UNIVERSITY PARTNER

UNIVERSITY OF WOLVERHAMPTON

BIRATNAGAR INTERNATIONAL COLLEGE

Assignment-01

5CS037: Concepts and Technologies of AI

Report

Title: Analysis of the World Happiness Report: Exploring South Asia and Middle East Perspectives

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Introduction:

The World Happiness Report ranks countries based on citizens' happiness, evaluating factors such as income, social support, life expectancy, freedom of choice, and perceptions of corruption. It highlights well-being over economic indicators like GDP and offers insights for improving quality of life. The report compares South Asia and the Middle East, showing that while South Asia faces challenges like poverty and instability, strong community ties contribute to happiness. In contrast, the Middle East, with its higher GDP, struggles with limited personal freedoms and political conflicts, which negatively impact happiness. Overall, the report helps understand how regional factors shape well-being and provides valuable guidance for policymakers.

Problem 1 – Data Exploration:

- **Dataset Overview:**

The provided code loads a dataset from a specified CSV file using the pandas library and performs basic exploratory data analysis. It first reads the data into a DataFrame and then displays the first 10 rows to give an overview of the dataset. Next, it identifies the number of rows and columns by using the '`shape`' attribute, which returns the dimensions of the DataFrame. Finally, it lists all the columns along with their respective data types using the "`info()`" method, which also provides information about the non-null values in each column. This simple analysis helps to quickly understand the structure and contents of the dataset.

- **Basic Statistics:**

The code calculates the mean, median, and standard deviation of the "Score" column to analyze the distribution of happiness scores. It then identifies and prints the countries with the highest and lowest happiness scores using `idxmax()` and `idxmin()`.

- **Missing Values:**

The code checks for missing values in the dataset and displays the count of missing values for each column using '`isnull().sum()`'.

- **Filtering and Sorting:**

The code filters the dataset to show only countries with a Score greater than 7.5. Then, it sorts the filtered dataset by GDP per Capita in descending order and displays the top 10 rows.

- **Happiness Category:**

"Happiness_Category" column was added to the dataset and then classifying countries into "Low," "Medium," or "High" categories based on their happiness scores. It then displays the count of countries in each category and shows the first few rows with the new column.

Problem 1.1 –Data Visualizations:

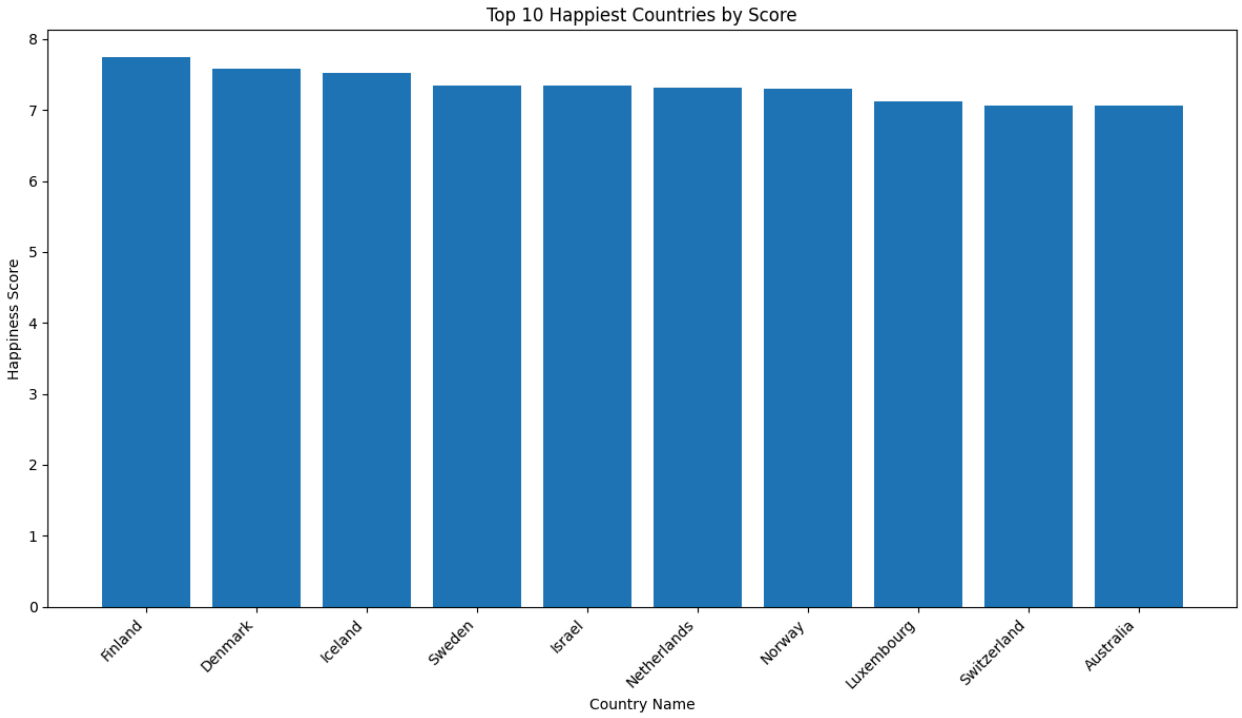

Fig.1

This bar chart displays the top 10 happiest countries according to their happiness scores. Finland leads the list, closely followed by Denmark, Iceland, and Sweden. These nations, known for their strong social support systems, high standards of living, and robust healthcare, dominate the rankings. The chart highlights the consistent success of Nordic countries in promoting well-being, with other nations like Israel and the Netherlands also securing high positions. The visual representation underscores the impact of social stability, economic prosperity, and personal freedom on national happiness.

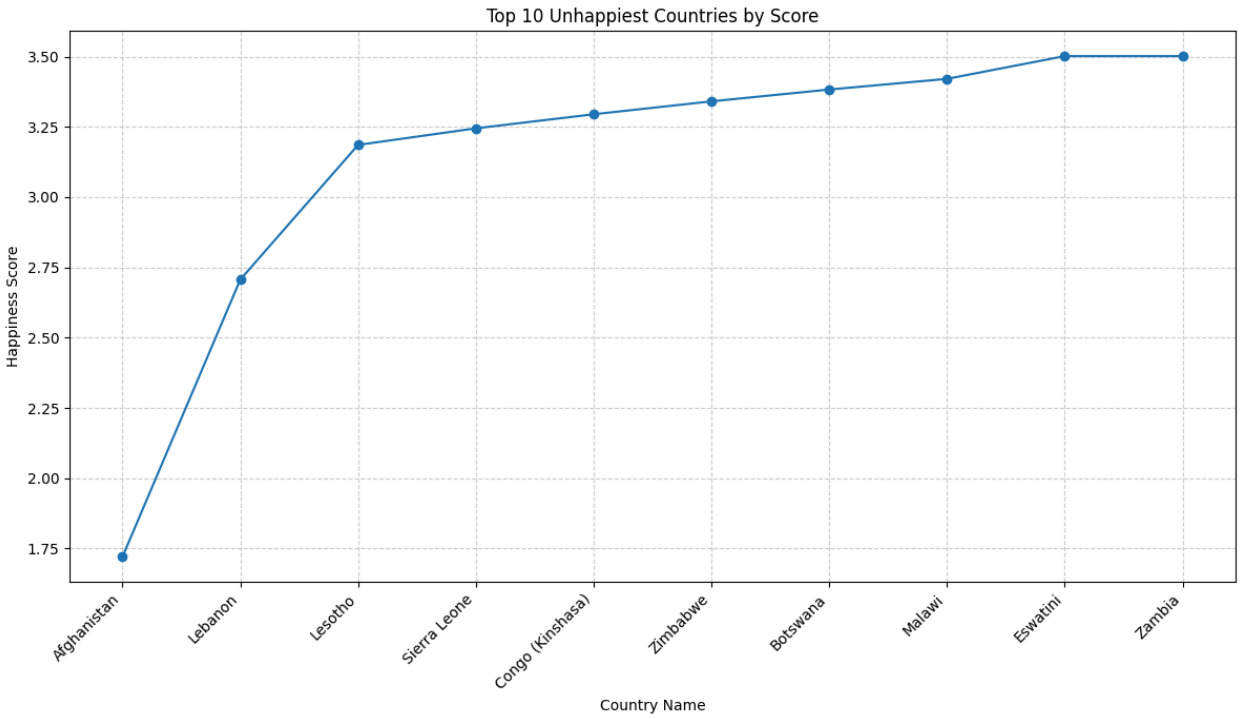

Fig.2

This chart shows the 10 least happy countries ranked by their happiness scores. Afghanistan has the lowest score, far below the others, making it the unhappiest country in the dataset. Lebanon follows next with a noticeably higher but still very low score. After these two, the scores gradually increased, with countries like Lesotho, Sierra Leone, Congo (Kinshasa), and Zimbabwe clustered between 3.2 and 3.4, showing smaller differences among them. Eswatini and Zambia have the highest scores within the bottom 10, around 3.5, meaning they are still among the least happy countries globally but are comparatively better than the others on the list.

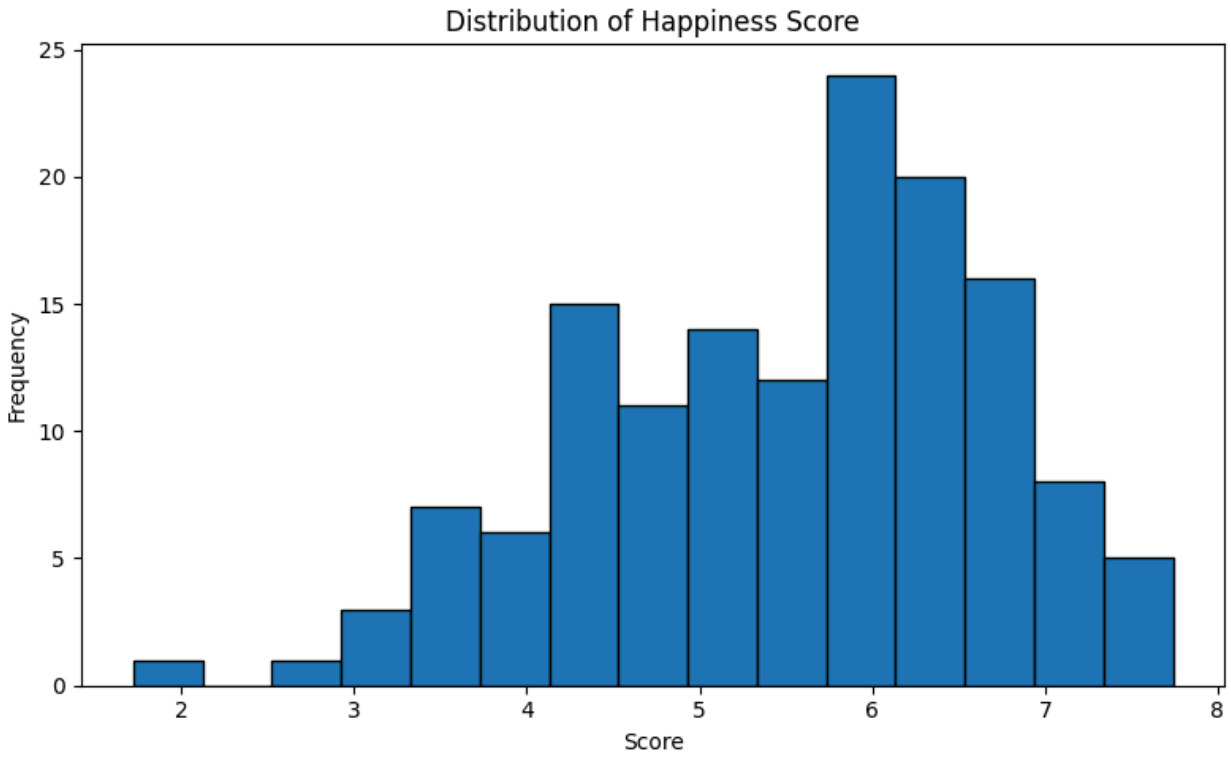

Fig.3

The histogram shows that most countries have happiness scores between 5 and 7, indicating generally moderate to high happiness levels. Very low scores are rare, and the distribution clusters mainly in the mid-to-high range.

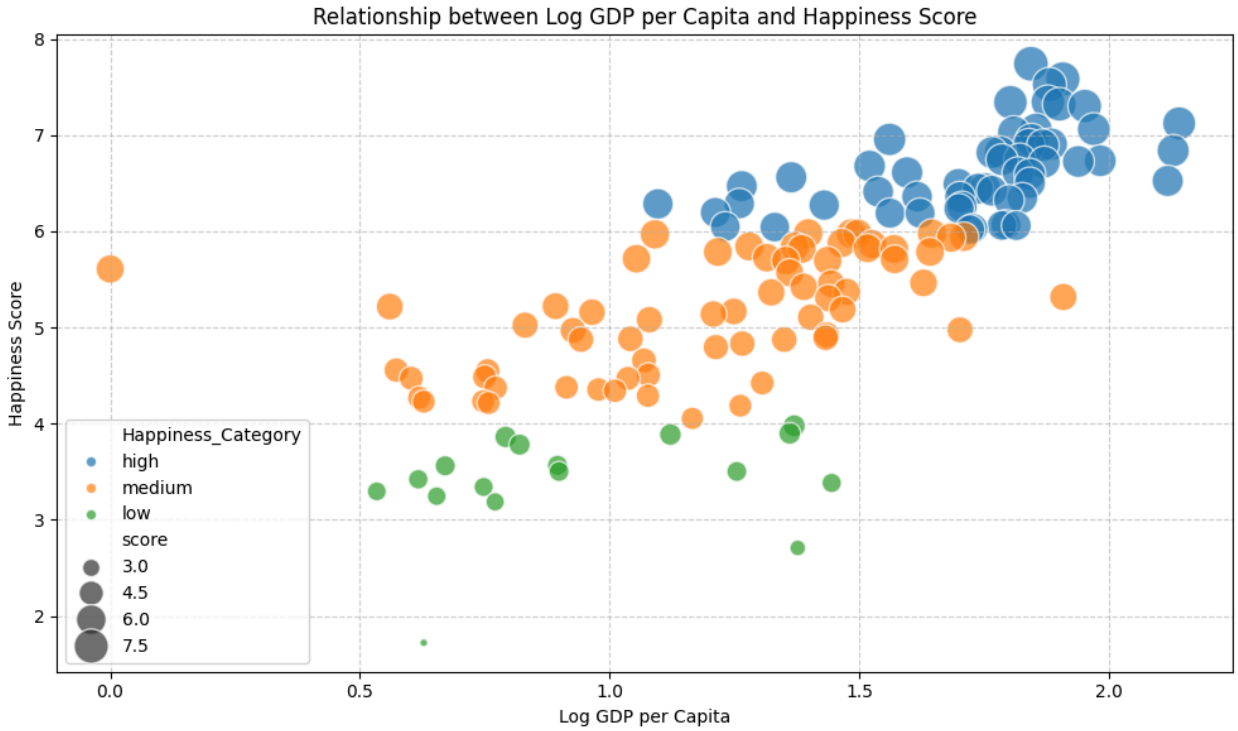

Fig.4

This scatter plot shows a positive relationship between log GDP per capita and happiness score: countries with higher GDP tend to have higher happiness. The blue points (high happiness) cluster in the high-GDP region, orange (medium) fall in the middle, and green (low happiness) appear mostly in the low-GDP region. Overall, richer countries are generally happier.

Problem 2 –Advance Data Exploration:

Task - 1 - Setup Task the South-Asia Dataset:

The South Asia dataset was prepared by filtering the main dataframe using a predefined list of South Asian countries. The extracted data was saved as *south_asian_filtered.csv*, and the first few rows were checked to confirm the filtering.

Task - 2 - Composite Score Ranking

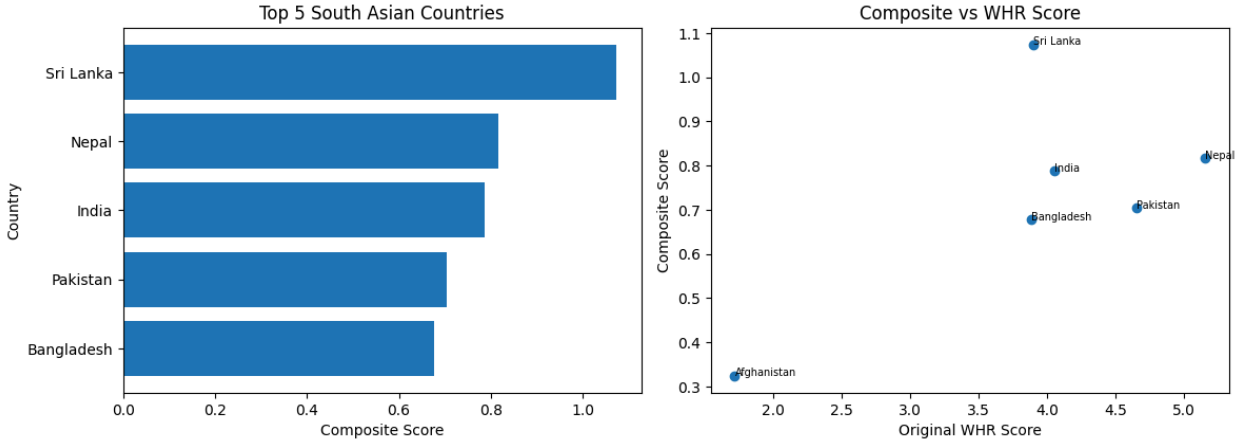

Fig.5

The Composite Score was created using weighted contributions from GDP per capita, social support, and healthy life expectancy to provide a balanced measure of well-being across South Asian countries. After calculating and ranking the scores, Sri Lanka emerged as the highest performer, followed by Nepal, India, Pakistan, and Bangladesh. The bar chart highlights this ranking clearly. When compared to the original World Happiness Report scores, the scatter plot shows a generally positive relationship, indicating that countries scoring high in the Composite Score also tend to have higher happiness scores. However, slight differences such as Nepal's stronger position in the composite ranking suggest that the weighted factors emphasize certain strengths not fully reflected in the original WHR ranking.

Task - 3 - Outlier Detection:

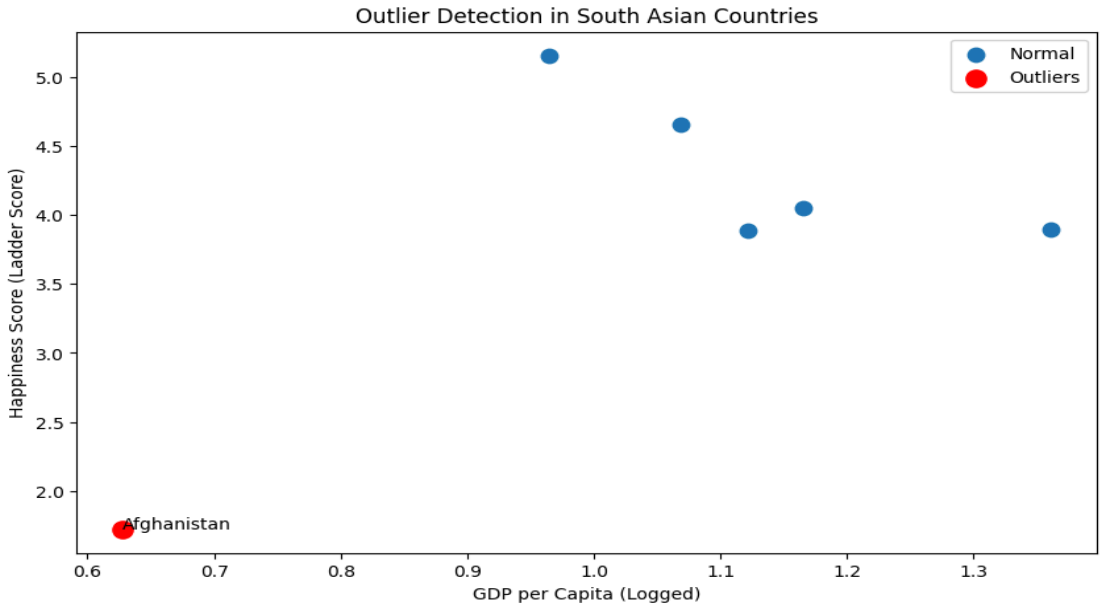

Fig.6

The scatter plot shows that most South Asian countries follow a similar pattern between GDP and happiness, but Afghanistan stands out as a clear outlier with a much lower happiness score than expected for its GDP level. This indicates that non-economic factors may be strongly affecting well-being in Afghanistan compared to the rest of the region.

Task - 4 - Exploring Trends Across Metrics:

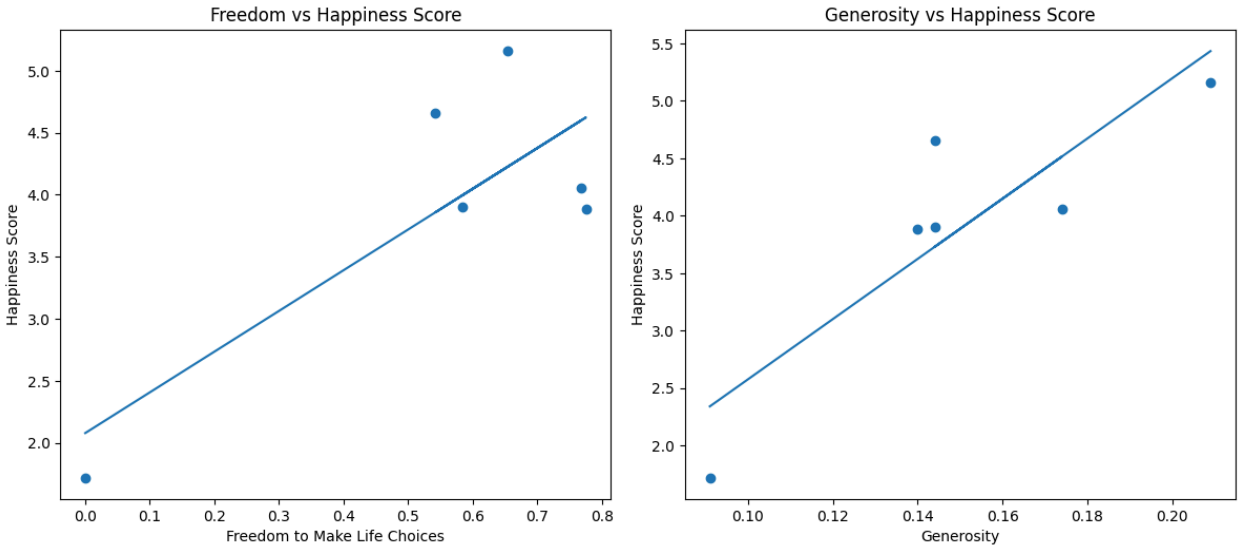

Fig.7

The plots show that both freedom to make life choices and generosity have positive relationships with happiness in South Asian countries. Higher freedom is more strongly linked to higher happiness, while generosity shows a weaker but still upward trend, suggesting both factors contribute to overall well-being.

Task - 5 - Gap Analysis:

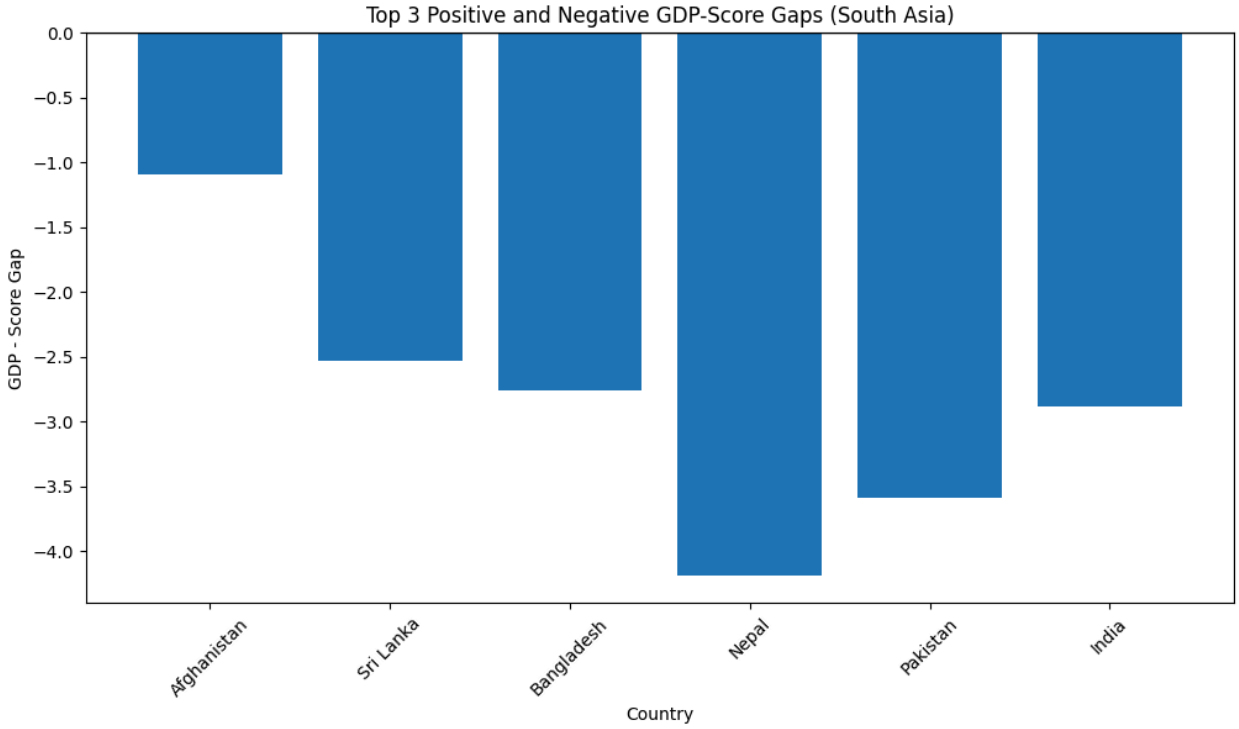

Fig.8

The chart shows that all South Asian countries have negative GDP–Score gaps, meaning their happiness levels are lower than expected based on GDP alone. Nepal and Pakistan have the largest gaps, suggesting other factors strongly affect well-being, while Afghanistan shows the smallest gap. This highlights that economic performance does not fully explain happiness in the region.

Problem 2 –Comparative Analysis:

1. Preparing the Middle Eastern Dataset:

The Middle East dataset was created by filtering the World Happiness Report to include only countries from the region. This provides a focused table containing key happiness and socioeconomic indicators for Middle Eastern nations, enabling clearer regional analysis.

1.1 Descriptive Statistics:

The comparison shows that the Middle East has a higher average happiness score than South Asia. Mean and standard deviation values highlight not only the difference in overall well-being but also the variation in happiness within each region.

1.2 Top and Bottom Performers:

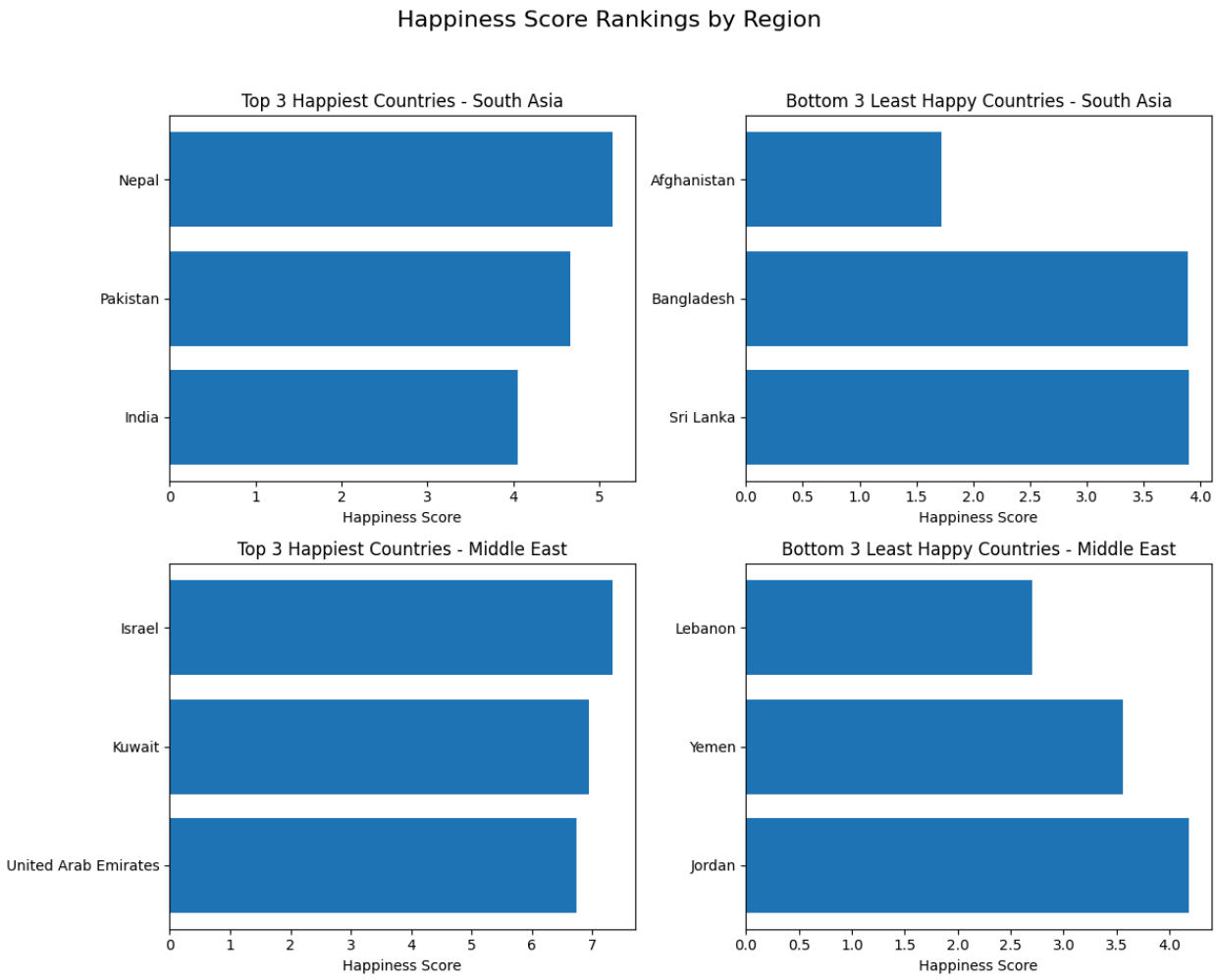

Fig.9

The chart highlights the top and bottom three happiest countries in both regions. South Asia's highest scores come from Nepal, Pakistan, and India, while Afghanistan ranks lowest. In the Middle East, Israel, Kuwait, and the UAE lead, with Lebanon and Yemen among the least happy. The Middle East shows generally higher happiness levels than South Asia.

1.3 Metric Comparisons:

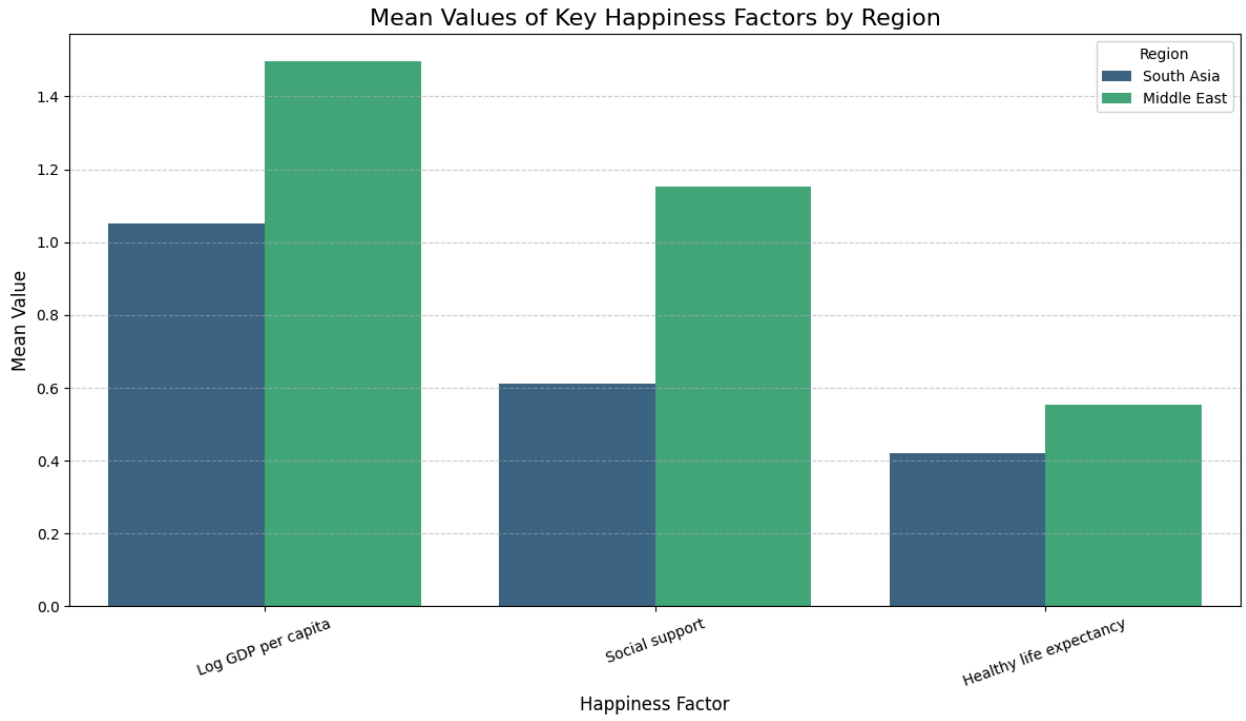

Fig.10

The chart compares the average values of key happiness factors between South Asia and the Middle East. Overall, the Middle East scores higher across all three indicators. It shows notably higher levels of economic prosperity (log GDP per capita), stronger social support, and better healthy life expectancy. South Asia, while showing positive levels in each factor, consistently reports lower averages, highlighting a regional gap in the conditions that contribute to overall well-being.

1.4 Happiness Disparity:

South Asia shows greater variation in happiness scores than the Middle East, meaning its countries differ more widely in their happiness levels. The Middle East's scores are more consistent and less spread out.

1.5 Correlation Analysis:

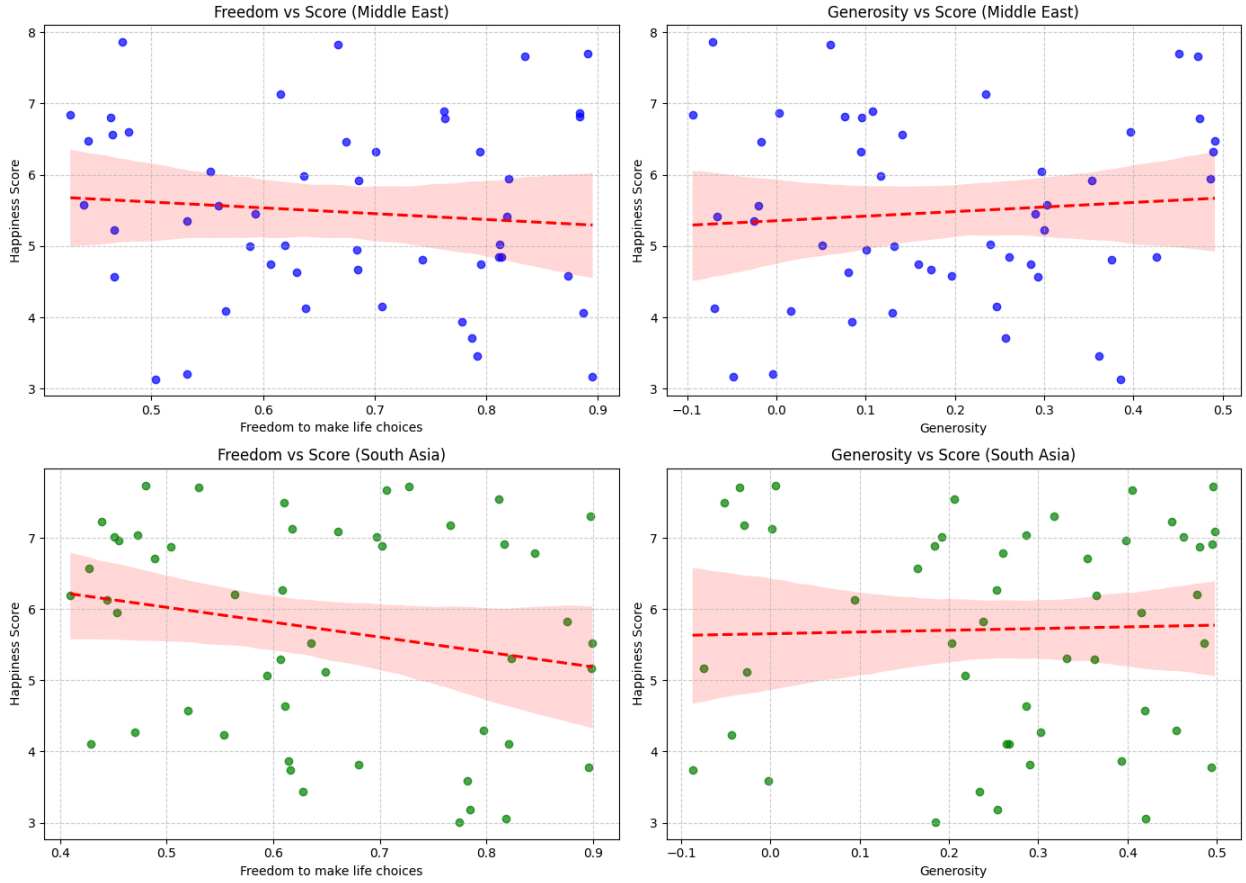

Fig.11

The plots show that freedom has a slight negative relationship with happiness in both regions, while generosity shows a weak positive relationship. Overall, neither factor strongly predicts happiness scores, but generosity appears slightly more supportive of higher happiness than freedom.

1.6 Outlier Detection:

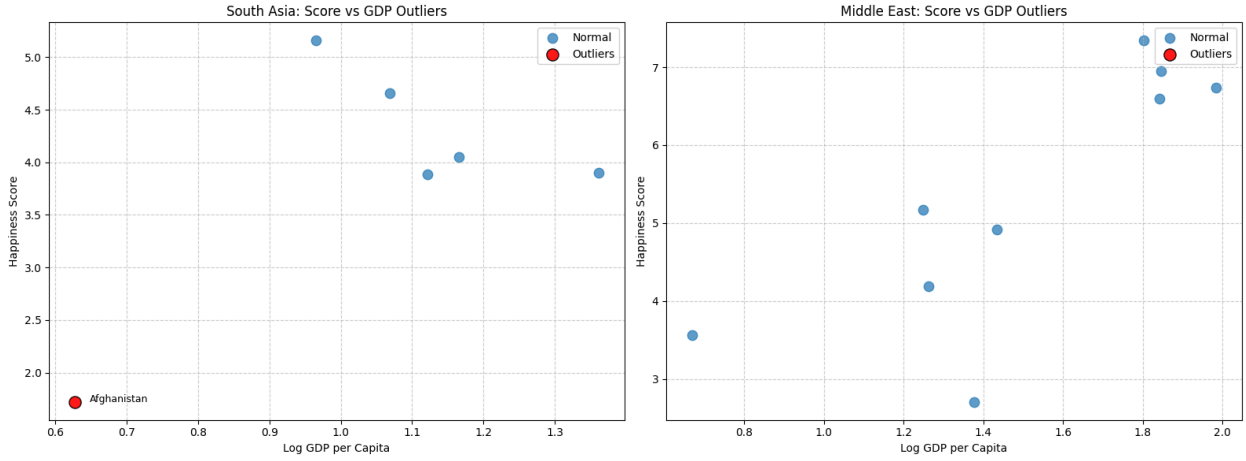

Fig.12

The charts show “Afghanistan” a clear outlier in South Asia which has much lower GDP and happiness than the rest. The Middle East displays no major outliers, with countries following a more consistent GDP–happiness pattern.

1.7 Visualization:

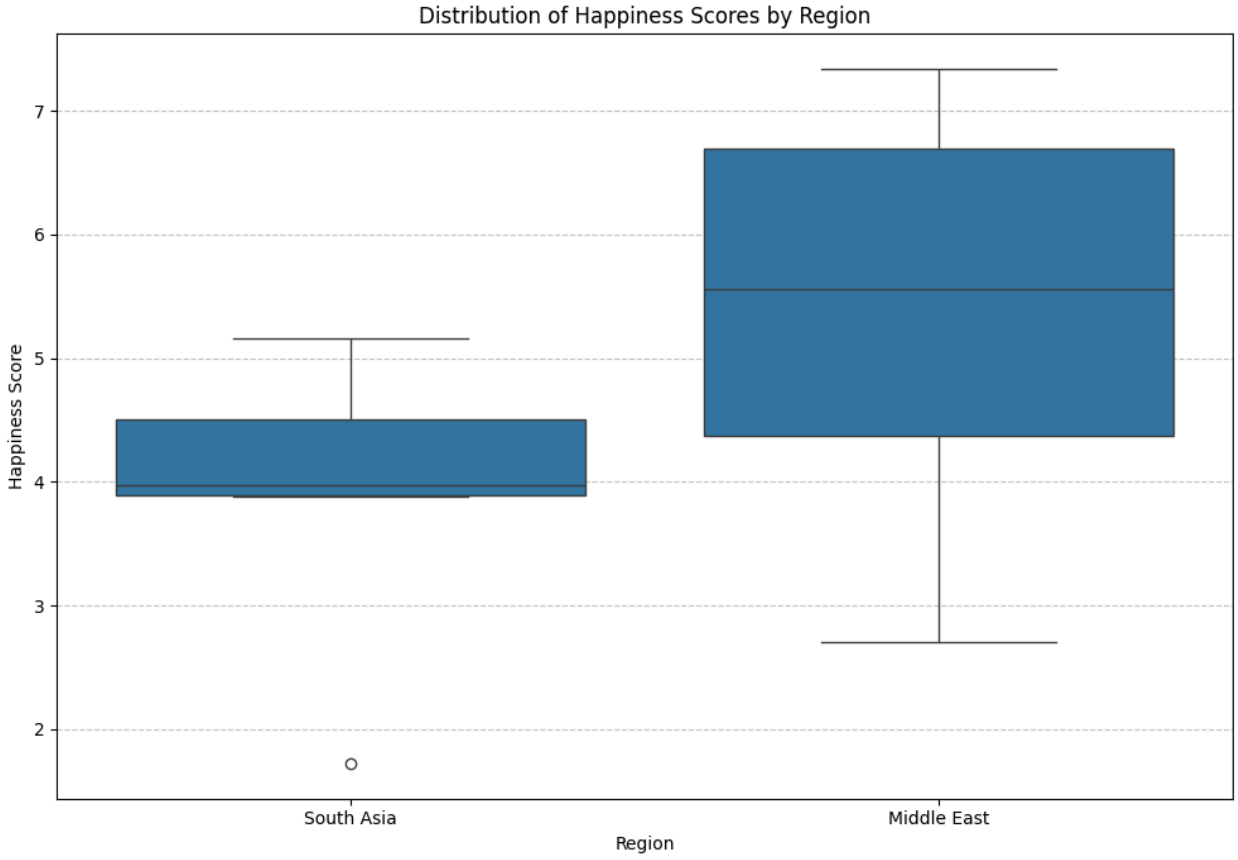

Fig.13

The boxplot compares happiness score distributions between South Asia and the Middle East. South Asia shows lower overall scores with a noticeable outlier, while the Middle East displays higher median happiness and a wider spread. This indicates that Middle Eastern countries tend to be happier on average, with greater variation compared to South Asia.

Conclusion:

This histogram shows how happiness scores are distributed across countries. Most scores fall between 5 and 7, indicating that many countries report moderate to high happiness levels. Fewer countries appear in the very low or very high score ranges, showing that extreme happiness or unhappiness is less common globally. The distribution suggests a general clustering toward the middle, reflecting a balanced but slightly right-skewed trend in global well-being.