BIRATNAGAR
INTERNATIONAL COLLEGE

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

Statistical Interpretation and Exploratory Data Analysis

Course: Concepts and Technologies of AI (5CS037)

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1. Introduction

The World Happiness Report (Helliwell, et al., 2024) that factors in subjective well-being in addition to economic output, marks an important shift in the way that global progress is assessed. The report offers important insights into the social, economic, and health aspects of a meaningful life by rating nations according to life evaluation scores. The WHR dataset is used in this analysis to examine global trends, with a focus on the regional changes in the Middle East and South Asia.

This report has three goals. To figure out the global distribution of happiness, an initial exploratory data analysis (EDA) is carried out. After that, a thorough analysis of the South Asian region is conducted to evaluate regional performance using composite scoring and outlier detection. Lastly, a data-driven view of regional well-being is obtained by comparing South Asia with the Middle East to find differences in wealth, health, and happiness.

2. Global Data Exploration

Activity Summary

The first stage of the analysis focuses on statistical understanding and data preparation. To make sure it was suitable for analysis, the raw dataset was loaded, cleaned, and examined. Renaming columns for clarity and confirming the lack of crucial missing values were part of this procedure.

Step-by-Step Methodology

1. **Data Loading:** The dataset was imported using the Pandas library.
2. **Structure Validation:** The dimensions of the dataset were confirmed (143 countries), and data types were verified to ensure numerical columns were processed correctly.
3. **Statistical Summary:** Basic descriptive statistics (mean, median, standard deviation) were calculated to establish a global baseline.

Observations and Interpretation

The average happiness score worldwide is roughly 5.53. With a tiny negative skew, the score distribution is unimodal and approaches a normal distribution. Most countries report scores in the range of 4.5 to 6.5. This implies that only a small group of countries, mostly in the Nordic region, achieve the highest levels of well-being (scores > 7.5), but extreme sadness is very uncommon.
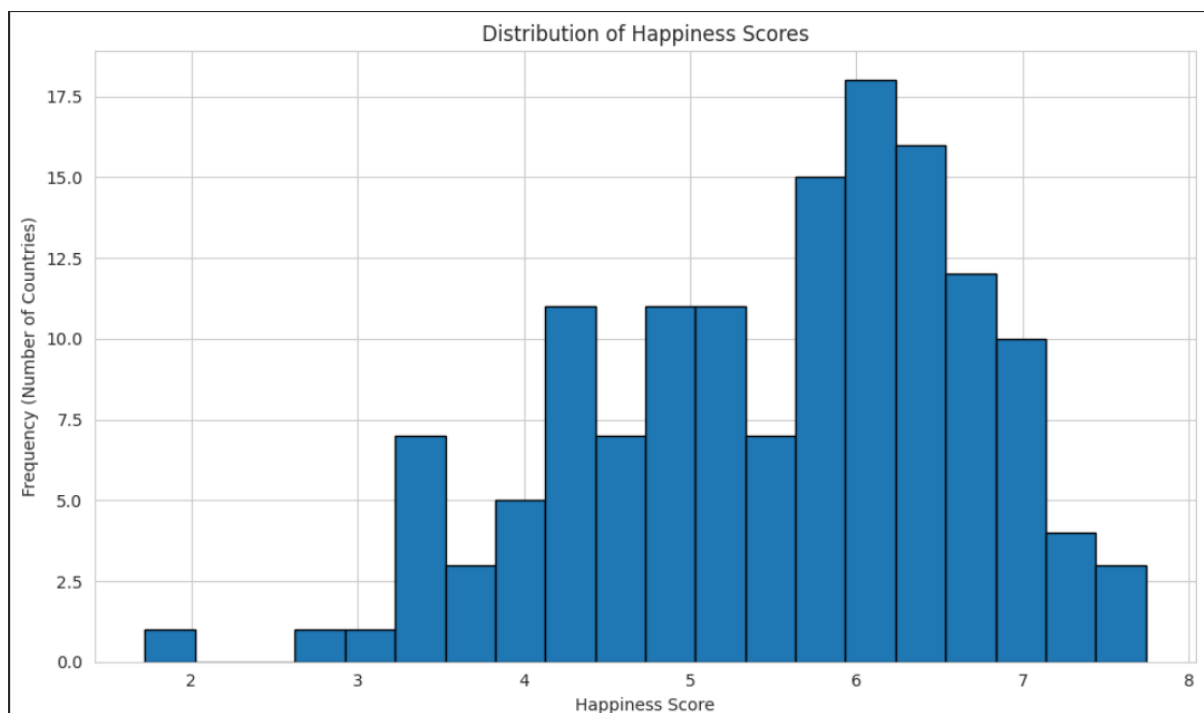

Figure 1. Histogram displaying the frequency distribution of global happiness scores.

3. South Asia Regional Analysis

Activity Summary

This section isolated the South Asian region to evaluate country performance using alternative metrics and statistical anomaly detection.

Composite Score Ranking

To provide a holistic view of well-being, a "Composite Score" was calculated using a weighted formula:

Composite = (0.4 * GDP) + (0.3 * Social Support) + (0.3 * Health)

Results: The region's top composite rankings were obtained by Nepal and Sri Lanka. This suggests that these countries maintain a balance between social-health indicators and economic output. Afghanistan, on the other hand, continued to be at the bottom of the list, showing that its poor performance is systematic across all important indicators.
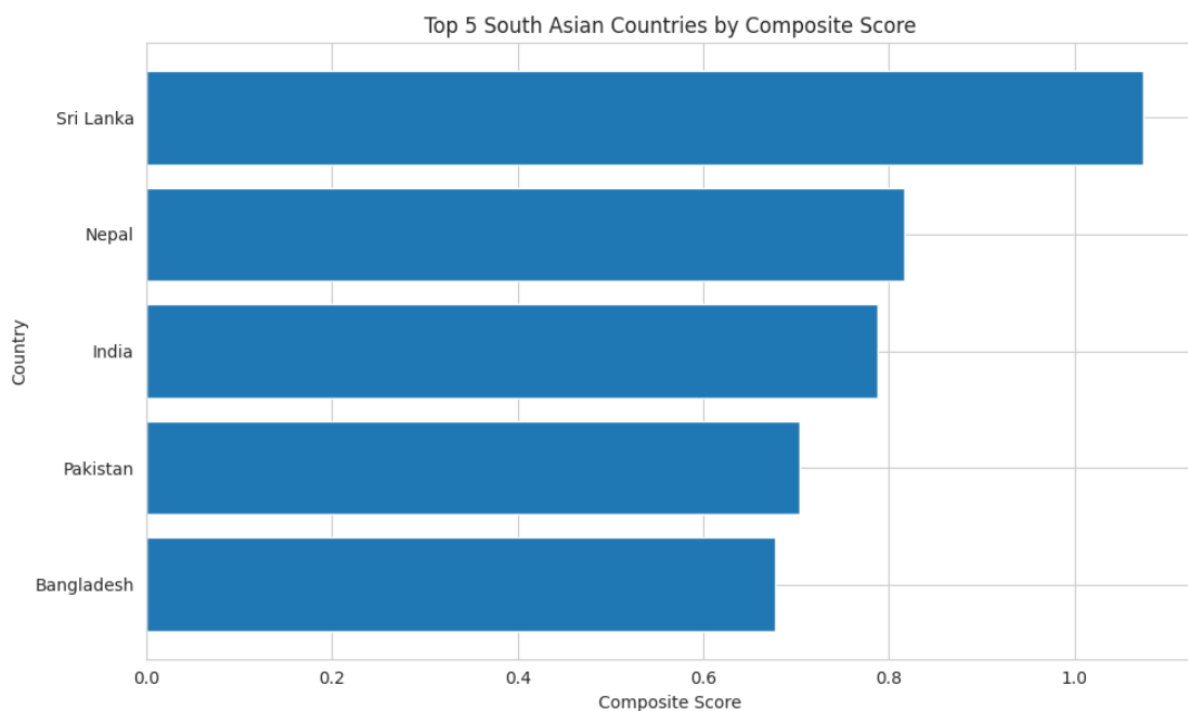

Figure 2. Horizontal bar chart ranking South Asian countries by Composite Score.

Outlier Detection and Gap Analysis

Afghanistan was shown to be a statistical outlier using the interval range (1.5 * IQR) criteria. With a happiness score of 1.721, it differs significantly from the regional cluster.

Interpretation: Afghanistan's outlier position is a result of severe socio-political instability that has separated its welfare from regional patterns. Additionally, the "GDP-Score Gap" analysis showed that nations such as Nepal have a significant negative gap, suggesting a "happiness surplus." These countries' residents report higher levels of happiness than their GDP per capita would typically indicate, showing that social capital and cultural resilience are more important in South Asia than riches.
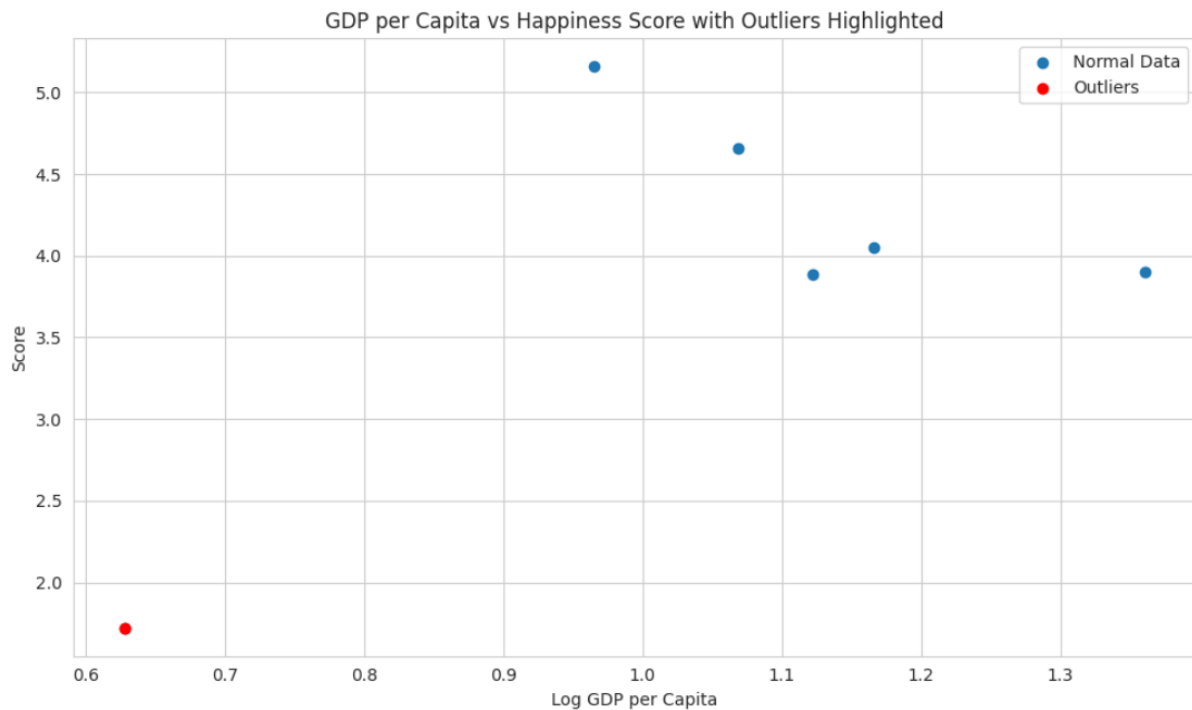
Figure 3. Scatter plot illustrating GDP vs. Happiness Score, highlighting regional outliers.

4. Comparative Analysis: South Asia vs. Middle East

Activity Summary

A comparative study was conducted to analyze the structural differences in happiness between South Asia and the Middle East.

Descriptive Statistics and Disparity

The average happiness score is greater in the Middle East (5.36) than in South Asia (3.90). On the other hand, South Asia's standard deviation (1.18) is far lower than the Middle East's (1.49).

Interpretation: While the Middle East is wealthier on average, it suffers from higher inequality. The region includes both affluent Gulf nations and conflict-affected areas, resulting in a wide dispersion of scores. South Asia, while scoring lower, shows greater uniformity in living standards across the region (excluding outliers).
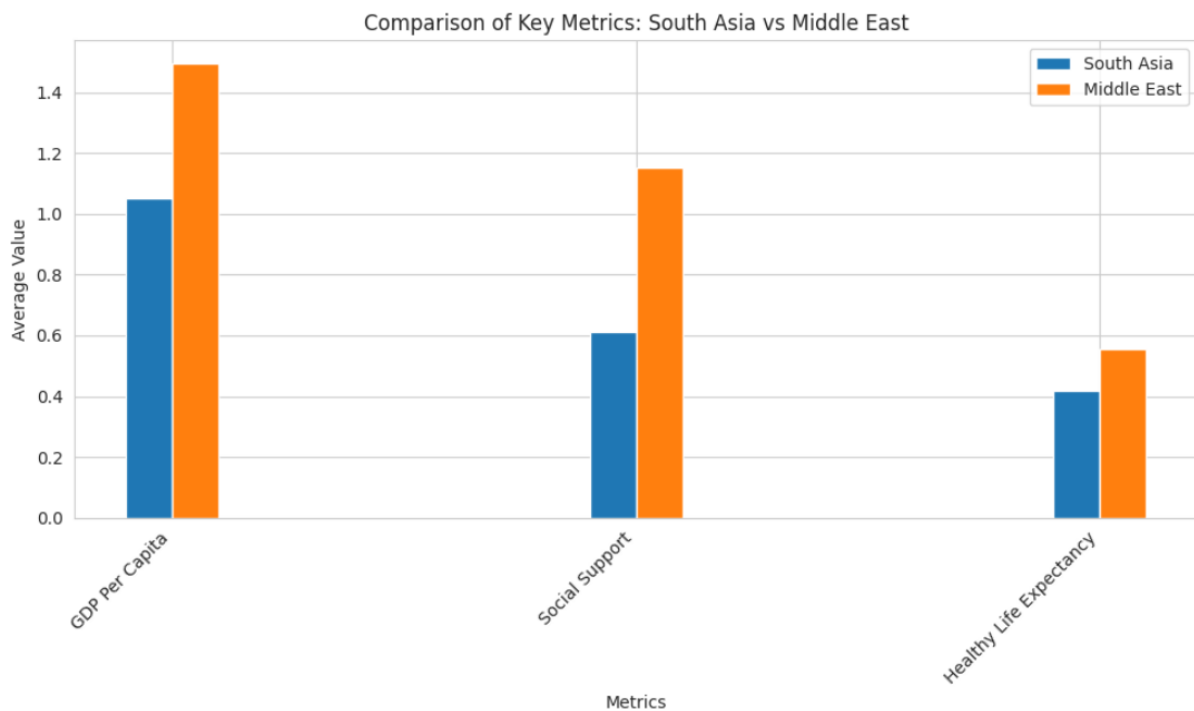
Figure 4. Grouped bar chart comparing mean GDP, Social Support, and Health between regions.

Correlation Analysis

Correlation coefficients were calculated to identify the primary drivers of happiness in each region:

- **South Asia:** The strongest correlation was found between **Generosity** and Happiness ($r = 0.875$).
- **Middle East:** The strongest correlation was found between **Freedom to Make Life Choices** and Happiness ($r = 0.863$).
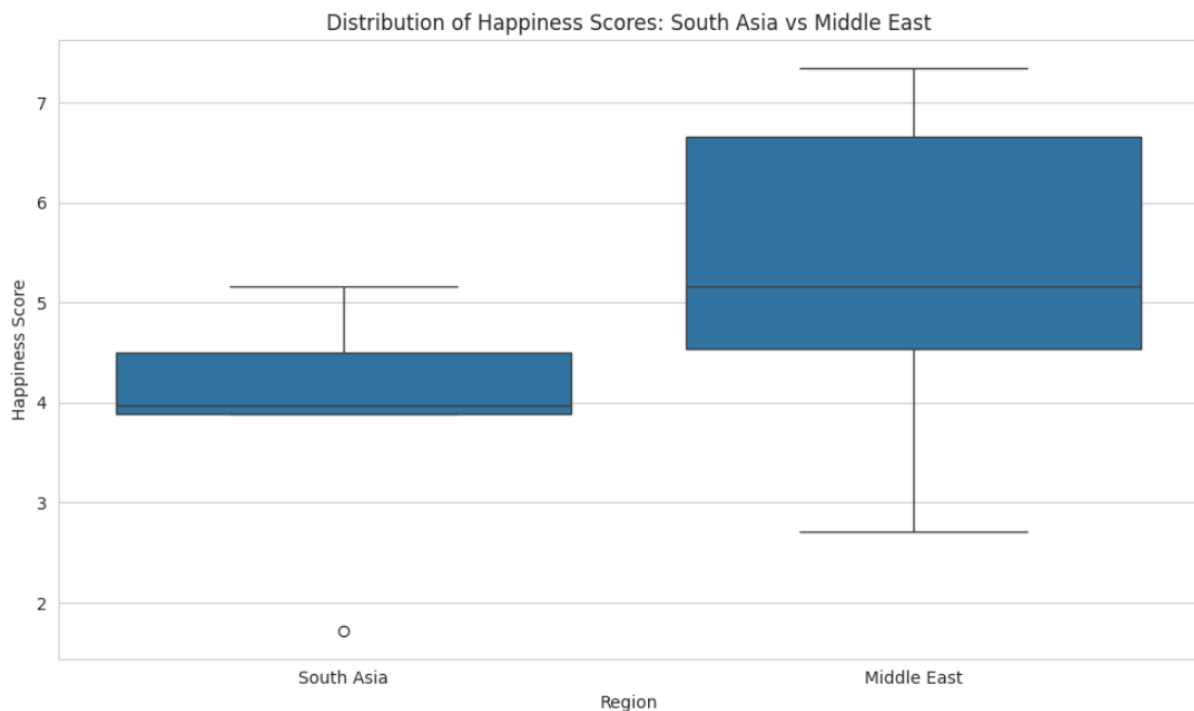
Figure 5. Boxplot comparing the distribution and interquartile range of scores in both regions.

5. Conclusion

This statistical analysis of the World Happiness Report underscores that well-being is multidimensional and regionally distinct.

Key Findings:

1. **Economic Decoupling:** While the Middle East sticks to a more conventional wealth-happiness correlation, South Asian countries frequently beat their economic indicators due to strong social correlations and generosity.
2. **Inequality:** The economic gap between oil-rich governments and developing countries within the same geographic region is reflected in the Middle East's large difference in well-being.
3. **Critical Outliers:** Afghanistan's statistical isolation emphasizes the fatal consequences of war, significantly reducing regional averages.

These insights suggest that while economic growth is essential, policy interventions in South Asia should continue to foster social cohesion, while the Middle East may benefit from policies aimed at reducing regional inequality.

References

Helliwell, J. F., Layard, R., Sachs, J. D., De Neve, J.-E., Aknin, L., & Wang, S. (2024). World Happiness Report 2024. *World Happiness Report.*

6. GitHub Repositories Link

- ➤ https://github.com/kuldeepmandal/Concepts-TechnologiesAI.git