CSE 564: Project Report

World Happiness Analysis

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Introduction:

Being happy is vital in achieving one's goals and also for a healthy lifestyle. Happiness creates a wave of liveliness and a happy society leads to a prosperous country. Many leaders consider happiness as an important metric of public policies and law and order in the region. The World Happiness Report is a landmark survey of the state of global happiness. Leading experts across fields – economics, psychology, survey analysis, national statistics, health, public policy and more – describe how measurements of well-being can be used effectively to assess the progress of nations.

We find this topic very interesting and that is why we took it up as our project to find some interesting insights from the dataset. The product of this project is a visualization dashboard tool for the better understanding of the World Happiness Dataset which will supplement people with the knowledge of factors and implications governing the World Happiness Index. We will look into what all factors affect happiness and how a country can learn from others to improve the happiness index for their citizens.

For this project we are choosing the World Happiness Index dataset by Sustainable Development Solutions Network(SDN) which is a part of the United Nations.

Goals:

1. Analyse the relationship between various factors that contribute towards the happiness of people.
2. Draw inferences by comparing various factors of the world's most and least happiest countries.
3. Based on the inferences, identify what least happy countries can improve or what they can learn from the happiest countries in order to provide a better life to their citizens.
4. Analyse the data for different countries over a span of 5 years and visualize the evolution of happiness score in these countries.

Dataset:

The dataset incorporates analysis by experts in economics, neuroscience and statistics, and shows how measurements of well-being can be used to evaluate a country’s progress. General

assessments of individuals' whole lives as well as data about their emotional experiences were collected and considered.

The happiness ranking of countries was determined by asking individuals to evaluate their lives as a whole, according to six variables. Respondents scored them on a scale of 0 to 10.

Column name	Description
Country	Name of the country
Region	Region the country belongs to
Happiness Rank	Rank of the country based on the Happiness Score.
Happiness Score	On a scale of 0-10
GDP	GDP contribution towards happiness
Family	Family contribution towards happiness
Health (Life Expectancy)	Life expectancy contribution towards happiness
Trust (Government Corruption)	How corruption affects happiness
Generosity	Generosity among people that contributes towards happiness

Data Preparation:

- Combine the dataset for a span of five years for different countries.
- There were no missing values in our dataset.
- We had to manually correct for the names of countries across the data for different years, since the USA and United States of America are the same.

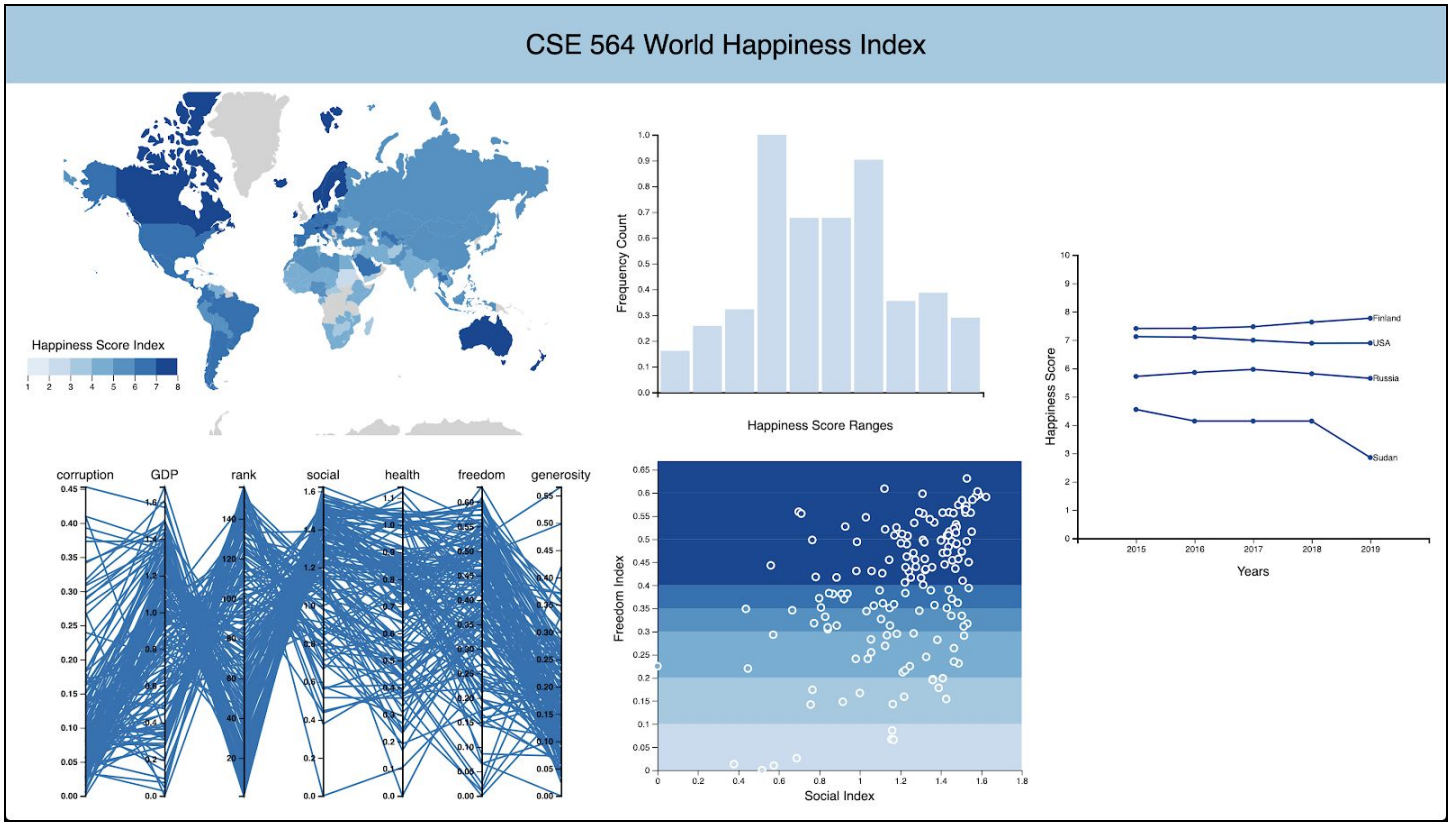
Hypothesis:

If we are asked to give our opinion on how the above attributes would contribute towards happiness of a country, we would state some opinions/thoughts and say that it's an obvious thing. So we also have some hypotheses for this dataset as below:

1. More the GDP, more should be the Happiness Score.
2. More the freedom index, more the happiness.
3. Less corruption, more happiness, etc

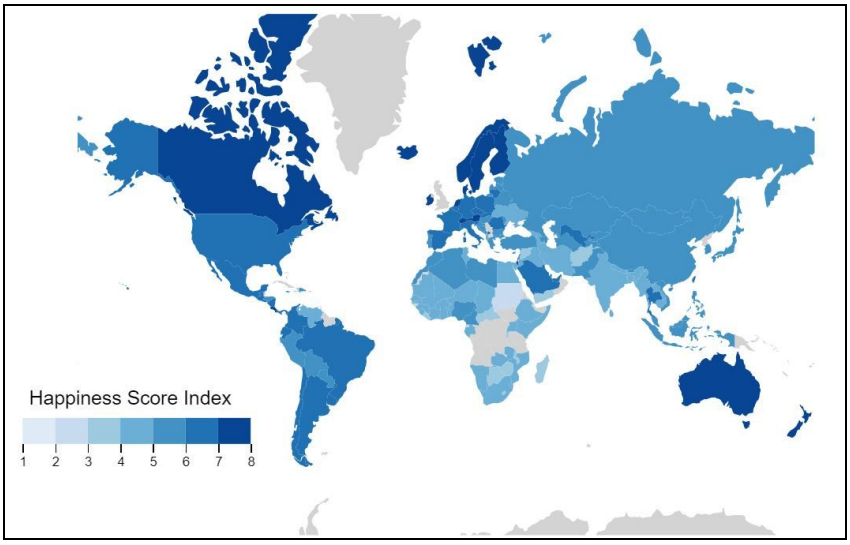
Now, let's see how our dashboard tool can help to prove/disprove some of these hypotheses.

Dashboard:



Components:

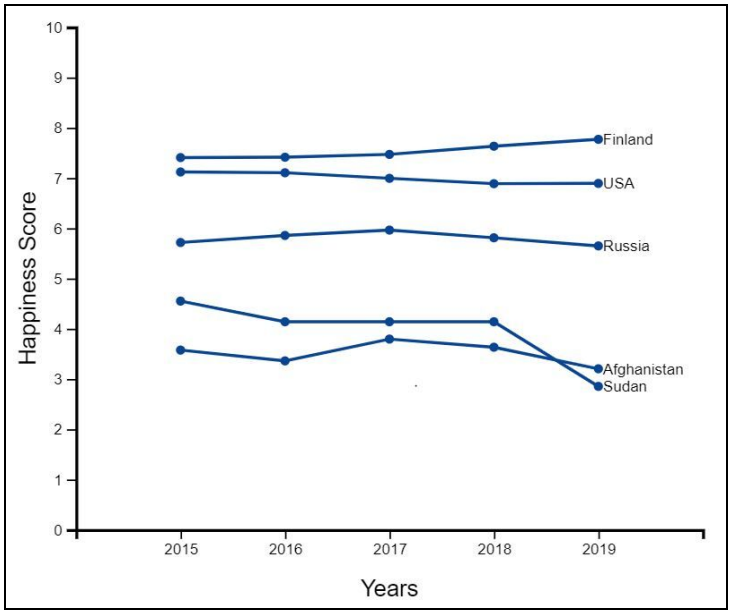
Choropleth Map:



Features:

- Visualizes countries as per their happiness score using color scale.
- **Tooltip** to show country names upon hovering over a country.
- **Legend:** Color scale ranges over happiness scores in the dataset.
- **Single click:** Single click on a country generates a time series graph showing evolution of happiness score for that country from 2015-2019.
- **Double Click:** Removes the time series graph for that country.

Time Series Graph:



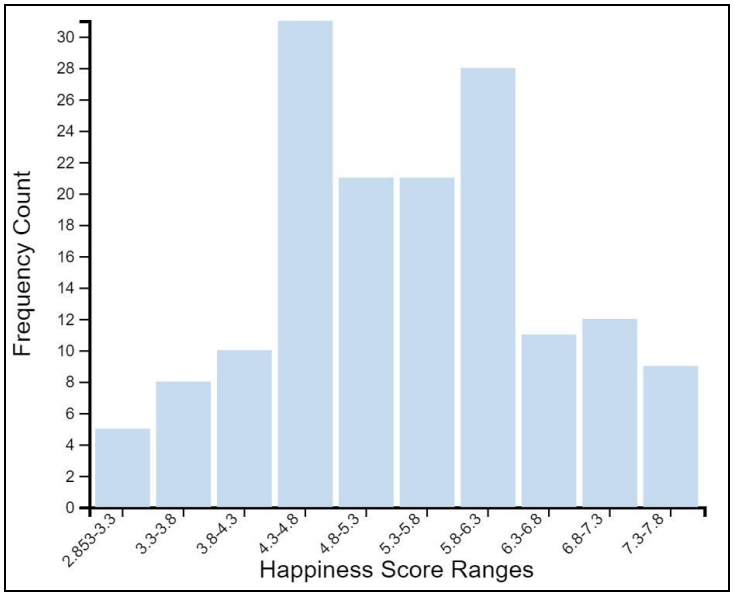
Features:

- Visualizes evolution of happiness index for the countries for the years 2015-2019.
- Generated when a single click operation is performed on a country in the choropleth map.
- Opaque circles used to represent the happiness score of a country for a particular year on the path.
- Country names are displayed at the rear end of the path.

Inferences:

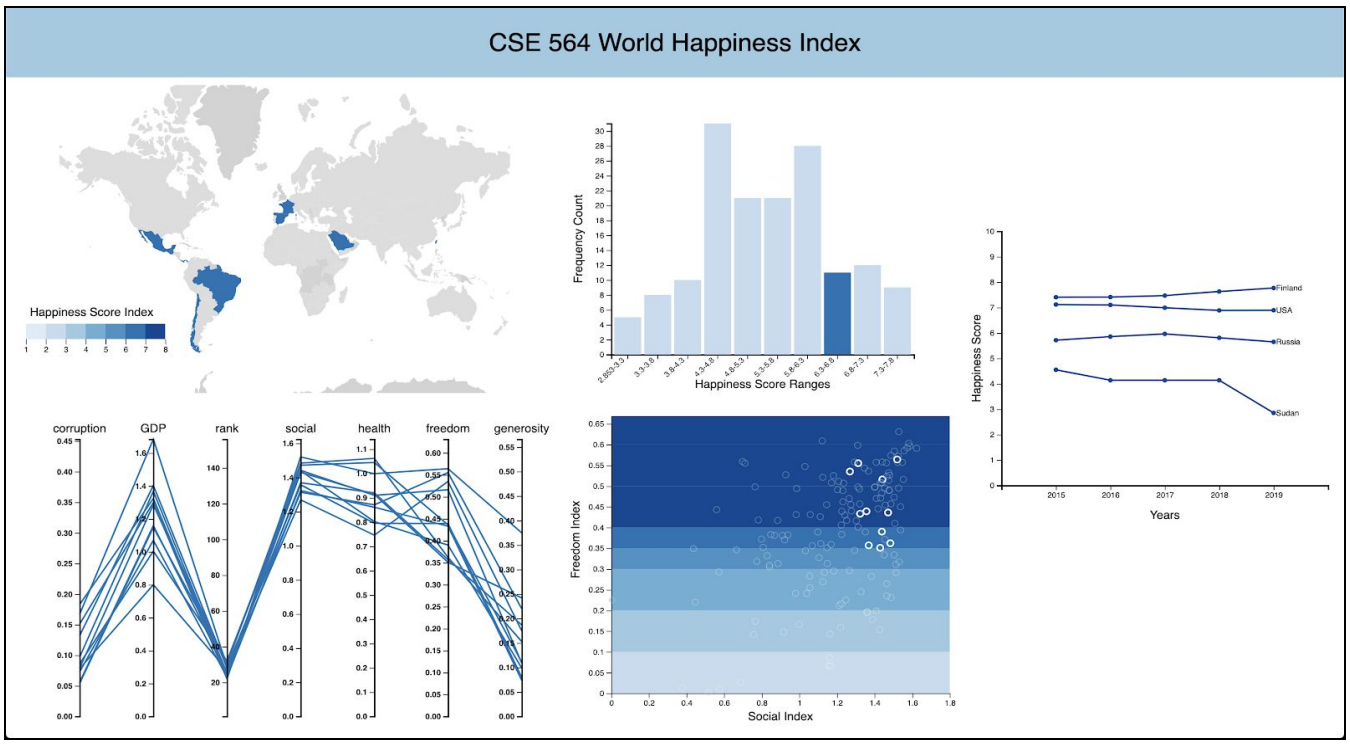
- Sudan has a consistent decline in happiness score.
- Finland is consistently improving its happiness score.
- Some countries have a consistent happiness score over the years.

Histogram:



Features:

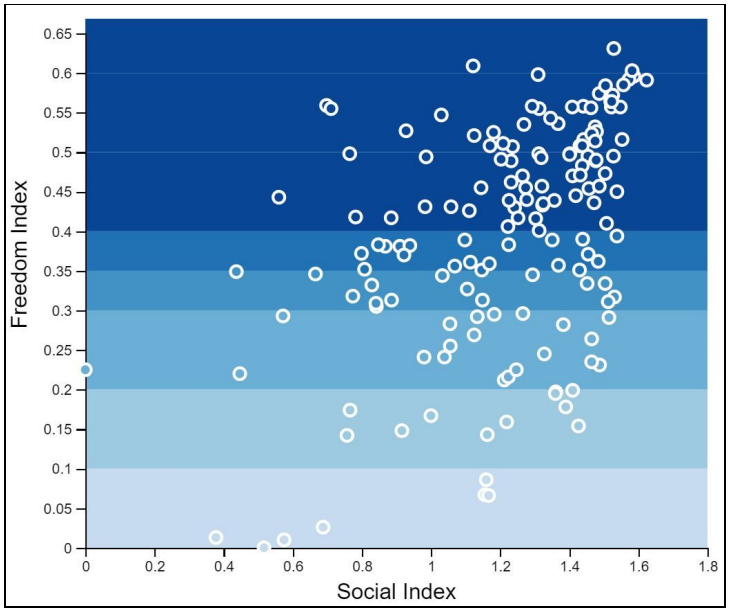
- Binning done based on the happiness score of the countries.
- **Single click** on a bin selects it and changes color from light blue to dark blue.
- **Double click** on the selected bin unselects it and restores light blue color..
- Upon **selecting a bin**, a filter is applied on the dataset to select only the countries belonging to that bin. Choropleth map, parallel coordinates and scatter plot will show data only for these countries which satisfy the score range on the histogram bar.
- Unselecting the bin will restore the entire data back.



Inferences:

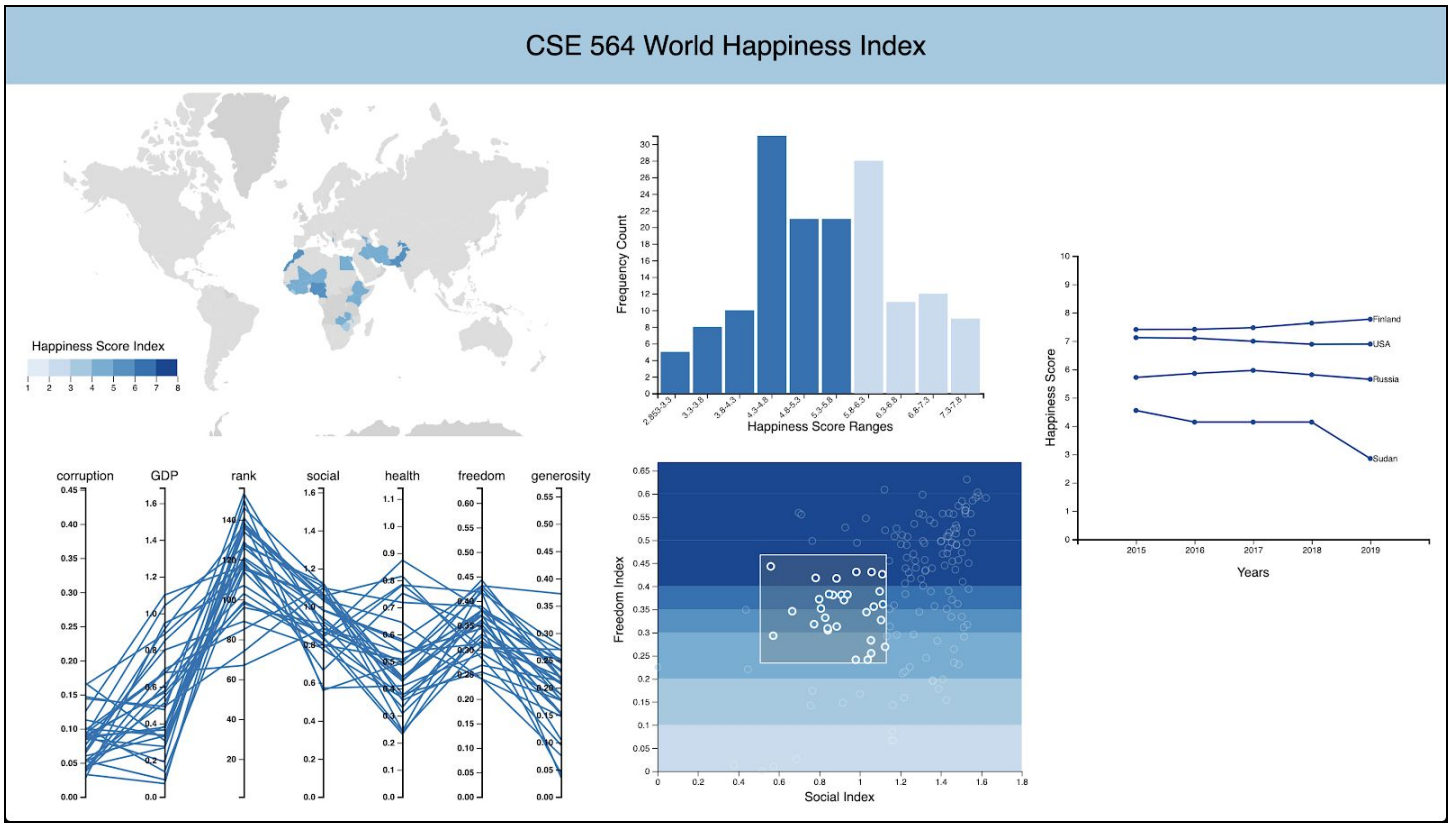
- Only 1/4th of the countries have a happiness index greater than 6.
- Majority of countries have a happiness score between 4-6.
- For countries with high happiness scores, corruption is very high. Does this mean people are happy due to corruption?
- For countries with low happiness scores, corruption is low. Why are they still unhappy?

Scatterplot:



Features:

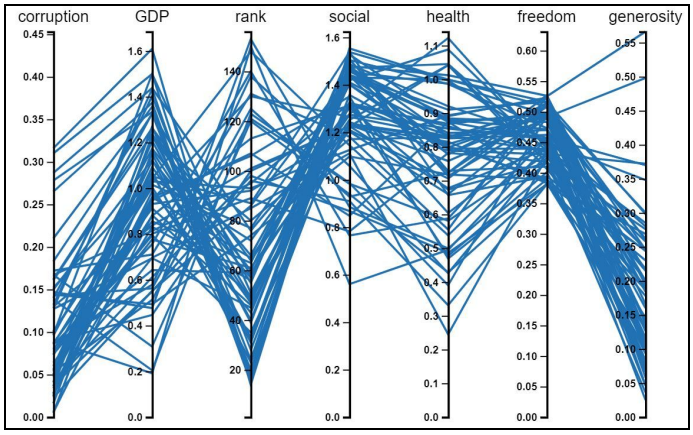
- Visualizes correlation between Social support and freedom of making choices in a country.
- Each point is represented by a no fill circle.
- **Brushing** feature is implemented on this plot.
- Can select a particular point or set of points using brushing.
    - Highlights all the bins in histogram containing countries of the selected points.
    - Highlights countries in the map for selected points.
    - Displays path only for the countries of the selected points(parallel coordinates).
    - Can move this generated outline box over the plot to see different set of points.
- Single click on scatterplot restores the entire data and removes the brushing effect from all the visuals.



Inferences:

- As per intuition, there is a positive correlation between social support and freedom to make choices.
- Though we were expecting that countries with high social support and freedom of choice will be amongst one of the happiest countries, it is not true in all the cases. This means that some other factors also have a significant impact on determining happiness. One of such factors is GDP. A low-medium GDP indicates low economic support which may be significant for happiness.

Parallel Coordinate:



Features:

- Visualizes how various factors correlate with each other and vary as per the happiness scores.
- A path represents data for a particular country.
- When a particular bin is selected in histogram or a set of points is selected in scatter plot, parallel coordinates will help us to visualize the trend/correlation between features for those selected countries.

Inferences:

- Corruption has positive correlation with GDP for happiest countries and negative correlation for least happy countries.
- As per the intuition, GDP and happiness rank have a positive correlation.
- Health is positively correlated with the happiness rank.

Implications/Applications:

Happiness is increasingly considered an important and useful factor to guide public policy and measure its effectiveness. More and more, local and national governments are using the data on happiness to shape policies that enhance the lives of their citizens. To shape policy with data about happiness and well-being, a cost-benefit analysis can be done ranking all potential policies according to the amount of happiness they might produce per dollar spent.

Knowing about the factors contributing towards the happiness measure, can provide individuals with useful and important information which will help them shape their mental outlook towards the country and fellow individuals. They can take proactive measures to work towards their own betterment and their nation's.

For NGOs, and various philanthropic organizations working in different countries and various fields, the understanding of the World Happiness Index data will provide them with essential data to identify and work for the mitigation of hardship and problems in various countries identified through this dashboard's visual analytics ability.

References:

About Dataset:
https://worldhappiness.report/faq/#why-do-we-use-these-six-factors-to-explain-life-evaluations
https://worldhappiness.report/ed/2020/cities-and-happiness-a-global-ranking-and-analysis/

D3 Code templates:
https://bl.ocks.org/
https://observablehq.com/

Youtube Demo Video: https://www.youtube.com/watch?v=IUhTCR9Mqdk