high social support scores (1.364 and 1.513, respectively), which is consistent with their high happiness ratings. Lebanon, on the other hand, has a lower social support score of 0.577, which emphasizes the challenges it faces in fostering communal well-being.

South Asia - Top and Bottom 3 Countries by Score

Middle East - Top and Bottom 3 Countries by Score

### 3. Metric Comparisons:

• Using grouped bar charts, compare important indicators between the regions, such as GDP per capita, social support, and healthy life expectancy.

• What measures reveal the biggest differences between the two areas?

Average values for important indicators were calculated for the Middle East and South Asia in this study, and a Datagram was created to help visualize the results. To clearly show the disparities between the two regions, a grouped bar chart was made to show the average values of GDP per capita, social support, and healthy life expectancy. The investigation also identified the statistic with the biggest difference, highlighting the notable differences in well-being between the Middle East and South Asia.

Comparison of Key Metrics between South Asia and Middle East
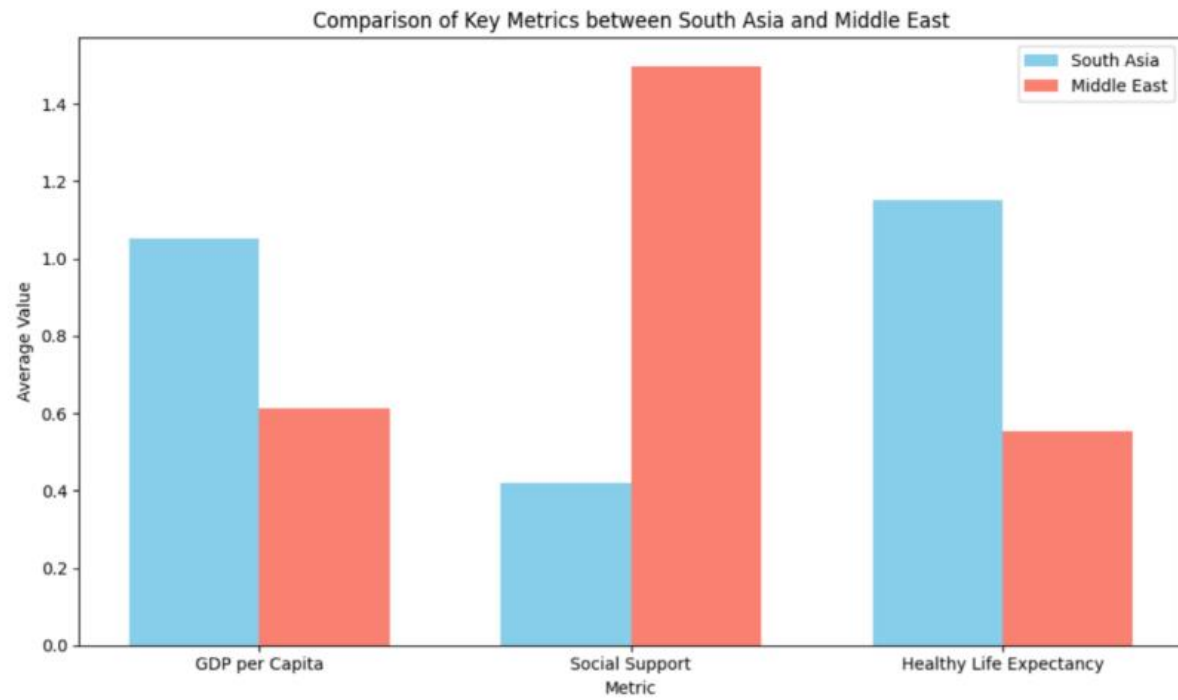
The largest disparity is observed in: Social Support
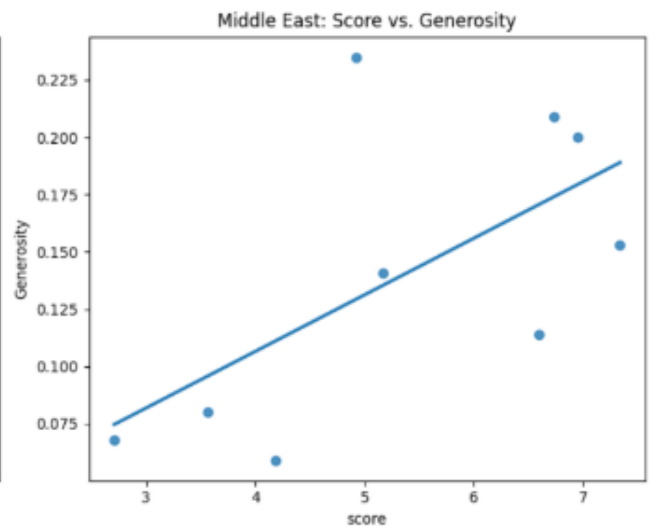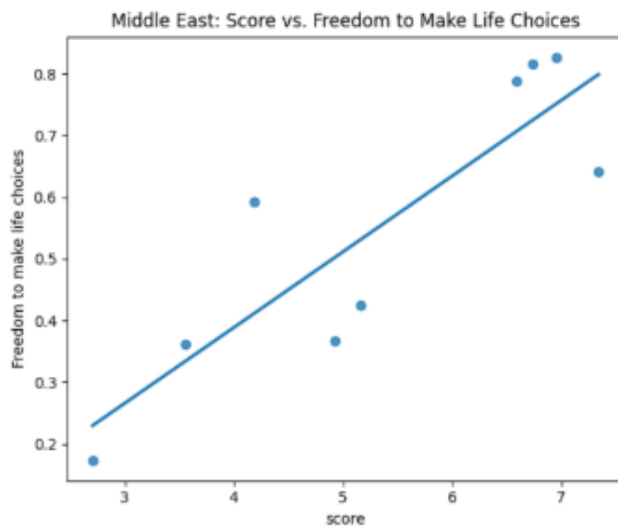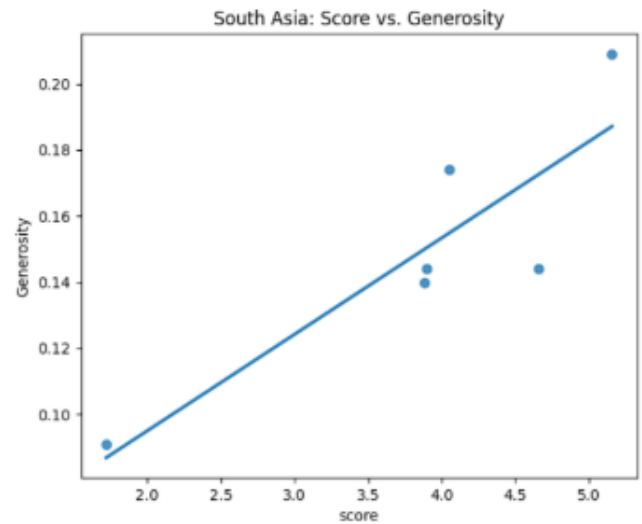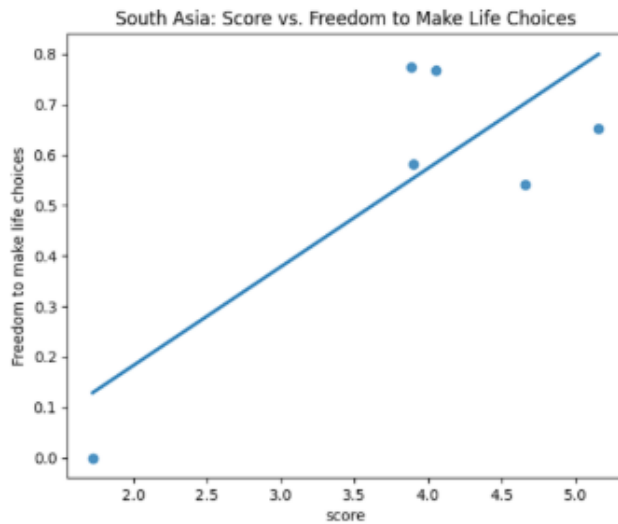
Based on their GDP per capita and happiness scores, outlier nations have been found in both zones. These outliers usually have unique traits that have a big influence on their economic performance and degree of enjoyment. Their existence has the potential to skew regional comparisons and averages, highlighting the need for a nuanced interpretation of the data when examining regional trends.

**Outlier Countries based on Score and GDP per Capita**
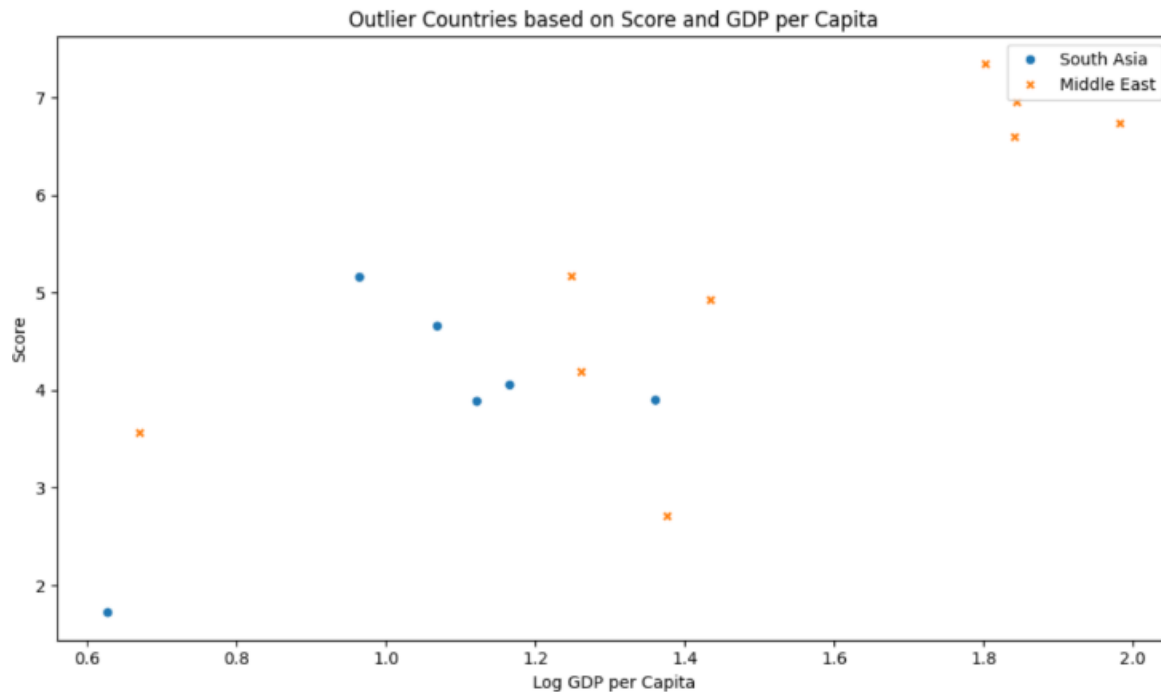


Conclusion:

In conclusion, this study examines the World Happiness Report to compare South Asia with the Middle East. South Asia has lower averages for GDP per capita and social support, and more variety in happiness than the Middle East. Giving has a strong positive association with happiness, but the relationship between freedom of action and happiness is much shorter. Strong social ties and persistence are proven by negative GDP-Happiness gaps, whereas buying habits and inequality are demonstrated by positive gaps. Outliers like Afghanistan (South Asia) and Lebanon (Middle East) have significant impacts on regional averages. Social support and access to healthcare are significant determinants of pleasure in both dimensions. Reducing inequality and fostering social harmony are necessary to raise happiness levels. Understanding these

patterns can help officials create strategies to improve well-being and reduce disparities. The political or social aspects of happiness could be the subject of future studies.

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