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Udacity Data Analyst Nanodegree – July 2018

Exploring Weather Trends

# Method

1. Data Extraction – used the following SQL Queries to extract the data from the database

### SQL queries

/\* Locate City \*/

SELECT \*

FROM city\_list

WHERE country LIKE 'USA' or country LIKE 'United States';

/\* Confirm City \*/

SELECT city

FROM city\_list

WHERE country LIKE 'United States';

/\* Extract City Data \*/

SELECT \*

FROM city\_data

WHERE city LIKE 'New York';

/\* Extract Global Data \*/

SELECT \*

FROM global\_data;

1. Data Analysis – used Excel to:
   1. Calculate 10-year moving averages
      1. To calculate the moving averages
         1. I chose to use a 10-year period for the moving average.
         2. I chose to start at 1760 because there was 10 years of data prior to 1760 in both datasets that so I would start with a full 10-year period and get a consistent moving average. I ended at 2010 because the data beyond was not a complete 10-year period.
         3. I added a column for 10 Year MA in both City and Global datasets.
         4. Used AVERAGE function to calculate 10-year moving average (ex. =AVERAGE(D10:D19)).
   2. Create line chart with chart title, axis title, and legend
      1. I chose to simplify the X-axis from every year to every 10 years because every year was too granular and it matched my moving average.
      2. The 10-year moving average also helped to smooth out the visualization and reduce the visual noise that using the yearly average temperatures yield, leaving a clear trend

# Observations

1. With the exception of the period between 1779-1789, New York has been consistently warmer than the global average temperature by about 1.12 degrees Celsius.
2. Between 1779-1789, New York experienced a period of average temperatures below that of the global average.
3. The general trend in New York temperature mirrors the global trend closely.
4. Beginning around 1840, we see a fairly consistent rise in temperatures both locally and globally. Prior to 1840 there was more change, more peaks and valleys. After 1840, the peaks and valleys are smoother, less pronounced, but generally always growing.

| **Year** | **NYC 10-Year MA** | **Global 10-Year MA** |
| --- | --- | --- |
| 1760 | 8.33 | 7.88 |
| 1761 | 8.27 | 7.96 |
| 1762 | 8.95 | 8.24 |
| 1763 | 8.72 | 8.15 |
| 1764 | 8.68 | 8.14 |
| 1765 | 8.92 | 8.13 |
| 1766 | 8.93 | 8.09 |
| 1767 | 8.90 | 8.01 |
| 1768 | 8.95 | 8.01 |
| 1769 | 8.96 | 7.98 |
| 1770 | 9.09 | 8.03 |
| 1771 | 9.09 | 7.94 |
| 1772 | 9.10 | 7.90 |
| 1773 | 9.38 | 7.97 |
| 1774 | 9.38 | 8.01 |
| 1775 | 9.51 | 8.10 |
| 1776 | 9.41 | 8.09 |
| 1777 | 9.44 | 8.09 |
| 1778 | 9.26 | 8.27 |
| 1779 | 8.37 | 8.40 |
| 1780 | 8.30 | 8.57 |
| 1781 | 8.26 | 8.60 |
| 1782 | 8.20 | 8.57 |
| 1783 | 8.06 | 8.51 |
| 1784 | 7.94 | 8.42 |
| 1785 | 7.74 | 8.24 |
| 1786 | 7.73 | 8.24 |
| 1787 | 7.75 | 8.21 |
| 1788 | 8.07 | 8.21 |
| 1789 | 9.09 | 8.14 |
| 1790 | 9.12 | 8.00 |
| 1791 | 9.08 | 8.01 |
| 1792 | 9.03 | 8.03 |
| 1793 | 9.14 | 8.08 |
| 1794 | 9.28 | 8.15 |
| 1795 | 9.35 | 8.25 |
| 1796 | 9.35 | 8.25 |
| 1797 | 9.34 | 8.30 |
| 1798 | 9.34 | 8.32 |
| 1799 | 9.31 | 8.34 |
| 1800 | 9.33 | 8.39 |
| 1801 | 9.39 | 8.42 |
| 1802 | 9.55 | 8.47 |
| 1803 | 9.57 | 8.50 |
| 1804 | 9.56 | 8.53 |
| 1805 | 9.68 | 8.55 |
| 1806 | 9.72 | 8.57 |
| 1807 | 9.75 | 8.54 |
| 1808 | 9.74 | 8.44 |
| 1809 | 9.71 | 8.30 |
| 1810 | 9.68 | 8.14 |
| 1811 | 9.63 | 7.97 |
| 1812 | 9.38 | 7.82 |
| 1813 | 9.26 | 7.74 |
| 1814 | 9.16 | 7.61 |
| 1815 | 8.95 | 7.48 |
| 1816 | 8.80 | 7.33 |
| 1817 | 8.66 | 7.20 |
| 1818 | 8.52 | 7.22 |
| 1819 | 8.54 | 7.25 |
| 1820 | 8.50 | 7.32 |
| 1821 | 8.41 | 7.45 |
| 1822 | 8.62 | 7.56 |
| 1823 | 8.59 | 7.56 |
| 1824 | 8.65 | 7.65 |
| 1825 | 8.84 | 7.77 |
| 1826 | 9.04 | 7.91 |
| 1827 | 9.19 | 8.09 |
| 1828 | 9.44 | 8.13 |
| 1829 | 9.45 | 8.18 |
| 1830 | 9.59 | 8.27 |
| 1831 | 9.64 | 8.23 |
| 1832 | 9.57 | 8.16 |
| 1833 | 9.62 | 8.18 |
| 1834 | 9.63 | 8.14 |
| 1835 | 9.45 | 8.04 |
| 1836 | 9.21 | 7.98 |
| 1837 | 9.10 | 7.84 |
| 1838 | 8.90 | 7.77 |
| 1839 | 8.90 | 7.74 |
| 1840 | 8.80 | 7.67 |
| 1841 | 8.79 | 7.67 |
| 1842 | 8.82 | 7.73 |
| 1843 | 8.75 | 7.74 |
| 1844 | 8.73 | 7.69 |
| 1845 | 8.83 | 7.74 |
| 1846 | 9.05 | 7.83 |
| 1847 | 9.16 | 7.90 |
| 1848 | 9.25 | 7.94 |
| 1849 | 9.21 | 7.98 |
| 1850 | 9.19 | 7.99 |
| 1851 | 9.22 | 8.04 |
| 1852 | 9.18 | 8.05 |
| 1853 | 9.30 | 8.03 |
| 1854 | 9.34 | 8.09 |
| 1855 | 9.30 | 8.11 |
| 1856 | 9.16 | 8.06 |
| 1857 | 9.08 | 8.03 |
| 1858 | 9.04 | 8.04 |
| 1859 | 9.07 | 8.07 |
| 1860 | 9.08 | 8.07 |
| 1861 | 9.10 | 8.04 |
| 1862 | 9.10 | 7.98 |
| 1863 | 9.04 | 7.99 |
| 1864 | 9.02 | 7.97 |
| 1865 | 9.07 | 7.98 |
| 1866 | 9.14 | 8.00 |
| 1867 | 9.15 | 8.07 |
| 1868 | 9.03 | 8.09 |
| 1869 | 9.00 | 8.11 |
| 1870 | 9.09 | 8.13 |
| 1871 | 9.03 | 8.16 |
| 1872 | 9.00 | 8.22 |
| 1873 | 8.93 | 8.24 |
| 1874 | 8.91 | 8.29 |
| 1875 | 8.72 | 8.26 |
| 1876 | 8.76 | 8.24 |
| 1877 | 8.91 | 8.25 |
| 1878 | 9.16 | 8.30 |
| 1879 | 9.21 | 8.28 |
| 1880 | 9.20 | 8.27 |
| 1881 | 9.29 | 8.28 |
| 1882 | 9.35 | 8.28 |
| 1883 | 9.36 | 8.24 |
| 1884 | 9.39 | 8.18 |
| 1885 | 9.46 | 8.18 |
| 1886 | 9.41 | 8.17 |
| 1887 | 9.31 | 8.11 |
| 1888 | 9.10 | 8.03 |
| 1889 | 9.15 | 8.05 |
| 1890 | 9.11 | 8.03 |
| 1891 | 9.13 | 8.01 |
| 1892 | 9.13 | 8.00 |
| 1893 | 9.14 | 8.01 |
| 1894 | 9.19 | 8.05 |
| 1895 | 9.28 | 8.07 |
| 1896 | 9.34 | 8.10 |
| 1897 | 9.39 | 8.13 |
| 1898 | 9.59 | 8.14 |
| 1899 | 9.55 | 8.15 |
| 1900 | 9.63 | 8.20 |
| 1901 | 9.56 | 8.26 |
| 1902 | 9.59 | 8.28 |
| 1903 | 9.65 | 8.30 |
| 1904 | 9.44 | 8.29 |
| 1905 | 9.43 | 8.30 |
| 1906 | 9.47 | 8.31 |
| 1907 | 9.36 | 8.28 |
| 1908 | 9.32 | 8.28 |
| 1909 | 9.32 | 8.26 |
| 1910 | 9.23 | 8.23 |
| 1911 | 9.30 | 8.19 |
| 1912 | 9.28 | 8.18 |
| 1913 | 9.42 | 8.19 |
| 1914 | 9.54 | 8.24 |
| 1915 | 9.61 | 8.28 |
| 1916 | 9.53 | 8.26 |
| 1917 | 9.51 | 8.27 |
| 1918 | 9.47 | 8.26 |
| 1919 | 9.52 | 8.28 |
| 1920 | 9.49 | 8.30 |
| 1921 | 9.59 | 8.33 |
| 1922 | 9.67 | 8.36 |
| 1923 | 9.54 | 8.37 |
| 1924 | 9.53 | 8.36 |
| 1925 | 9.51 | 8.36 |
| 1926 | 9.46 | 8.41 |
| 1927 | 9.60 | 8.46 |
| 1928 | 9.63 | 8.51 |
| 1929 | 9.63 | 8.49 |
| 1930 | 9.73 | 8.52 |
| 1931 | 9.74 | 8.53 |
| 1932 | 9.78 | 8.56 |
| 1933 | 9.85 | 8.56 |
| 1934 | 9.91 | 8.57 |
| 1935 | 9.89 | 8.57 |
| 1936 | 10.01 | 8.55 |
| 1937 | 10.05 | 8.57 |
| 1938 | 10.11 | 8.59 |
| 1939 | 10.12 | 8.64 |
| 1940 | 9.95 | 8.66 |
| 1941 | 9.87 | 8.66 |
| 1942 | 9.82 | 8.66 |
| 1943 | 9.76 | 8.70 |
| 1944 | 9.81 | 8.73 |
| 1945 | 9.86 | 8.73 |
| 1946 | 9.95 | 8.75 |
| 1947 | 9.92 | 8.76 |
| 1948 | 9.87 | 8.74 |
| 1949 | 10.00 | 8.73 |
| 1950 | 10.12 | 8.69 |
| 1951 | 10.12 | 8.67 |
| 1952 | 10.18 | 8.67 |
| 1953 | 10.34 | 8.68 |
| 1954 | 10.37 | 8.65 |
| 1955 | 10.41 | 8.65 |
| 1956 | 10.33 | 8.61 |
| 1957 | 10.39 | 8.61 |
| 1958 | 10.32 | 8.61 |
| 1959 | 10.26 | 8.62 |
| 1960 | 10.26 | 8.64 |
| 1961 | 10.24 | 8.66 |
| 1962 | 10.12 | 8.67 |
| 1963 | 9.93 | 8.67 |
| 1964 | 9.90 | 8.65 |
| 1965 | 9.82 | 8.64 |
| 1966 | 9.82 | 8.68 |
| 1967 | 9.70 | 8.67 |
| 1968 | 9.76 | 8.65 |
| 1969 | 9.66 | 8.64 |
| 1970 | 9.66 | 8.65 |
| 1971 | 9.66 | 8.63 |
| 1972 | 9.67 | 8.60 |
| 1973 | 9.84 | 8.61 |
| 1974 | 9.85 | 8.62 |
| 1975 | 9.94 | 8.64 |
| 1976 | 9.92 | 8.61 |
| 1977 | 9.99 | 8.63 |
| 1978 | 9.93 | 8.65 |
| 1979 | 9.96 | 8.66 |
| 1980 | 9.96 | 8.69 |
| 1981 | 9.96 | 8.74 |
| 1982 | 9.99 | 8.76 |
| 1983 | 9.94 | 8.77 |
| 1984 | 9.96 | 8.79 |
| 1985 | 9.93 | 8.78 |
| 1986 | 9.99 | 8.83 |
| 1987 | 10.03 | 8.84 |
| 1988 | 10.10 | 8.89 |
| 1989 | 10.07 | 8.91 |
| 1990 | 10.21 | 8.94 |
| 1991 | 10.36 | 8.94 |
| 1992 | 10.33 | 8.96 |
| 1993 | 10.29 | 8.94 |
| 1994 | 10.26 | 8.98 |
| 1995 | 10.26 | 9.05 |
| 1996 | 10.23 | 9.07 |
| 1997 | 10.19 | 9.09 |
| 1998 | 10.38 | 9.12 |
| 1999 | 10.53 | 9.16 |
| 2000 | 10.40 | 9.15 |
| 2001 | 10.35 | 9.18 |
| 2002 | 10.52 | 9.25 |
| 2003 | 10.50 | 9.32 |
| 2004 | 10.54 | 9.34 |
| 2005 | 10.59 | 9.38 |
| 2006 | 10.76 | 9.43 |
| 2007 | 10.82 | 9.48 |
| 2008 | 10.70 | 9.47 |
| 2009 | 10.60 | 9.49 |
| 2010 | 10.74 | 9.54 |