B1 - Resubmission

Added **Visual Encoding** and **Data Attributes** for each graph

D3 Visualization

Global Temperature

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Link: https://huangxuankun.github.io/D3-Global-Temperature-Trend-Visualization/

Dataset

The original dataset are used.

Dataset Pre-processing

Pre-processing with python script is performed to:

- Extract seasonal data with regards to Global, Northern and Southern Hemisphere.
- Extract annual data of the year from Jan to Dec with regards to Global, Northern and Southern

The processing script source code can be viewed: Code

Processed Dataset 1 (CSV): Annual Temperature By Hemispheres

Consists of 360 rows and 3 columns

Column	Data type	Range	Unit	Description
Year	Year	1900 - 2020	Year	
Hemisphere	String	Global, Northern, Southern	Null	The hemispheres where temperature is collected from
AnnualAvg	Float (2 dec)	-0.57 - 1.36	Degree	The average temperature of the year from Jan to Dec

Processed Dataset 2 (CSV): Seasonal Average Temperature By Hemispheres
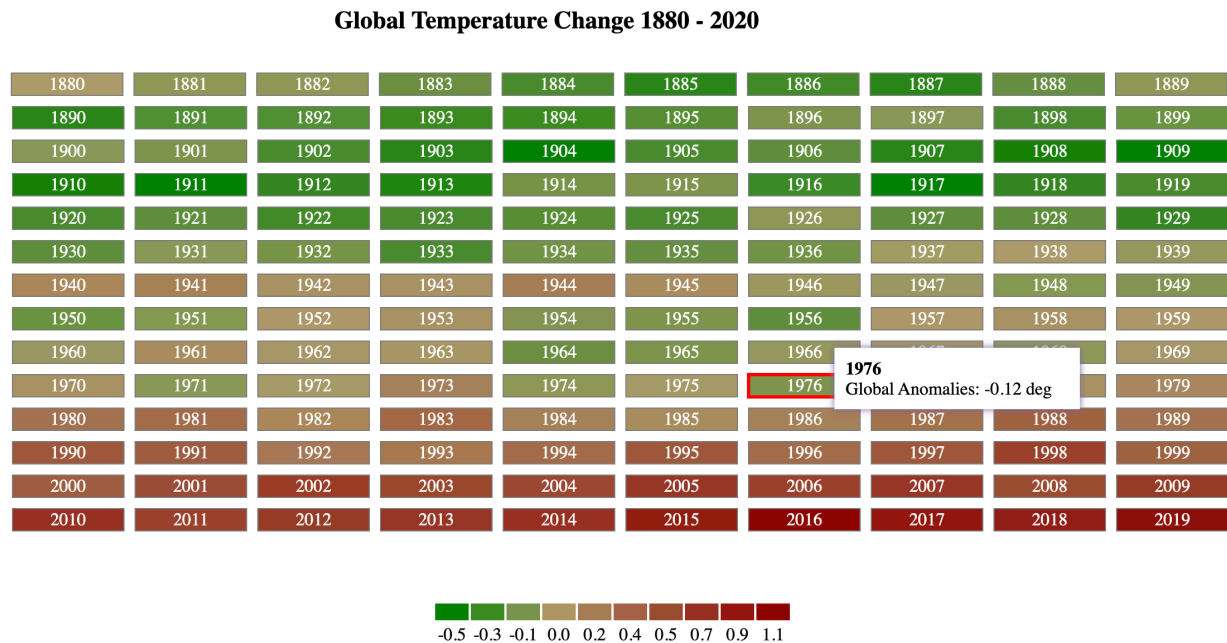
Consists of 360 rows and 3 columns

Column	Data type	Range	Unit	Description
Year	Year	1900 - 2020	Year	
Hemisphere	String	Global, Northern, Southern	Null	The hemispheres where temperature is collected from
SeasonAvg	Float (2 dec)	-0.78 - 1.68	Degree	The average temperature of the year from current season
Season	String	Winter, Spring, Summer, Autumn	Null	Winter: Dec to Feb, Spring: Mar to May, Summer: Jun to Aug, Autumn: Spet to Nov

Objective

1. Using interactive visualisation to show the trending of global temperature anomalies since 1880.

2. Focus on temperature change in recents year to explore how modernisation affect global temperature.

3. Explore insight by comparing temperature anomalies variation between
   - seasons (Winter, Spring, Summer, Autumn)
   - Hemispheres (Northern, Southern)

Query 1: Show global annual temperature anomalies from 1880- 2020

Link: https://huangxuankun.github.io/D3-Global-Temperature-Trend-Visualization/DataViz_1/Part2/

Global Temperature Change 1880 - 2020

1880	1881	1882	1883	1884	1885	1886	1887	1888	1889
1890	1891	1892	1893	1894	1895	1896	1897	1898	1899
1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
1930	1931	1932	1933	1934	1935	1936	1937	1938	1939
1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
1960	1961	1962	1963	1964	1965	1966			1969
1970	1971	1972	1973	1974	1975	1976			1979
1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019

1976
Global Anomalies: -0.12 deg

-0.5 -0.3 -0.1 0.0 0.2 0.4 0.5 0.7 0.9 1.1

Visual Encoding & Data (Added in re-submission)

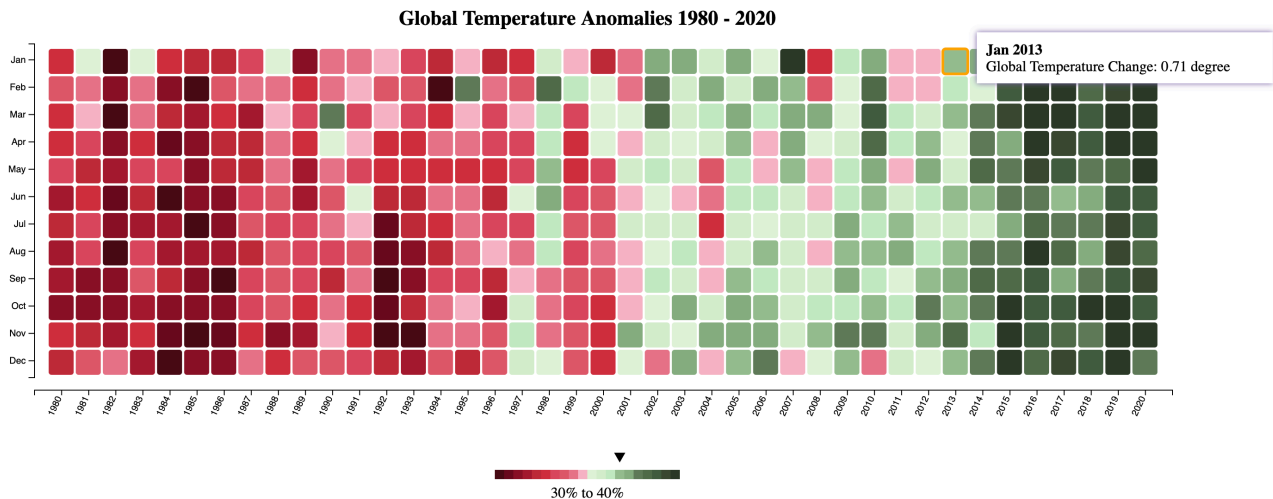| Data	Data Type	Encoding	Note
Year	Ordinal	Position	Each rectangle presents a year
Temperature Change	Categorical	Color	Temperature changes is indicated in linear color map.

Interactivity:

- Tooltip on hover to show the temperature anomalies with year

Insight:

- From 1880 to 1920, the increases of anomalies is negligible. It is worth notice that from 1890 to 1910, the anomalies is even decreasing.

- However, since 1920, the anomalies increases with higher gradient.

- From 1930 to 2020, the anomalies increases from about **0 to 1.1** degree, implying the severe global warming during the era of entering modernisation.

Query 2: Focus on visualising global **monthly** temperature anomalies from 1880 - 2020

Link: https://huangxuankun.github.io/D3-Global-Temperature-Trend-Visualization/DataViz_1/Part1/

Visual Encoding & Data (Added in re-submission)

Data	Data Type	Encoding	Note
Year	Ordinal	Position	The x-axis indicates year timeline
Month	Ordinal	Position	The y-axis indicates the month of the year
Temperature anomalies	Categorical	Color	The temperature anomalies is highlighted by linear color map in terms of percentage changed from the median value.

Interactivity:

- Tooltip on hover to show the temperature anomalies with year

- Use color legend to show the **temperature percentage change of selected month** compare to mean temperature anomalies

Insight:

- The anomalies **increase rapidly** since 1980 to 2000, with increases of about **0.2 to 0.5**

- The anomalies increases slower down in from 2001 to 2013, with increases of about **0.6 to 0.7**

- After 2010, the anomalies increases with a higher gradient, such that as of 2020, it increases from about **0.7 to 1.1**

Query 3: Visualises annual temperature anomalies with respect to **seasons** and **hemispheres**.
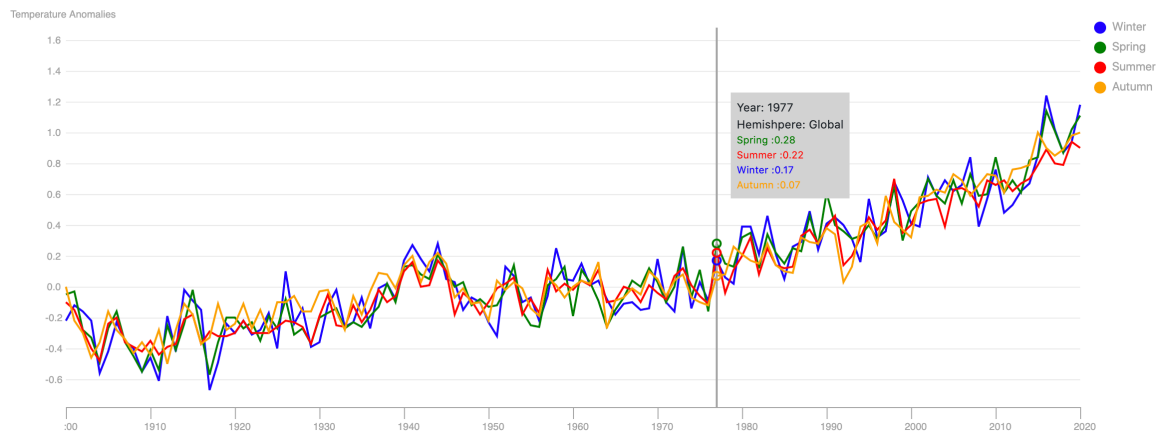
Link: https://huangxuankun.github.io/D3-Global-Temperature-Trend-Visualization/DataViz_1/Part3/

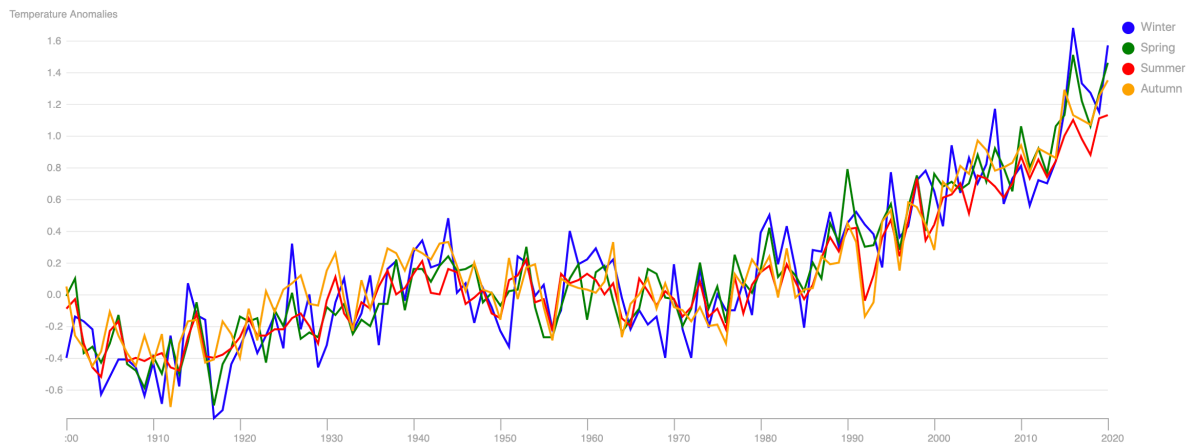## Seasonal Average Temperature Anomalies 1900 - 2020

Temperature Anomalies average computed from Jan to Dec of the year

Northern = half that lies north of the Equator. Southern = half that lies south of the Equator
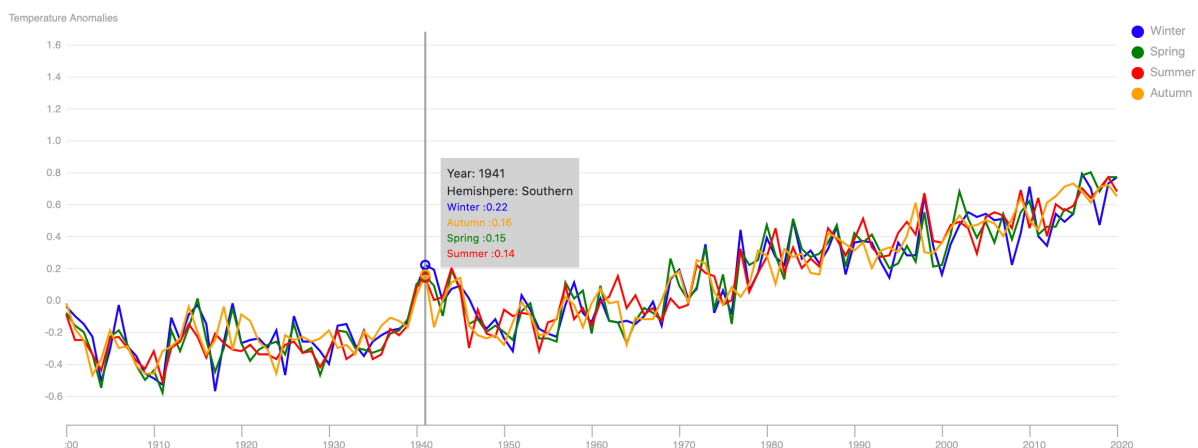
◉ Global   ○ Northern   ○ Southern

○ Global   ◉ Northern   ○ Southern

○ Global   ○ Northern   ◉ Southern

Visual Encoding & Data (Resubmission)

Data	Data Type	Encoding	Note
Year	Ordinal	Position	The x-axis indicates year timeline
Temperature anomalies	Quantitative	Position	The temperature anomalies indicated along y -axis
Season	Categorical	Color	Four colors are used to highlight the seasons of temperature anomalies.

Interactivity & Animation:

- On hover show tooltips with seasonal temperature anomalies
- Switching between Global, Northern and Southern Hemispheres with animation

Insight:

Insight 1: Northern hemisphere has **higher temperature anomalies** than southern hemisphere
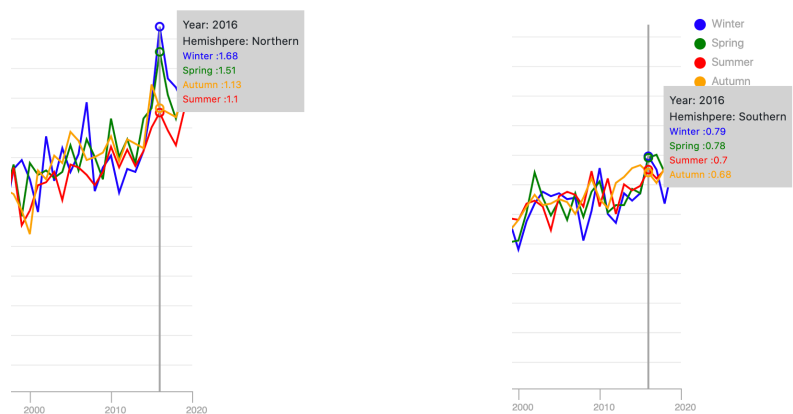
Figure 3.1: Northern hemisphere vs Southern hemisphere

Insight 2: Northern hemisphere has **higher seasonal anomalies variation**.
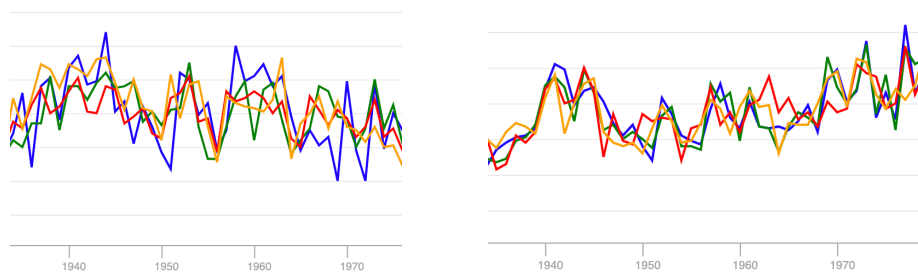

Figure 3.2: Northern hemisphere vs Southern hemisphere

Insight 3: Southern hemisphere has **closer seasonal anomalies trending** than Northern hemisphere
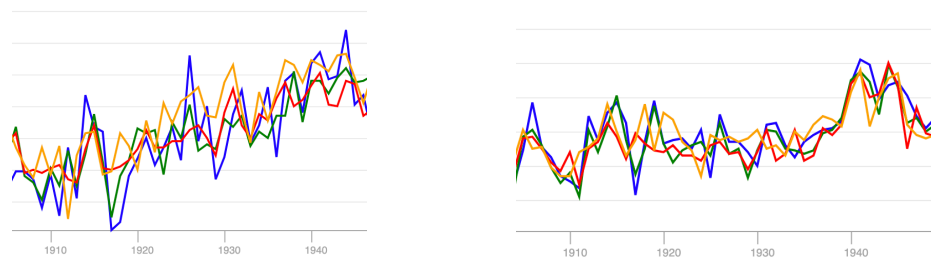

Figure 3.3: Northern hemisphere vs Southern hemisphere

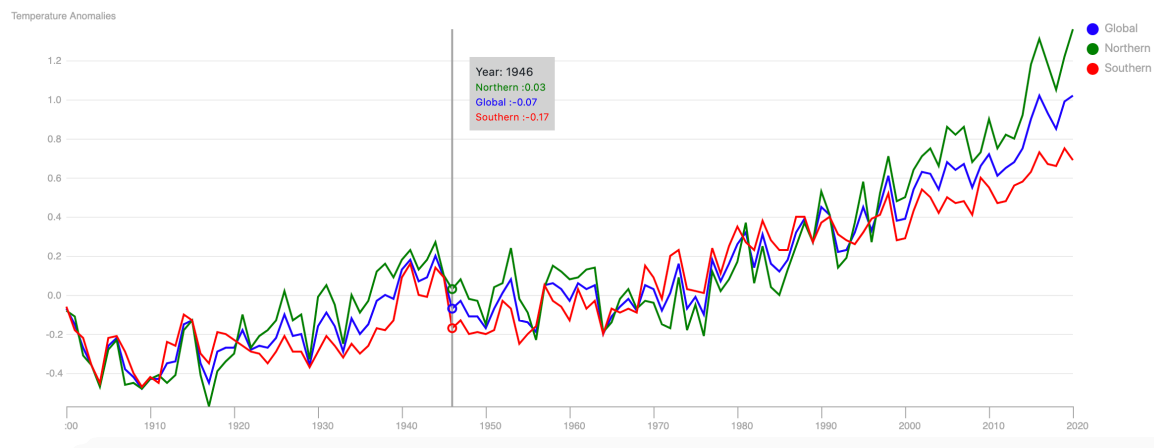# Query 4: Compare annual temperature anomalies with between hemispheres.

Link: https://huangxuankun.github.io/D3-Global-Temperature-Trend-Visualization/DataViz_1/Part4/

Visual Encoding & Data (Re-submission)

Data	Data Type	Encoding	Note
Year	Ordinal	Position	The x-axis indicates year timeline
Temperature anomalies	Quantitative	Position	The temperature anomalies indicated along y -axis
Hemisphere	Categorical	Color	Three colors are used to indicate the hemispheres (northern, southern, global)

Purpose
In previous query, we have observe the variation between hemispheres. By using annual anomalies instead of seasonal anomalies, the difference between hemispheres can be spotted easily.

Interaction
Tooltip of detail is displayed upon mouse hover

Insight:

1. Northern hemisphere has higher temperature anomalies

2. Before 1915, there is no obvious variation of anomalies between northern and southern hemispheres

3. After 1915, the variation of temperature anomalies between northern and southern hemispheres is increasing over year