temperature trends. I built a website through which the user chooses his city and shows it the city's data. The data is processed and the moving average of the user's city and the world is calculated, and his line chart is displayed and allowed to write his observations about the similarities and/or differences in the trends and then save the web page as a PDF file. **DEMO** It is was implemented using SQL, Python language, Pandas, Matplotlib, and Streamlit. The Road Ahead 🖹 I break the notebook into separate steps. • STEP 1: Data Extraction. STEP 2: Data Manipulation. STEP 3: Data Visualization. STEP 4: Observations. Data Extraction 🔍 I extracted data from a database using SQL query on the SQL Workspace in the Udacity classroom. SQL query SQL query to retrieve the cities in Saudi Arabia in the city_list table. Screenshot SELECT * FROM city list WHERE country = 'Saudi Arabia'; SQL query to retrieve the average temperatures data for the city of Riyadh in the city_data table. Screenshot SELECT year, avg_temp FROM city_data WHERE city = 'Riyadh'; SQL query to retrieve the average global temperatures in the global data table. Screenshot SELECT * FROM global_data; Data Manipulation Read CSV Files and Removing missing values In [1]: import pandas as pd local data = pd.read csv("/content/local data.csv") global_data = pd.read_csv("/content/global_data.csv") In [2]: local data = (local data.dropna()).reset index(drop=True) local data.head(20) Out[2]: year avg_temp **0** 1843 24.74 **1** 1844 15.45 **2** 1845 20.82 **3** 1848 24.56 **4** 1849 24.80 24.34 **5** 1850 **6** 1851 25.03 **7** 1852 24.85 24.93 **8** 1853 24.72 **9** 1854 **10** 1855 24.92 **11** 1856 24.57 **12** 1857 24.26 25.01 **13** 1858 **14** 1859 24.95 **15** 1860 24.94 **16** 1861 24.13 23.77 **17** 1862 **18** 1863 24.28 **19** 1864 25.03 In [3]: global data.head(20) Out[3]: year avg_temp **0** 1750 8.72 **1** 1751 7.98 **2** 1752 5.78 **3** 1753 8.39 8.47 **4** 1754 **5** 1755 8.36 6 1756 8.85 9.02 **7** 1757 **8** 1758 6.74 9 1759 7.99 **10** 1760 7.19 **11** 1761 8.77 **12** 1762 8.61 **14** 1764 8.40 **15** 1765 8.25 1766 8.41 16 **17** 1767 8.22 **18** 1768 6.78 7.69 **19** 1769 **Calculating Moving Averages** In [4]: local_data['ma_local'] = local_data['avg_temp'].rolling(window=20).mean() global_data['ma_global'] = global_data['avg_temp'].rolling(window=20).mean() In [5]: local_data.tail(20) Out[5]: year avg_temp ma_local **149** 1994 26.08 25.4760 150 1995 25.64 25.5060 1996 26.28 25.5715 151 **152** 1997 25.49 25.5465 **153** 1998 26.73 25.5855 1999 26.92 25.6215 154 2000 26.55 25.6575 155 **156** 2001 26.67 25.6935 2002 26.44 157 25.7845 **158** 2003 26.62 25.8730 2004 26.20 25.9305 159 160 2005 26.27 25.9790 2006 26.24 26.0230 161 **162** 2007 26.49 26.0290 **163** 2008 26.21 26.0400 **164** 2009 26.71 26.1230 **165** 2010 27.37 26.2065 **166** 2011 26.40 26.2550 **167** 2012 26.83 26.3780 **168** 2013 27.78 26.4960 In [6]: global_data.tail(20) Out[6]: year avg_temp ma_global **246** 1996 9.04 8.9465 **247** 1997 9.20 8.9640 248 1998 9.52 9.0055 9.29 9.0335 **249** 1999 250 2000 9.0445 2001 9.0565 251 9.41 **252** 2002 9.57 9.1030 2003 9.53 9.1280 253 **254** 2004 9.32 9.1595 **255** 2005 9.70 9.2115 **256** 2006 9.53 9.2465 **257** 2007 9.73 9.2835 258 2008 9.43 9.2950 2009 9.51 9.3245 259 260 2010 9.70 9.3480 **261** 2011 9.52 9.3650 **262** 2012 9.51 9.3985 **263** 2013 9.61 9.4355 **264** 2014 9.57 9.4620 **265** 2015 9.83 9.4860 Data Visualization 🗵 **Creating a Line Chart Without Moving Averages** import matplotlib.pyplot as plt In [7]: plt.plot(local_data['year'], local data['avg temp'], label='Riyadh temp', color= 'g') plt.plot(global_data['year'], global_data['avg_temp'], label='Global temp', color= 'b') plt.legend() plt.title('Weather Trends Without Moving Average') plt.xlabel('\nYear') plt.ylabel('Temperature (°C)\n') plt.show() Weather Trends Without Moving Average Riyadh temp Global temp 25 20 15 10 1800 1850 1900 1950 2000 Year **Creating a Line Chart With Moving Averages** In [8]: plt.plot(local_data['year'], local_data['ma_local'], label='Riyadh temp', color= 'g') plt.plot(global_data['year'], global_data['ma_global'], label='Global temp', color= 'b') plt.legend() plt.title('Weather Trends With Moving Average') plt.xlabel('\nYear') plt.ylabel('Temperature (°C)\n') plt.show() Weather Trends With Moving Average 25.0 Global temp 22.5 Temperature (°C) 20.0 17.5 15.0 12.5 10.0 1800 1850 1900 1950 2000 Year Observations 🖄 • The average temperature in Riyadh ranges from 24°C to 27°C, while the average world temperature ranges from 6°C to 9°C. • The average temperature of Riyadh is hotter than the average temperature in the world. • I note that the changes in the average temperatures of Riyadh and the average temperatures of the world have changed similarly. • According to the line chart, the overall trend was consistent over a long period. • In the coming years, the average temperature will increase in both Riyadh and the world. from IPython.display import Image In [9]: Image(filename='/content/Img_App_1.png', height=400) Explore Weather Trends App · Str × 👲 Amal Aljabri ☆ ※ | ☆ 🛈 🎱 … \rightarrow C (i) localhost:8501 🌥 Explore Weather Trends 🌥 Select the closest big city to where you live .. Riyadh In [10]: Image(filename='/content/Img_App_2.png', height=400) Out[10]: \rightarrow C (i) localhost:8501 Select the closest big city to where you live .. Riyadh city year avg_temp 1829 7.7180 7.9400 47953 Riyadh 1925 25 24.978 1830 8.5200 7.7980 47954 Riyadh 1926 24.995 7.6400 7.8370 1831 47955 Riyadh 1927 25,2900 25.037 1832 7.4500 7.8570 47956 Riyadh 25.3900 25.059 8.0100 7.8705 1833 47957 Riyadh 1929 25.3600 25.049 1834 8.1500 7.8985 47958 Riyadh 25.3900 25.081 7.9060 1835 7.3900 47959 Riyadh 1931 25.3800 25.138 1836 7.7000 7.9440 47960 Riyadh 1837 7.3800 7.9640 47961 Riyadh 1933 24.6700 25.140 1838 7.5100 7.9480 25.141 47962 Riyadh 24.9700 7.6300 7.9610 First Year: 1843 First Year: 1769 Last Year: 2013 Last Year: 2015 Min Temp: 15.45 Min Temp: 6.86 Max Temp: 27.78 Max Temp: 9.83 In [11]: Image(filename='/content/Img App 3.png', height=400) Explore Weather Trends App · Str × 👲 Amal Aljabri Out[11]: **(2)** \rightarrow C (i) localhost:8501 Max Temp: 27.78 Max Temp: 9.83 Weather Trends without Moving Average Riyadh temp Global temp 25 20 -10 1800 1850 1900 1950 2000 Year Weather Trends with Moving Average Image(filename='/content/Img App 4.png', height=400) In [12]: Explore Weather Trends App · Str × 🙋 Amal Aljabri Out[12]: \rightarrow C (i) localhost:8501 **(2)** 1800 1850 1900 1950 2000 Year Weather Trends with Moving Average Riyadh temp Global temp 25.0 22.5 20.0 -15.0 · 12.5 -10.0 -1950 2000 1800 1850 1900 Year

Explore Weather Trends

In this project, I analyzed local in Riyadh and global temperature data and I compared the temperature trends local in Riyadh and global

Overview 📝

