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Motivation and Line of Questioning

- Happiness is well-understood, but not always well-defined
- Key Questions this analysis seeks to explore around Happiness
 - What are some key contributing metrics to happiness and how does each influence the happiness of a population on a country-level?
 - What are some of the strongest metrics that correlate with the happiness of a population overall?
 - Which countries are the happiest?
 - Does the average air quality (as defined by particular matter concentration) in a given country correlate with happiness?
 Why or why not?
 - Is there a correlation between the number of deaths due to air pollution and happiness? Why or why not?
 - Is there a correlation between particulate matter concentration and number of deaths due to air pollution? Why or why not?
 - 50 Shades of Grey is considered to be one of the worst movies from the past decade. Do countries that have the lowest (per capita?) sales for movie tickets for 50 Shades of Gray have a higher level of happiness than countries where more people patronized the film in theaters? Does a bad movie affect Global Happiness? (control)

Motivation and Line of Questioning

- What questions did we want to ask about happiness?
 - Why were we interested in air pollution?
 - Why look at pollution to talk about happiness? That's a good question. Pollution and climate change are existential challenges facing humanity. In a <u>National Geographic</u> article in July 10, 2019 it is forecasted that global temperatures will rise 3-4 degrees celsius due to air pollution and greenhouse gases. These events will put pressures on countries and societies in many ways, happiness being one. Using data analysis, our group wants to ask: Is there a correlation between pollution and happiness within a country?
 - Why were we interested in the movie 50 Shades of Gray?
 - Considered the worst movie of 2015 (along with Fantastic Four)
 - Were happier countries more likely to avoid this film in order to preserve that happiness?

Searching for the Data

Global Happiness Report

- The World Happiness Report is produced using the Gallup World Poll (GWP) and contains scores for 153 countries along with the factors used to explain the score.
- The Gallup World Poll uses the Cantrill Ladder, which asks respondents to think of a step with the most excellent conceivable life for them being a 10 and the most exceedingly bad conceivable life being a 0 and to rate their claim current lives on that scale.
- Each of the factors are scored relative to other countries in the study. The factors included are: GDP per capita,
 Healthy Life Expectancy, Social Support, Freedom to make life choices, Generosity, Corruption Perception.
- Air pollution data was collected from the open source website <u>Our World In Data</u>, which sources its data from the Institute of Health Metrics and Evaluation at the University of Washington
 - Focus on outdoor air pollution
 - Metrics also exist for indoor air pollution and other environment
- Movie ticket sales data for 50 Shades of Gray was collected from <u>Box Office Mojo</u>

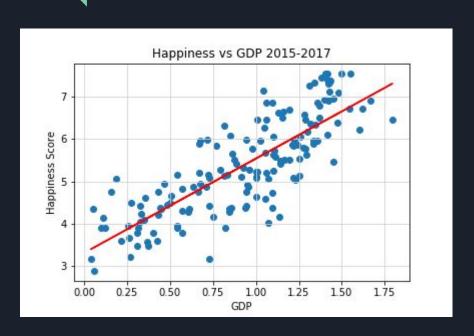
Data Cleanup and Exploration

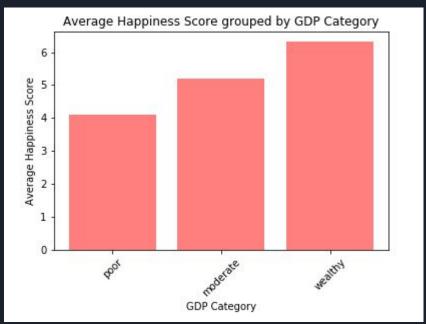
Happiness Data

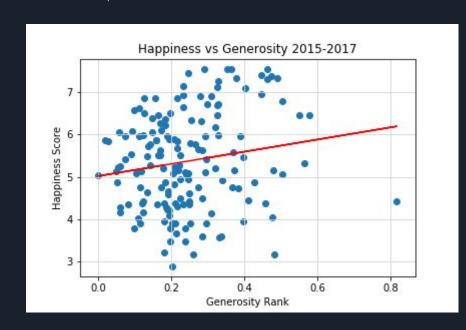
- Study publishes happiness data per year, therefore the years available for the related data sets (air pollution and movies) drove the selection of the happiness data years' datasets that were collected.
- Happiness data across 2015-2017 was merged to create a master data set with only columns of interest
- A summary data set was produced that average the target metrics across the 3 years.

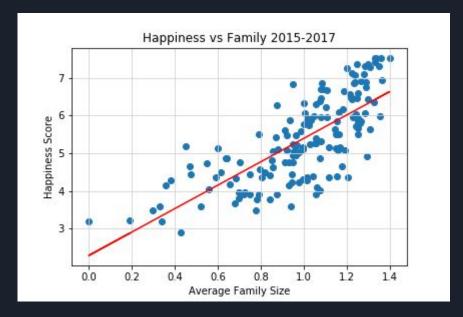
Air pollution

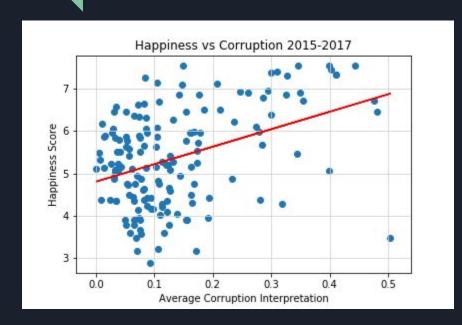
- Air pollutant concentration data (PM2.5) and per capita death rates due to air pollution were extracted from source CSV for the years 2015 and 2016, covering over 200 countries
- This data was merged with the happiness scores that were extracted from
- Merged with happiness scores extracted from cleaned happiness dataframe
- How the ticket sales data frame was constructed and merged with happiness scores
 - Sales information for 50 Shades of Grey and 50 Shades Darker were pulled from the Online Movie
 Database. Used happiness data for the year each movie was released, 2015 and 2017.
 - Merged Happiness Data for both years with opening and gross ticket sales data from both movies.
 - Plotted Scatterplots targeting a specific sample from the merged dataframe population.

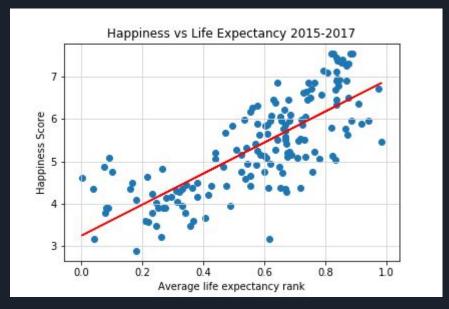


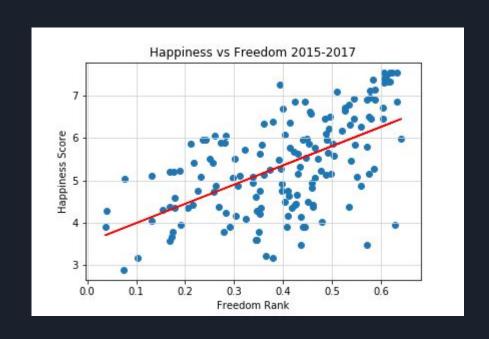








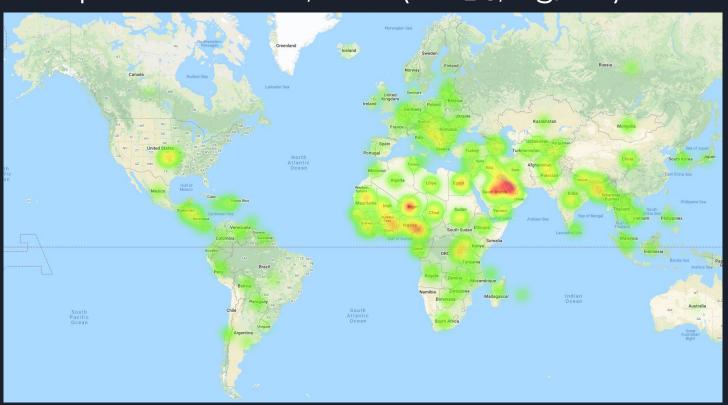




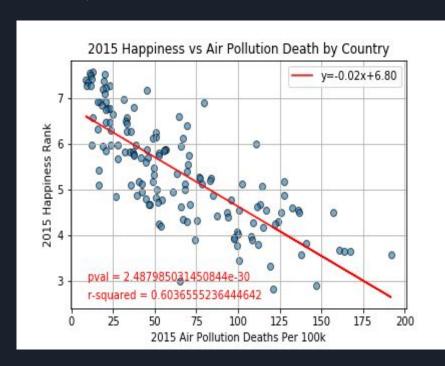
Global look at Happiness Scores Happiness Data ranked by country, 2015-2017

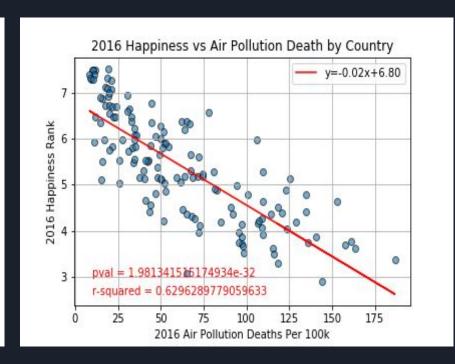


A Global View of Air Pollution Air pollutant data, 2016 (PM_{2.5}, ug/m³)

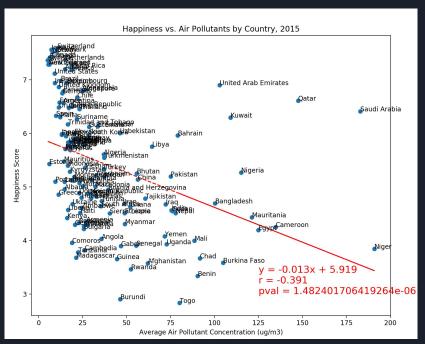


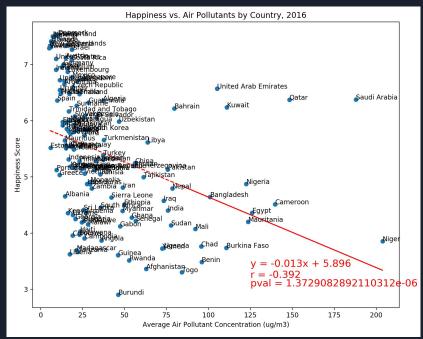
Data Analysis: Are the number of deaths due to air pollution correlated with happiness?



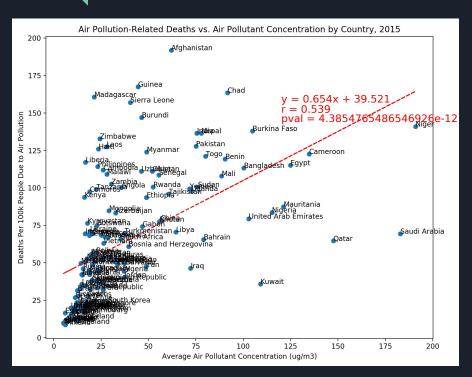


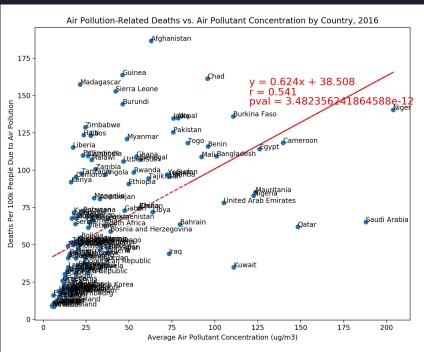
Data Analysis: Is average air pollutant concentration correlated with happiness?



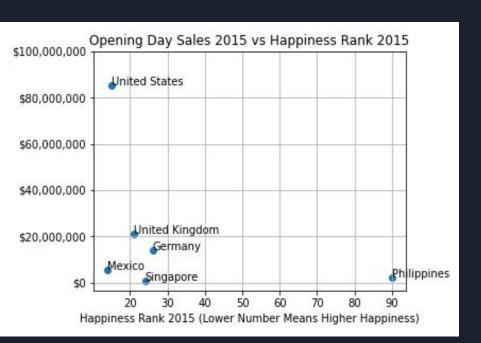


Data Analysis: Does more pollution necessarily mean more deaths?





50 Shades of Grey Opening Day and Gross Ticket Sales vs World Happiness Rank (2015)





50 Shades Darker Opening Day and Gross Ticket Sales vs World Happiness Rank (2017)





Final Points and Discussion

- Happiness is determined by a multitude factors
 - Many happiness factors are strongly subjective (e.g. perceptions of freedom and corruption)
 - Many potential factors were not covered in this analysis
- Correlation is not causation
- Air pollution is just one environmental factor that could influence lifestyle and happiness
 - Other potential contributing factors include but are not limited to greenhouse gas emissions,
 water quality, soil quality, deforestation, and plastics pollution.
 - Trends in air pollution and happiness over time is also worth investigating
- Bad Movies Increase Happiness
 - Countries who sold less movie tickets to the sequel of a bad movie were happier
 - Countries who sold more movie tickets to the sequel of a bad movie are less happy
 - Gross ticket sales to movies do not affect happiness directly

Questions?