Climate Change is not FAKE news

Yashashwini Gupta (yg1568)
Anuj Bhatia (arb776)
Supriya Pai (ssp570)

Project goal

Some say climate change is the biggest threat of our age while others say it's a myth based on dodgy science. Here we try to analyze how the world temperatures are shifting over the years on a day to day basis.

Data Set

Our dataset includes the following separate files-

Global Land and Ocean-and-Land Temperatures (GlobalTemperatures.csv):

- Date: starts in 1750 for average land temperature and 1850 for max and min land temperatures and global ocean and land temperatures
- LandAverageTemperature: global average land temperature in celsius
- LandAverageTemperatureUncertainty: the 95% confidence interval around the average
- LandMaxTemperature: global average maximum land temperature in celsius
- LandMaxTemperatureUncertainty: the 95% confidence interval around the maximum land temperature
- LandMinTemperature: global average minimum land temperature in celsius
- LandMinTemperatureUncertainty: the 95% confidence interval around the minimum land temperature
- LandAndOceanAverageTemperature: global average land and ocean temperature in celsius
- LandAndOceanAverageTemperatureUncertainty: the 95% confidence interval around the global average land and ocean temperature

Other files include:

- Global Average Land Temperature by Country (GlobalLandTemperaturesByCountry.csv)
    - date
    - AverageTemperature
    - AverageTemperatureUncertainty
    - Country

- Global Average Land Temperature by State (GlobalLandTemperaturesByState.csv
    - date
    - AverageTemperature
    - AverageTemperatureUncertainty
    - State
    - Country
- Global Land Temperatures By Major City (GlobalLandTemperaturesByMajorCity.csv)
    - date
    - AverageTemperature
    - AverageTemperatureUncertainty
    - City
    - Country
    - Latitude
    - Longitude
- Global Land Temperatures By City (GlobalLandTemperaturesByCity.csv)
    - date
    - AverageTemperature
    - AverageTemperatureUncertainty
    - City
    - Country
    - Latitude
    - Longitude

Analytical Questions and Proxy Tasks

Make a list of questions you want to answer in your project and corresponding proxy tasks (referring to the attributes described in the previous section).

1. Which countries record the largest temperature change and susceptibility to rise in temperature?
    - Proxy task: Temperature change: increase/decrease in temperature and Susceptibility: Compare the Average temperature of all countries to the average temperature of a particular country

2. How the temperature change over seasons from 1750 to 2015 in the US?
    - Proxy task: Determine the seasonality from the months and compare the trend over the years
3. Which states in the US record the highest temperature differences?

    - Proxy task: Find the difference between the max and min temperature value for every state

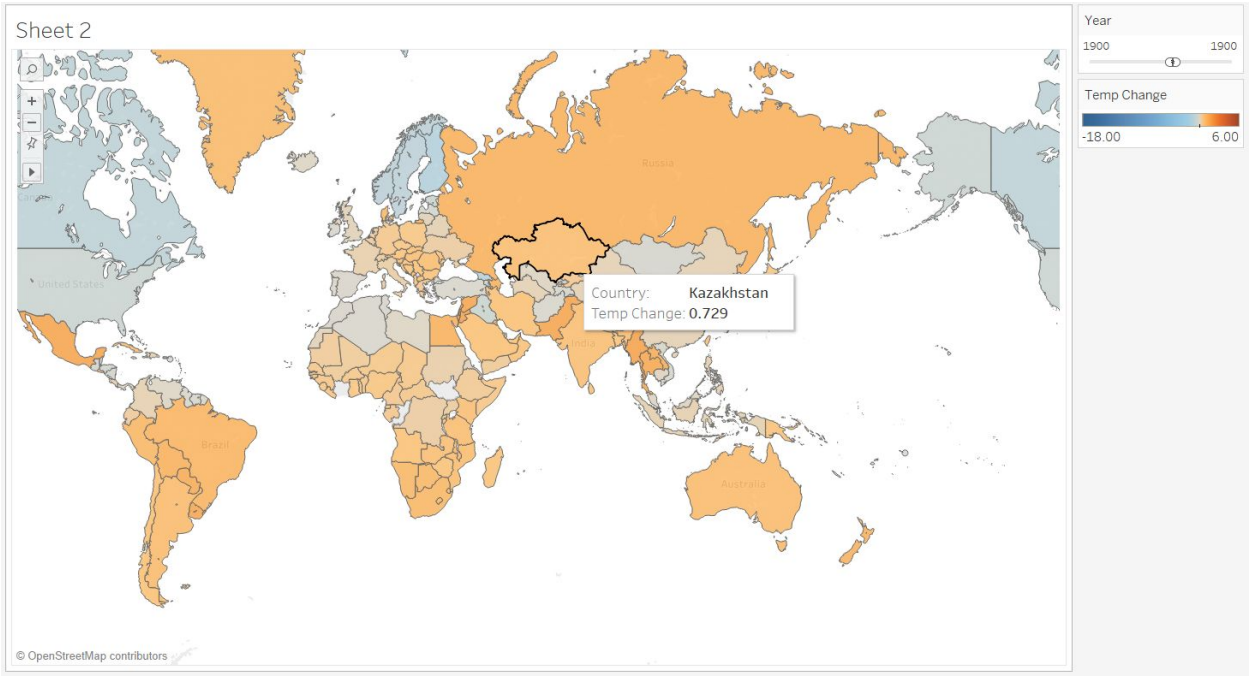
4. Is the gap between two extreme events shrinking, meaning that extremes are becoming more extreme faster than before?
    - Proxy task: Is the difference between the max and min temperature increasing or decreasing
5. How is the temperature uncertainty varying from 1750 for major cities in US?
    - Proxy task: Does the temperature uncertainty reduce over time

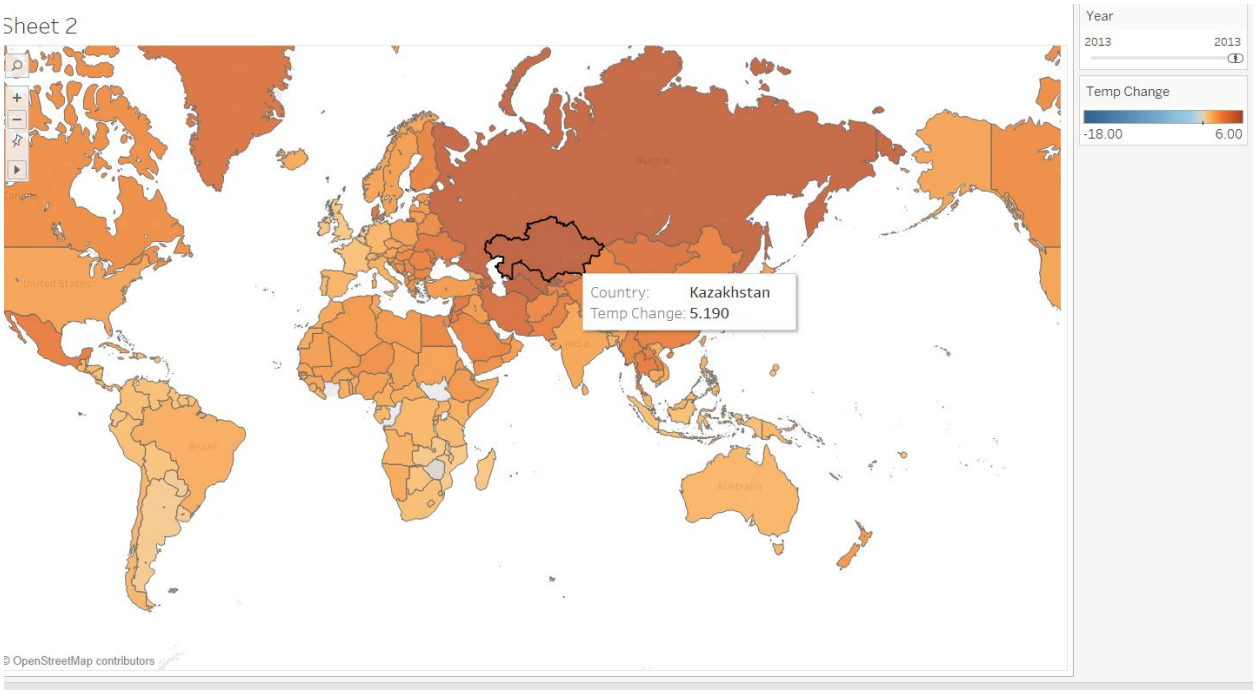
Story Design

Data Analysis

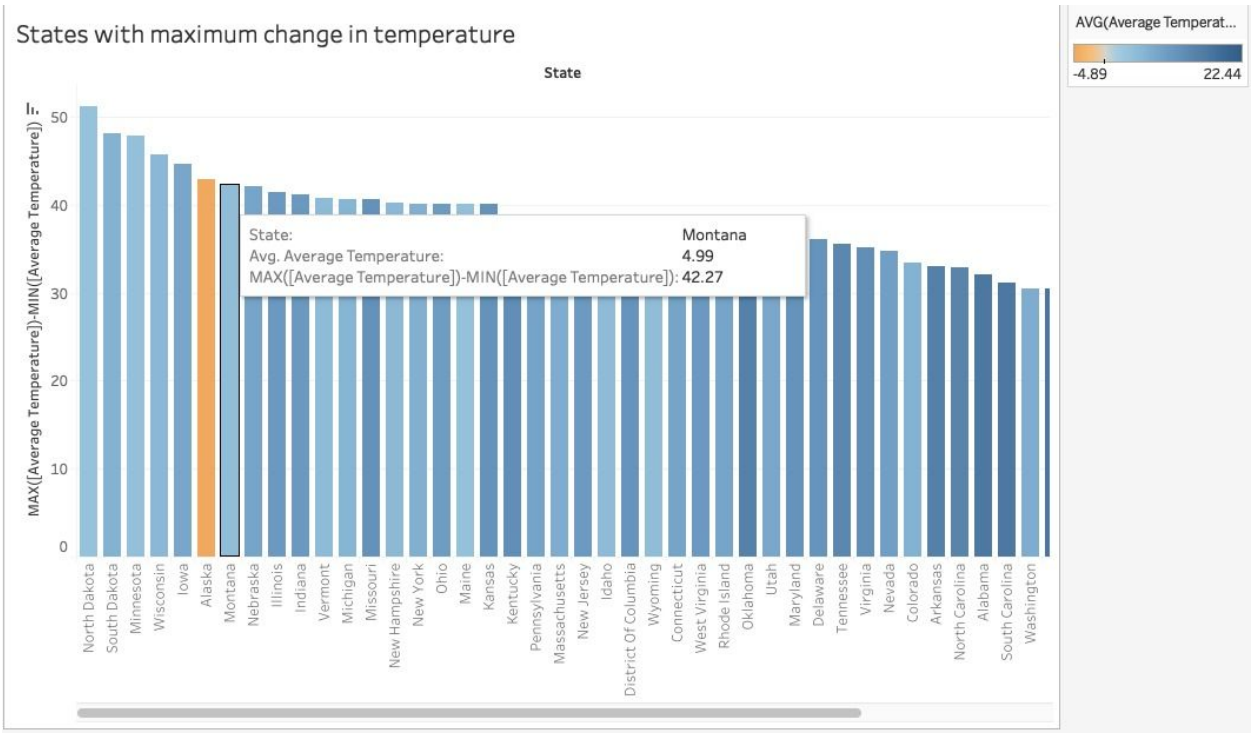
Which countries record the largest temperature change and susceptibility to rise in temperature?

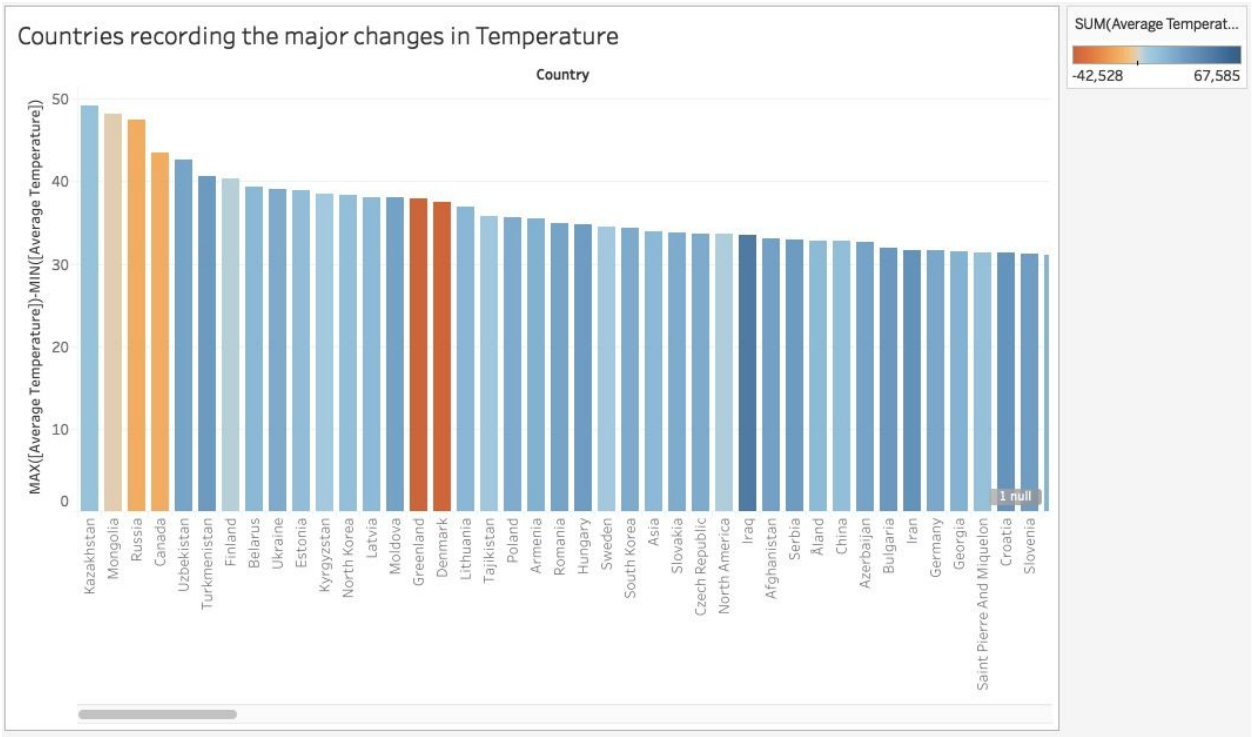
Consider the country Kazakhstan here:
The base temperature for Kazakhstan is considered as 3.75℃ (average) from the year 1812. In comparison to this, the temperature change in the year 1900 was only 0.73℃. However, the difference rose to 5.2℃ in 2013, which means the average temperature in 2013 was 8.95℃.

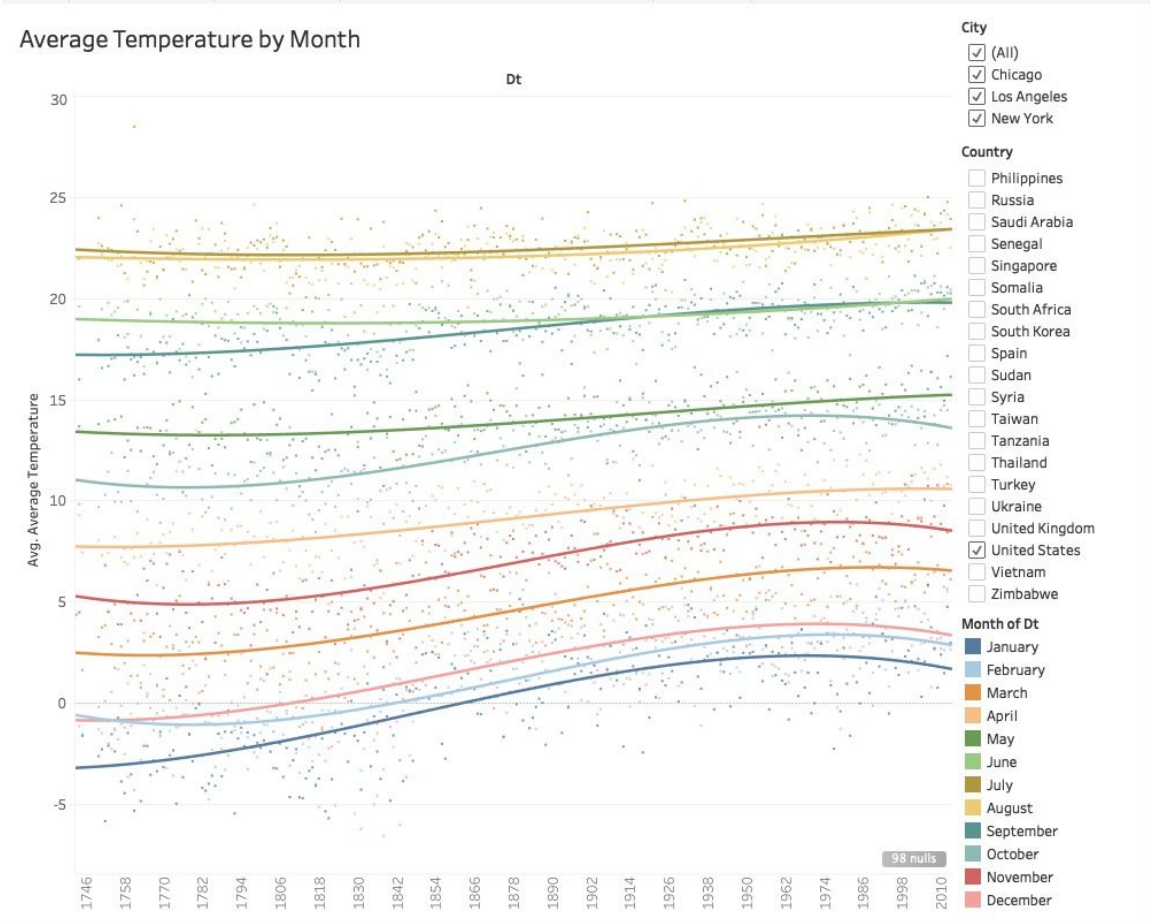




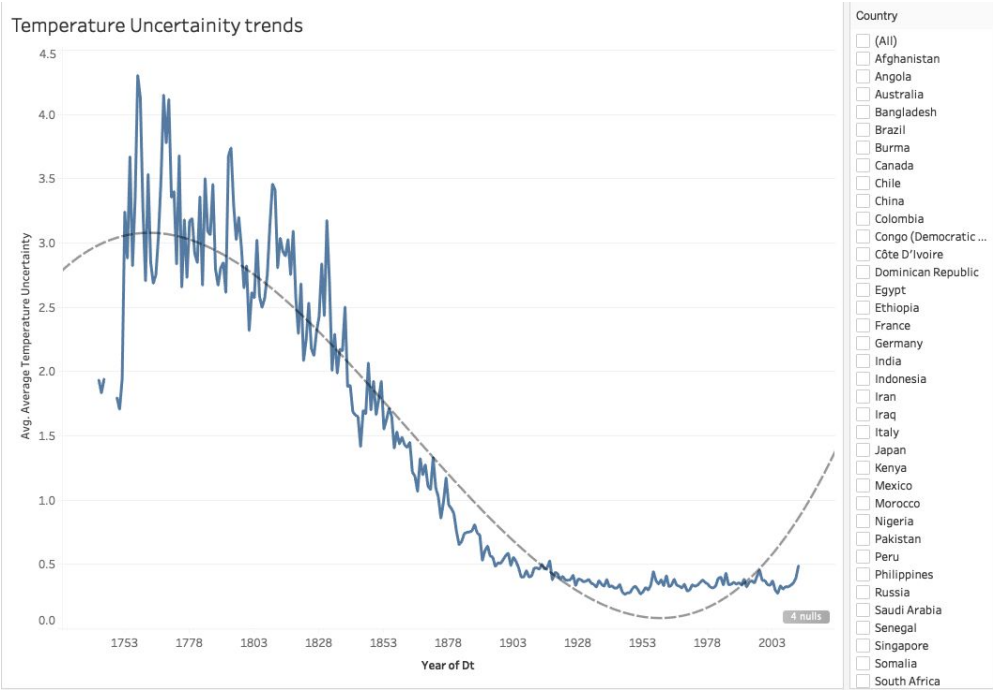
Is the gap between two extreme events shrinking, meaning that extremes are becoming more extreme faster than before?



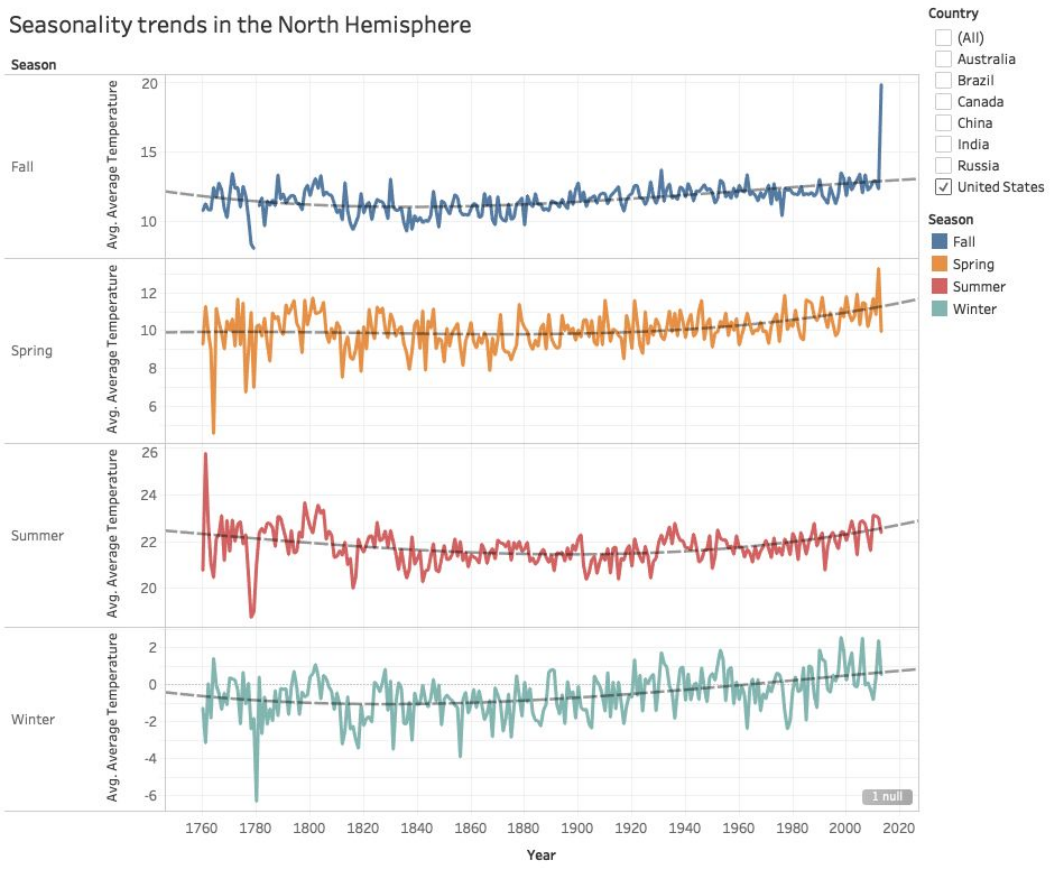

Countries recording the major changes in Temperature
Country
MAX([Average Temperature])-MIN([Average Temperature])
50
40
30
20
10
0
Kazakhstan
Mongolia
Russia
Canada
Uzbekistan
Turkmenistan
Finland
Belarus
Ukraine
Estonia
Kyrgyzstan
North Korea
Latvia
Moldova
Greenland
Denmark
Lithuania
Tajikistan
Poland
Armenia
Romania
Hungary
Sweden
South Korea
Asia
Slovakia
Czech Republic
North America
Iraq
Afghanistan
Serbia
Åland
China
Azerbaijan
Bulgaria
Iran
Germany
Georgia
Saint Pierre And Miquelon
Croatia
Slovenia
1 null
SUM(Average Temperat...
-42,528
67,585


Average Temperature by Month
Dt
Avg. Average Temperature
30
25
20
15
10
5
0
-5
1746
1758
1770
1782
1794
1806
1818
1830
1842
1854
1866
1878
1890
1902
1914
1926
1938
1950
1962
1974
1986
1998
2010
98 nulls
City
(All)
Chicago
Los Angeles
New York
Country
Philippines
Russia
Saudi Arabia
Senegal
Singapore
Somalia
South Africa
South Korea
Spain
Sudan
Syria
Taiwan
Tanzania
Thailand
Turkey
Ukraine
United Kingdom
United States
Vietnam
Zimbabwe
Month of Dt
January
February
March
April
May
June
July
August
September
October
November
December

How is the temperature uncertainty varying from 1750 for major cities in US?
With time, the measure in the uncertainty of temperature is decreasing for more developed countries the uncertainty measure is close to zero but for less developed countries



How the temperature change over seasons from 1750 to 2015 in the US?
For US , the trend line shows the temperature increases over time from 1750 to 2015 for all the seasons. There are slight variations but the the overall trend is upwards.



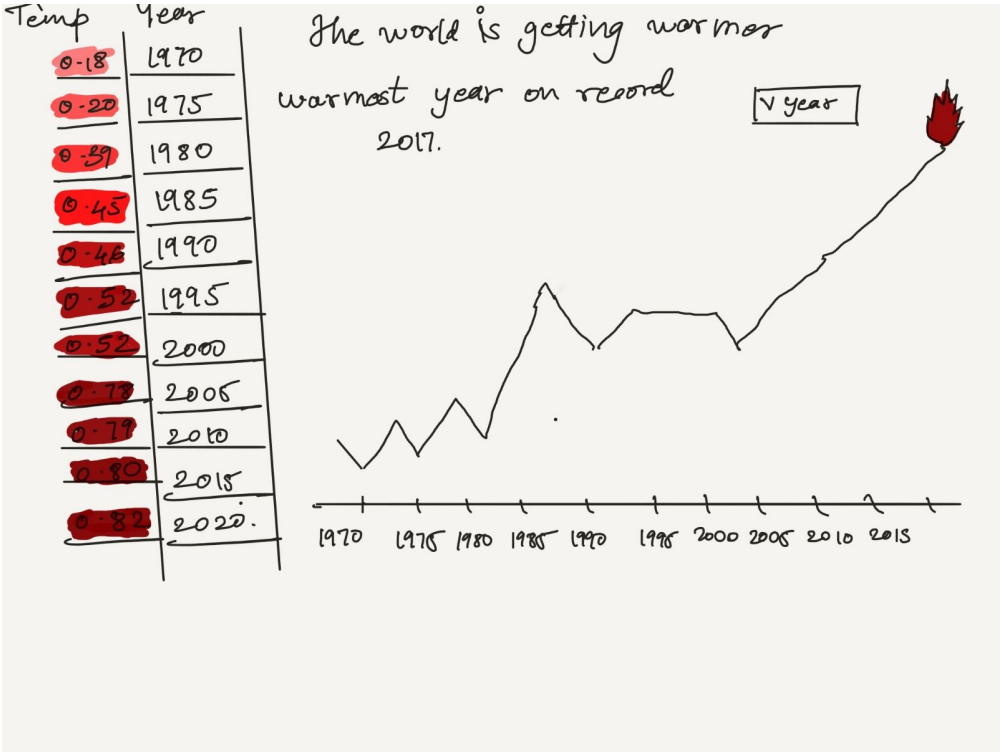
Storyboard

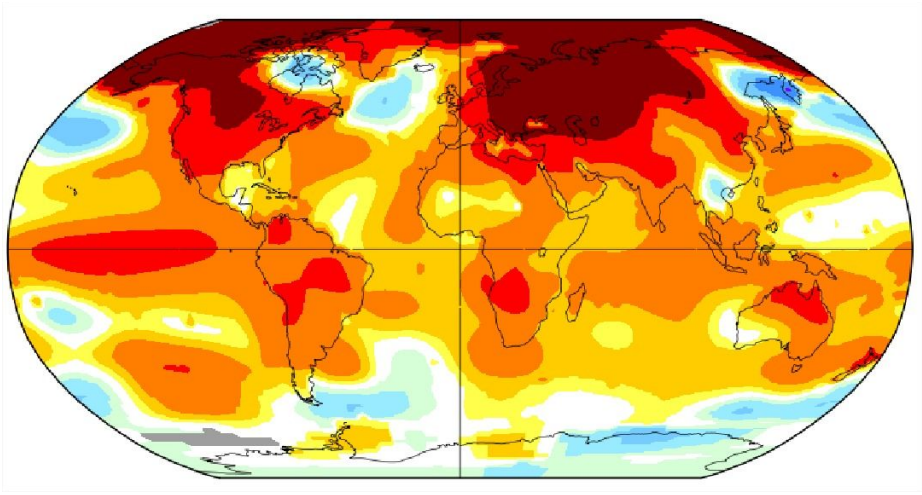
Climate Change is NOT fake news!

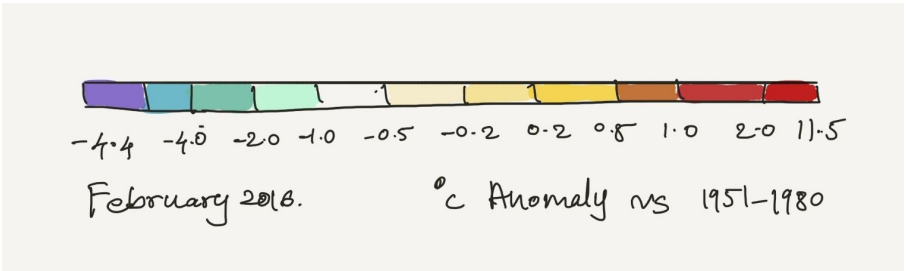
In recent years, global warming has been the subject of a great deal of political controversy. As scientific knowledge has grown, this debate is moving away from whether humans are causing warming and toward questions of how best to respond.

Signs that the Earth is warming are recorded all over the globe. The easiest way to see increasing temperatures is through the thermometer records kept over the past century and a half. Around the world, the Earth's average temperature has risen more than 1 degree Fahrenheit (0.8 degrees Celsius) over the last century, and about twice that in parts of the Arctic.

This doesn’t mean that temperatures haven't fluctuated among regions of the globe or between seasons and times of day. But if you average out the temperature all over the world over the course of a year, you see that temperatures have been creeping upward.


Temp
Year
0·18
1970
0·20
1975
0·27
1980
0·45
1985
0·46
1990
0·52
1995
0·52
2000
0·73
2005
0·77
2010
0·80
2015
0·82
2020.
The world is getting warmer
warmest year on record
2017.
V year
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015




-4·4
-4·0
-2·0
-1·0
-0·5
-0·2
0·2
0·8
1·0
2·0
11·5
February 2018.
°c Anomaly vs 1951-1980

Changelog

We narrowed down the dataset to just consider the climate and temperature data over the last 50 years for all countries. Also the tasks and proxy values were modified accordingly.

1) Updates you may have done on information submitted before, i.e. description, dataset, questions, insights and storyboarding

Dataset: created various calculated fields based on temperature change. Also included countries.topo.json to incorporate latitude and longitude.

2) A list of items already implemented;

Data preprocessing: Data cleaning was done to remove missing values, incompatible data types. Assigned all the country names to their respective longitude, latitude. Corrected the inconsistency in the date format and extracted day, month and year from the date. The entire csv data was preprocessed and converted into json using python script, as required for creating various visualizations.Removed data for countries which do not exist presently in the world map.

1.Visualization showing Temperature change across each month for each city over the last 50 years

3) A list of items yet to be implemented

1. Mercator map for all countries to show the temperature change across the years.
2. Visualization (a heatmap) showing overall climate change.
3. Conclusion from all the visualizations about climate change

4) A link to the current version of the page:
https://github.com/NYU-VIS-FALL2018/storytelling-group-8