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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

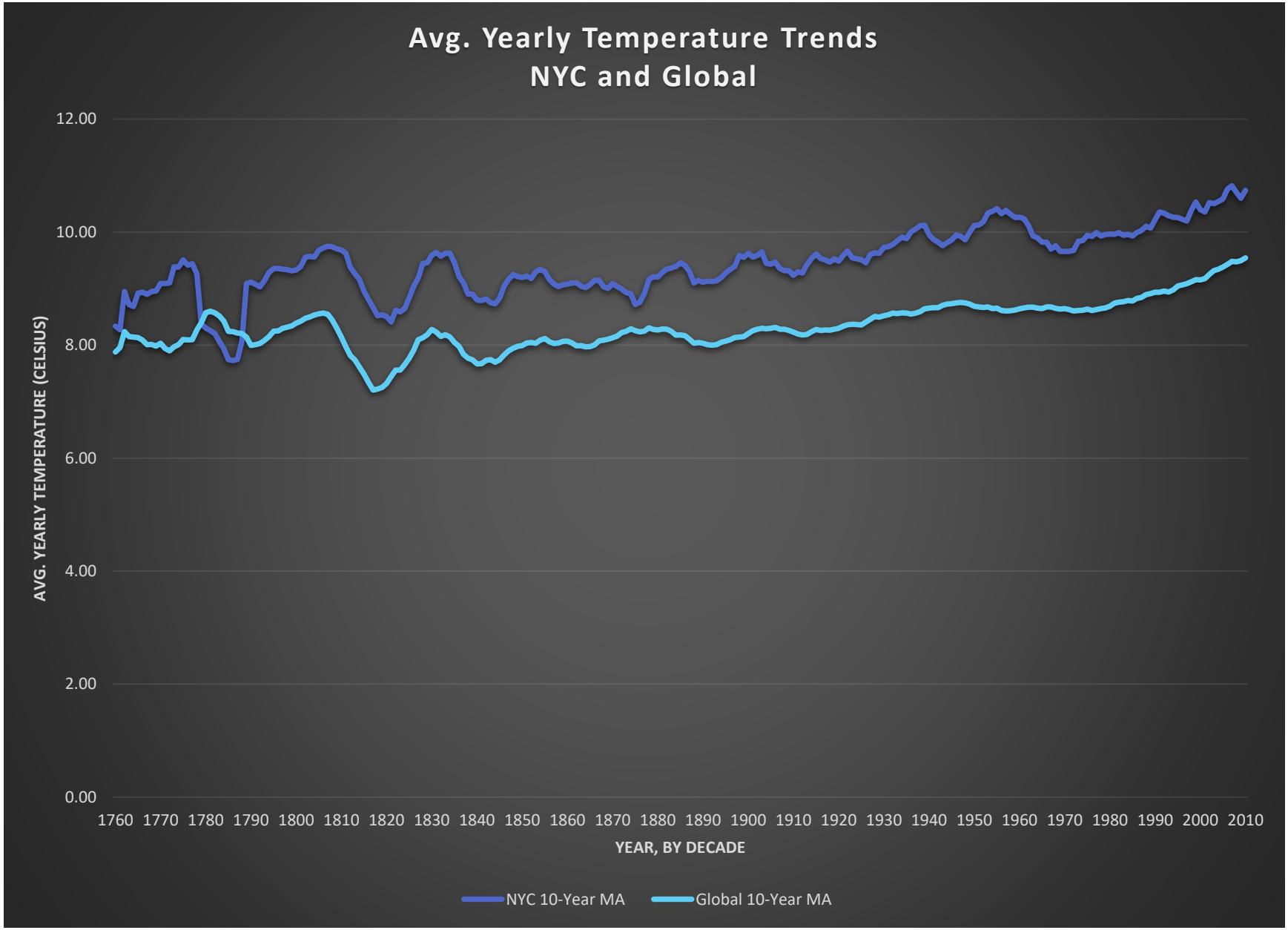
```
### SQL queries
/* Locate City */
SELECT *
FROM city_list
WHERE country LIKE 'USA' or country LIKE 'United States';

/* 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;
```

2. Data Analysis – used Excel to:
    a. Calculate 10-year moving averages
        i. 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)).
    b. Create line chart with chart title, axis title, and legend
        i. 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.

ii. 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.


Avg. Yearly Temperature Trends
NYC and Global
12.00
10.00
8.00
6.00
4.00
2.00
0.00
AVG. YEARLY TEMPERATURE (CELSIUS)
1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010
YEAR, BY DECADE
NYC 10-Year MA
Global 10-Year MA

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

Year	NYC 10-Year MA	Global 10-Year MA
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

Year	NYC 10-Year MA	Global 10-Year MA
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

Year	NYC 10-Year MA	Global 10-Year MA
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

Year	NYC 10-Year MA	Global 10-Year MA
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

Year	NYC 10-Year MA	Global 10-Year MA
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

Year	NYC 10-Year MA	Global 10-Year MA
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