Title: Changes in Global Temperatures

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Abstract:

We are interested in global warming throughout the world and we will analyze the changes in global temperatures by city/by country using average temperature collected. We will also make comparisons between cities within the same latitude and longitude locations. Here are the specific questions that we will look into:

1. Perform analysis about global temperature using ggmap and shiny, visualize them with different colors representing different temperatures.
2. Carry out time series analysis showing changes of temperature through different locations and make comparisons of temperatures in similar locations (in the same longitude/latitude).
3. Take into account other factors like changes in population and carbon dioxide emission, and evaluate how these factors affect specific regions' changes in temperature.
4. Create animated plots that reflect how each factor affects the changes in temperature over time around the world.

Techniques:

ggplot2, ggmap, interaction, Shiny, gganimate

Data Description:

1. Global Land Temperatures By Cities:
   https://www.kaggle.com/amelinvladislav/map-of-temperatures-and-analysis-of-global-warming/data
   a. This dataset includes temperatures of most cities around the world from the 18th century. It also includes latitudes and longitudes of cities that enable lat- or long-level comparisons of cities.
2. Temperature changes of countries:
   https://www.kaggle.com/sevgisarac/temperature-change
   a. This dataset records changes in average temperatures of each country from 1961 to 2020.
   b. Data is on a country-level, so this dataset is supplementary to the above dataset.

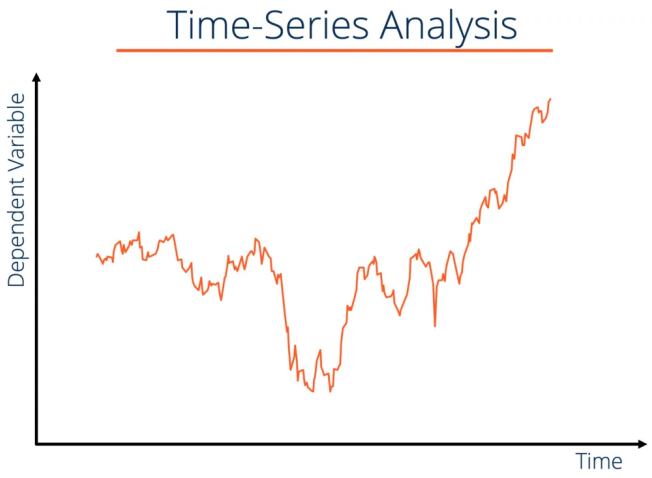
Visualizations:

Map:

We will use ggmap and shiny to make visuals of global temperatures interactive. We plan to use diverse colors to represent different levels of temperatures. Since, the temperatures are all numerical types, we may convert the data type to ordinal variables.

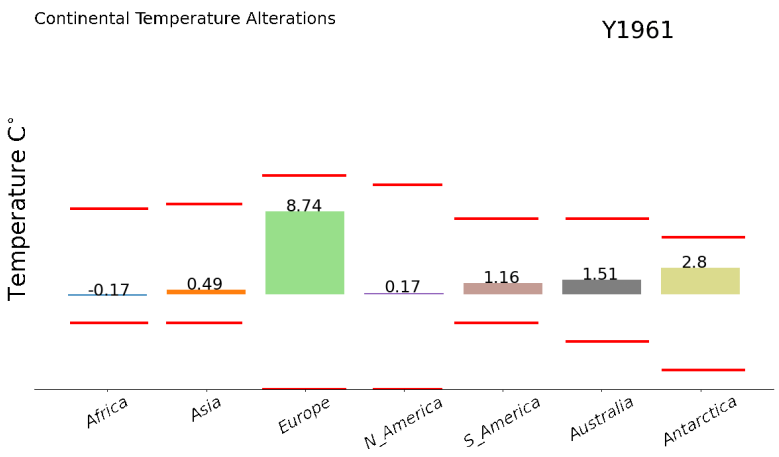
Line Plot(Time Series Analysis):

Our datasets have time data type, therefore in our analysis we could illustrate the changes of temperatures targeting specific regions(countries, cities) in comparison with the changes of population, CO2 emission, GDP, etc.
Additionally, we will compare the mean/min/max temperature increases of different regions(countries, or specific cities) along the same longitude.



Barplot:

Similarly, we are planning to use bar chart to illustrate the changes by regions (Continents) over time, we hope to see how temperature of different continents changes over time with an animated bar carts by using gganimate



Spiral chart:

We will create a colorful spiral chart to illustrate the temperature change from 1742 to 2013 with the limit of temperature rise, 1.5 and 2.0 degrees. The plot will finally show how during the last few years, the temperature has increased in relation to previous years.