# Exploratory Data Visualization of the World Happiness Report 2021

## Introduction

Happiness is a universal goal, yet its influences differ greatly across cultures and regions. The World Happiness Report 2021 sheds light on the primary factors that impact happiness worldwide. This dataset encompasses happiness scores and related metrics, including GDP per capita, social support, life expectancy, and corruption perceptions for over 150 nations.

In this project, we aim to reveal significant patterns and connections within the data by utilizing exploratory data visualization. Our analysis revolves around five key questions, providing both static and interactive visualizations to clarify insights. These visual representations will aid in understanding the drivers of happiness and their variations across different regions.

## Methodology

Dataset Overview

The World Happiness Report 2021 dataset includes:

- Columns: Metrics such as Ladder Score (happiness score), Logged GDP per capita, Social Support, Generosity, Freedom to Make Life Choices, and Corruption Perceptions.
- Rows: Data from 149 countries.

Data Preprocessing

1. Data Cleaning:
   - Checked column names and addressed any missing values.
   - Standardized numerical columns for uniform visual representation.
2. Tools Utilized:
   - Pandas for data manipulation.
   - Seaborn and Matplotlib for static visual representations.
   - Plotly for creating interactive visualizations.
3. Visualization Strategy:
   - Selected the most suitable visualization techniques for each research question to highlight specific insights.
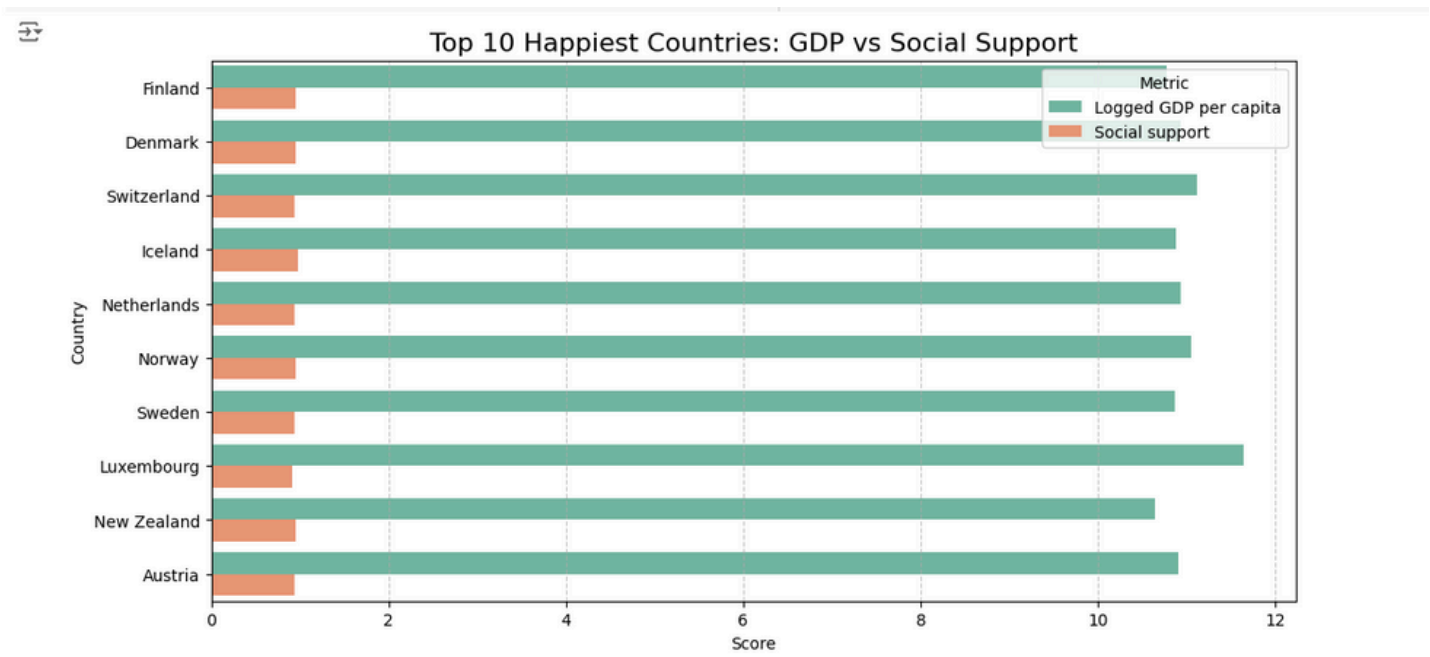
# Research Questions and Insights

Question 1: Which countries have the highest happiness scores, and how do their GDP and social support compare?

Visualization: Horizontal Bar Chart

Why Used?: A bar chart is perfect for comparing categorical data (countries) and multiple metrics (GDP and social support). Horizontal bars allow for longer country names and better readability.

Code Used: Horizontal bar chart comparing the top 10 countries based on happiness score, alongside GDP and social support metrics.

Screenshot:



Insight:
The ten happiest countries, including Finland, Denmark, and Switzerland, demonstrate high GDP per capita and social support levels. For example, Finland, ranked as the happiest, also leads in social support, underscoring the importance of community and relationships in fostering happiness. While GDP plays a role, variations among these countries suggest that additional factors significantly impact happiness.
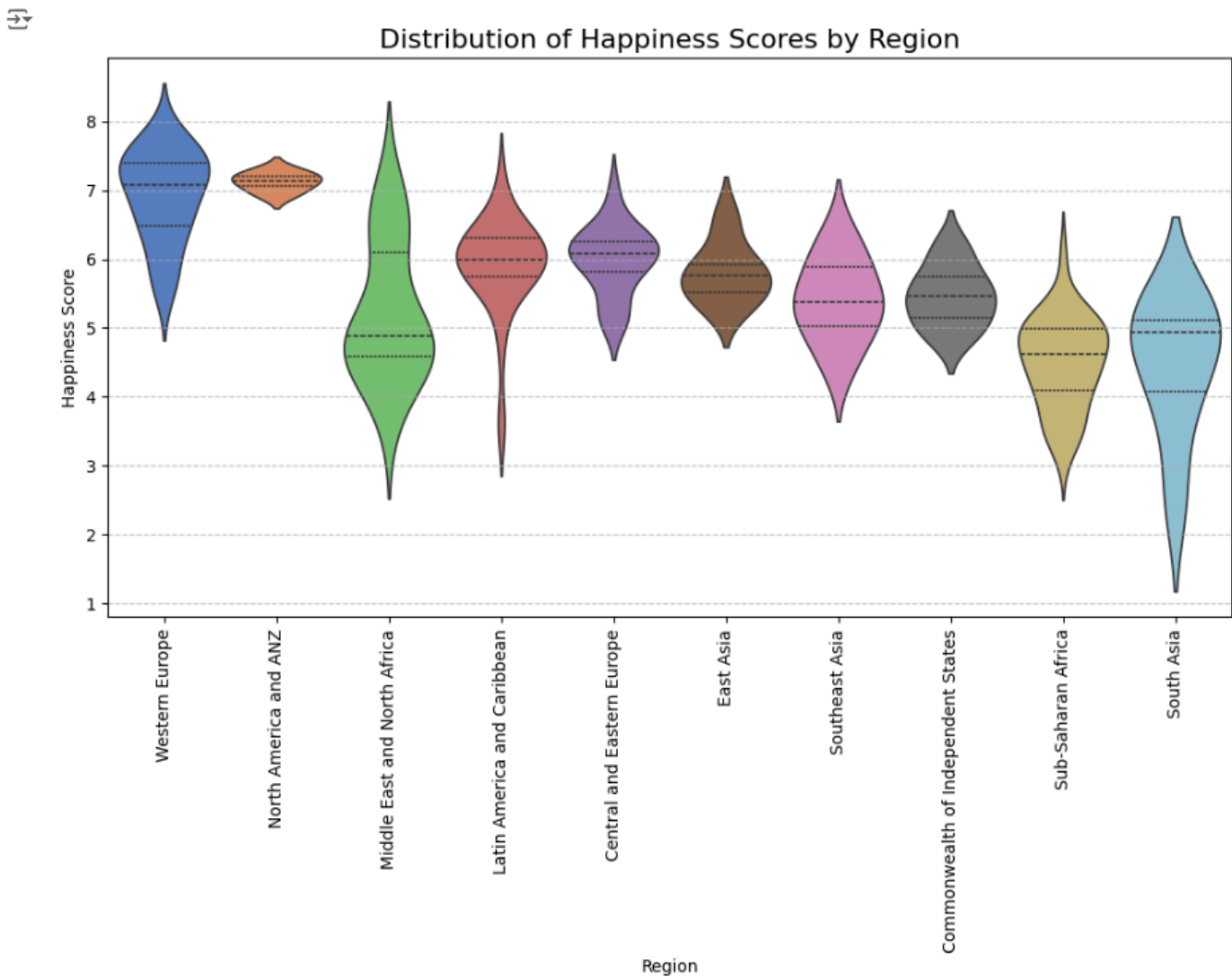
Question 2: What is the distribution of happiness scores across different regions?

Visualization: Violin Plot

Why Used?: A violin plot shows both the distribution and variability of happiness scores within regions. It combines the precision of a box plot with the density visualization, making it ideal for spotting patterns and outliers.

Code Used: Violin plot illustrating the distribution of happiness scores by region.

Screenshot:



Insight:
The violin plot indicates notable regional disparities. Western Europe boasts the highest median happiness scores with a relatively narrow range. Conversely, Sub-Saharan Africa shows the lowest median scores and a broader distribution, indicating greater variability in happiness across the region. This pattern highlights the influence of regional socio-economic and political stability on happiness.
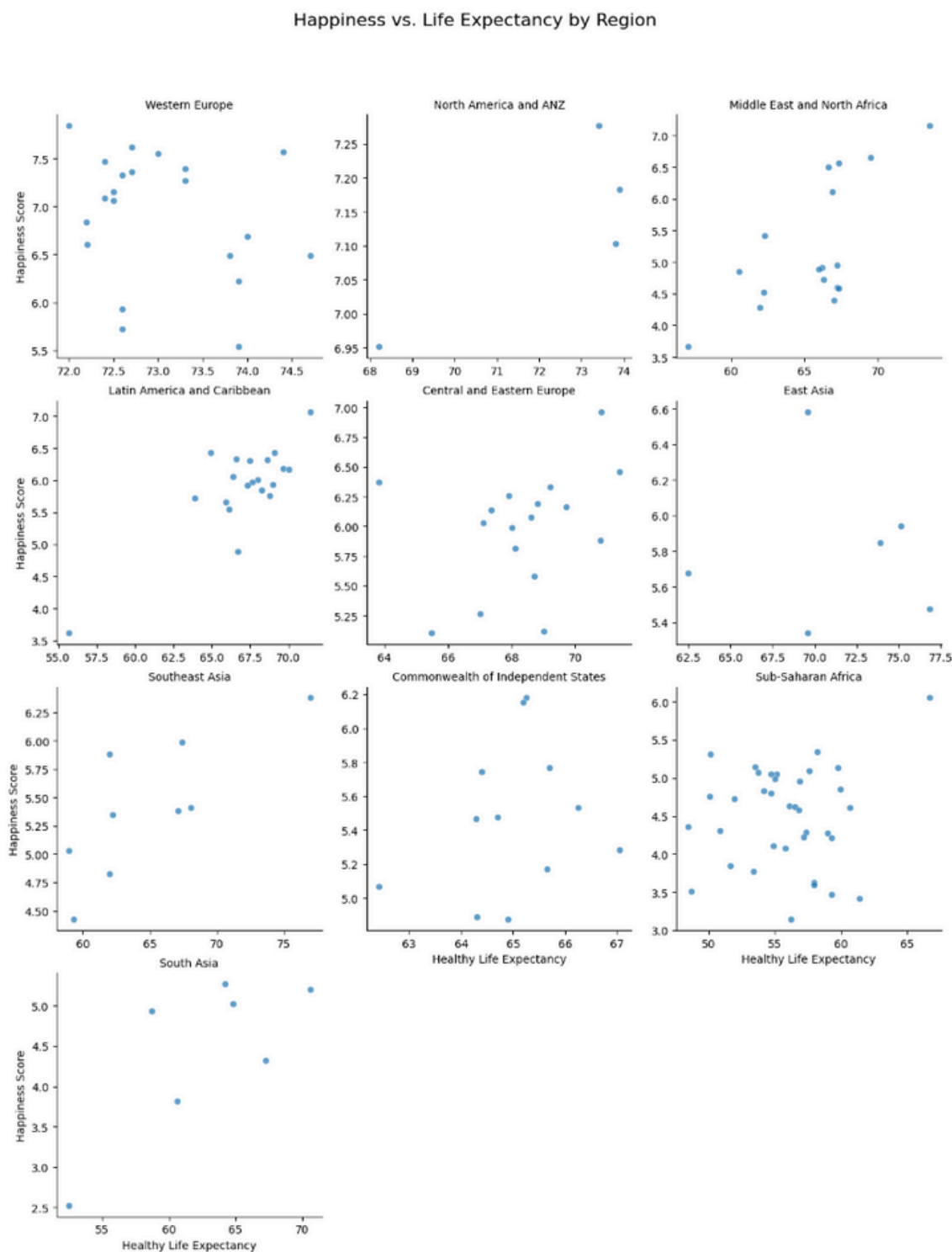
Question 3: What is the relationship between happiness and healthy life expectancy, and does it differ by region?

Visualization: Faceted Scatter Plots

Why Used?: Scatter plots highlight relationships between two numerical variables (happiness and life expectancy). Faceting by region breaks down the data, making it easier to compare trends without overcrowding.

Code Used: Scatter plots for each region depicting the relationship between happiness and healthy life expectancy.

Screenshot:



Happiness vs. Life Expectancy by Region

Insight:

In most regions, a positive correlation can be observed between happiness and healthy life expectancy. For instance, Western Europe displays a strong linear relationship, implying that nations with longer life expectancies also report higher happiness. In contrast, this correlation is less evident in Sub-Saharan Africa, suggesting that other factors may play a more dominant role in determining happiness in this area.
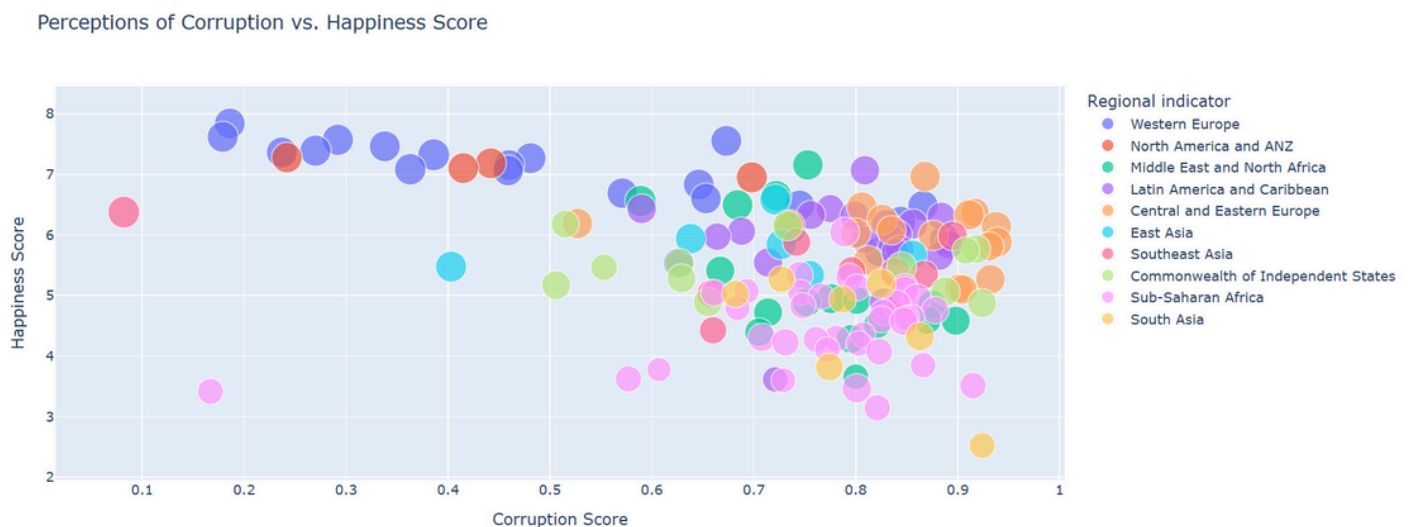
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Question 4: Which countries have the highest perceptions of corruption, and how does it impact their happiness?

Visualization: Bubble Chart

Why Used?: A bubble chart enables visualization of three variables simultaneously (happiness, corruption, and GDP). Adding interactivity helps users explore detailed insights, such as identifying countries by name.

Code Used: Interactive bubble chart illustrating corruption against happiness, color-coded by region.

Screenshot:



Insight:

Countries with elevated corruption scores, such as Afghanistan and Venezuela, report lower happiness levels. In contrast, regions like Western Europe exhibit both low corruption and high happiness, highlighting an inverse relationship. Additionally, the bubble size, representing GDP, indicates that wealthier nations generally experience lower corruption, thereby positively affecting happiness.
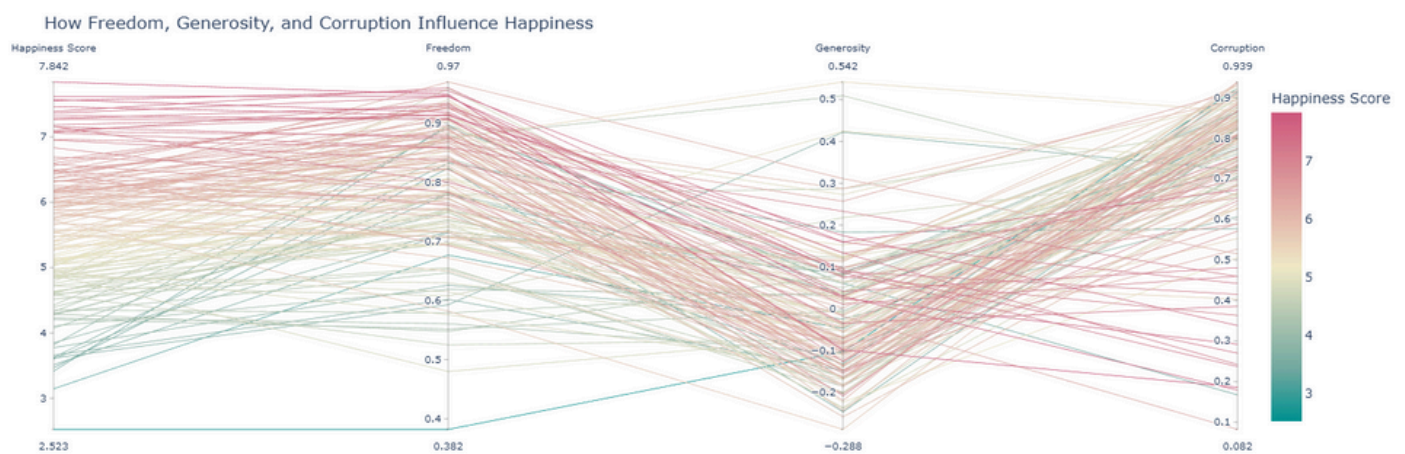
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Question 5: How do freedom, generosity, and corruption collectively influence happiness scores?

Visualization: Parallel Coordinates Plot

Why Used?: This plot is best for comparing multiple variables across countries, showing how happiness interacts with freedom, generosity, and corruption. It helps visualize patterns and outliers in a single chart

Code Used: Parallel coordinates plot comparing happiness with freedom, generosity, and corruption levels.

Screenshot:



Insight:
Nations with higher happiness scores reflect a balanced mix of freedom, generosity, and low corruption. For example, Nordic countries consistently rank high across these dimensions, while countries with lower happiness, particularly in Sub-Saharan Africa, exhibit significant imbalances, notably lower freedom and higher corruption.

## Conclusion

The analysis reveals crucial insights into global happiness:

- Social and Economic Factors: While high GDP and social support are vital, they are not the sole contributors—freedom, generosity, and low corruption also play key roles.
- Regional Disparities: Western Europe shines in happiness scores, while Sub-Saharan Africa faces considerable challenges.
- Health and Happiness: Life expectancy shows a strong correlation with happiness, particularly in developed areas.

Interactive visualizations enriched the analysis by enabling dynamic exploration. These findings emphasize the complex nature of happiness, highlighting the necessity for comprehensive strategies to enhance well-being globally.

## Appendix

1. Google Colab Notebook: [https://colab.research.google.com/drive/1MFCUnBFDG6URl3KQEasOOnjvMuHINeV1?usp=sharing]
2. Dataset Source: Kaggle - World Happiness Report 2021-https://www.kaggle.com/code/ajaypalsinghlo/world-happiness-report-2021-world/input?select=world-happiness-report.csv
3. Interactive Video: https://youtu.be/CYIfJxgH63A

This report illustrates how data visualization can effectively reveal patterns and insights, providing a deeper understanding of the factors influencing happiness around the world.