SI 206 Final Project Report

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Link to Github repository: https://github.com/tessavoy/SI-206-Final-Project/tree/main

1. The goals for your project (10 points)
The goal of our project was to gather data about past crime rates and weather to investigate the correlation between crime and weather in the Washington DC area. We focused on violent crimes, specifically homicide and assault with a dangerous weapon and daily temperature and amount of precipitation. Our goal was to create visualizations of the data we collected as well as to calculate the monthly averages to see if there is a correlation between crime and weather.

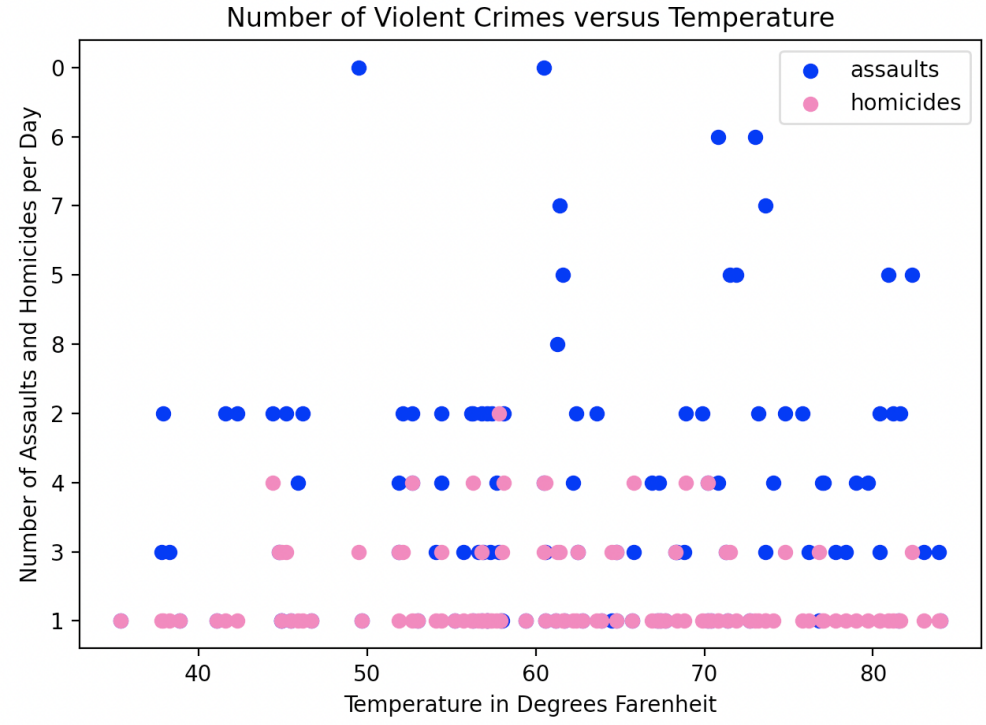
2. The goals that were achieved (10 points)
We found two free API's and learned how to use them to gather the data we needed. We problem-solved along the way to format the data correctly in the desired format. We calculated the average violent crime incidents per day as well as the average temperature and average precipitation in DC during the months of March, April, May and June in 2021.

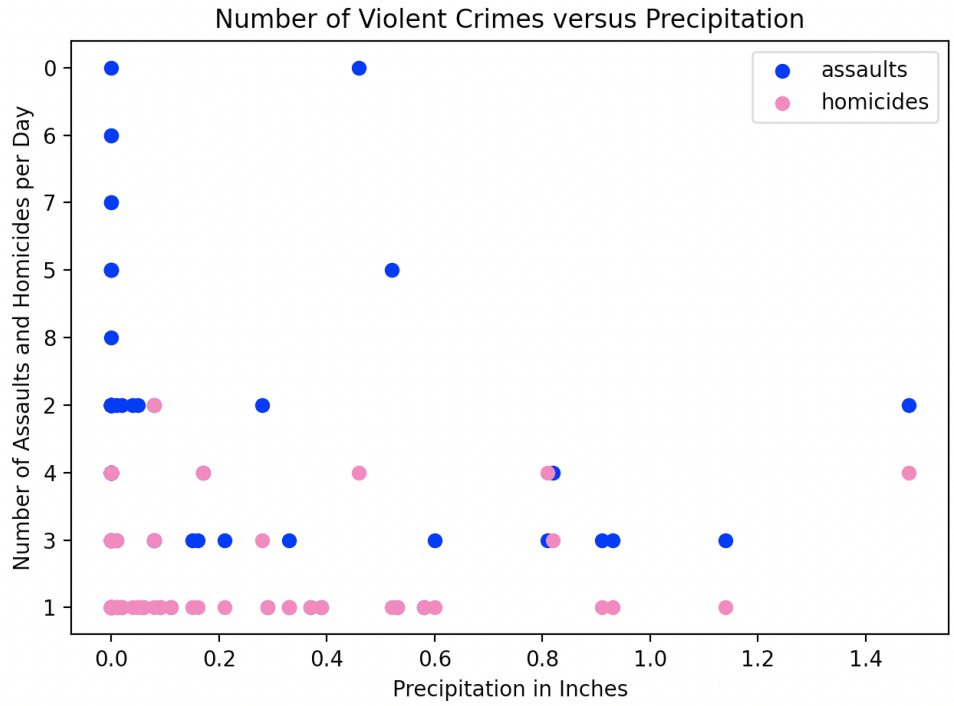
3. The problems that you faced (10 points)
We faced many challenges along the way. We encountered a lot of issues trying to find a free weather API that would allow us to get more than 20 results as well as access historical data instead of future forecasts. We also had issues with the dates that were returned by the crime API. They were in UNIX/ Epoch time, which we had both never heard of before. We put the data in a dictionary and changed the date to be formatted in a simpler format. We also had issues with data types and formatting when creating our visualizations. We solved these issues through trial and error. Additionally, we maxed out the daily limit on the weather API calls and had to make multiple accounts.

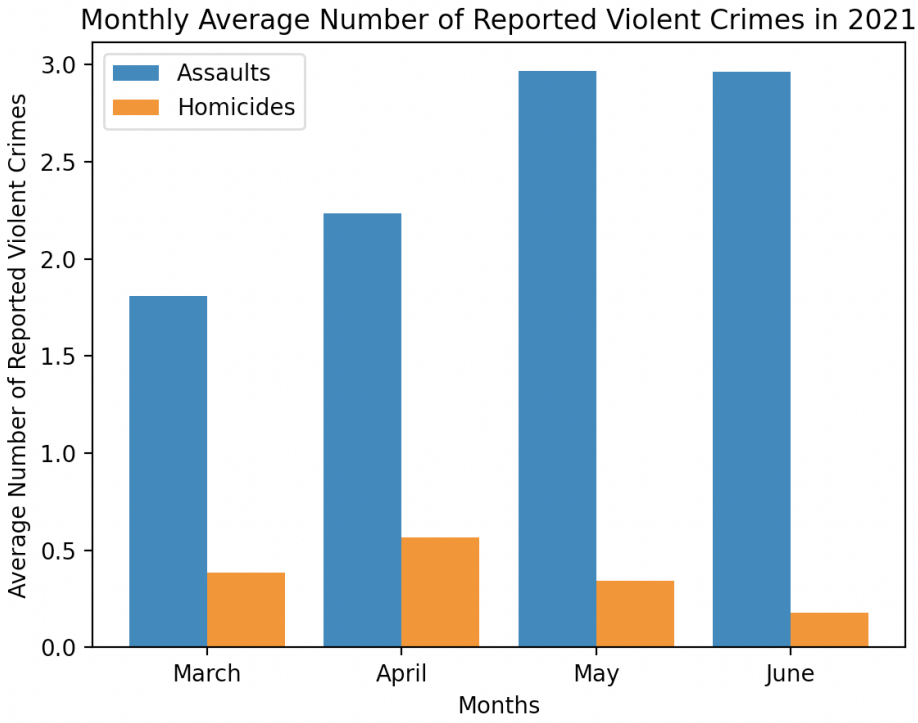
4. Your file that contains the calculations from the data in the database (10 points)
finalproject.txt

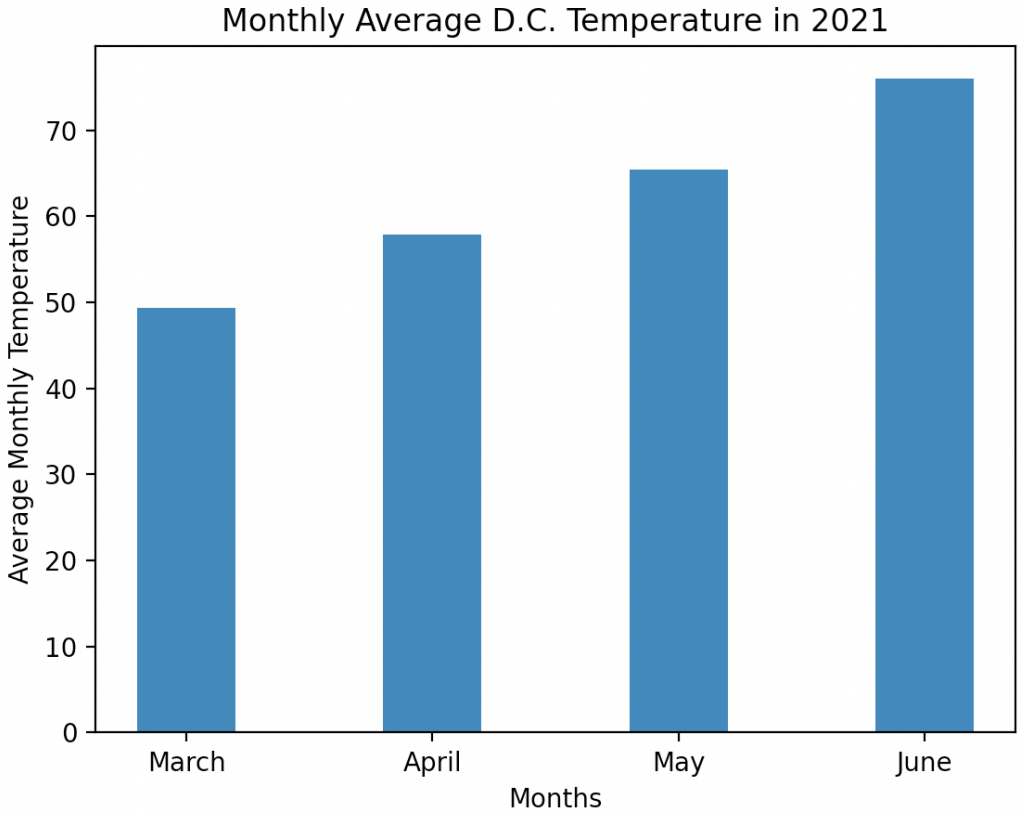
```
Average Number of Reported Assaults in Washington D.C. During March 2021: 1.8076923076923077
Average Number of Reported Homicides in Washington D.C. During March 2021: 0.38461538461538464
Average Amount of Precipitation (in) in Washington D.C. During March 2021: 49.353846153846156
Average Temperature in Washington D.C. During March 2021: 0.12192307692307693
Average Number of Reported Assaults in Washington D.C. During April 2021: 2.2333333333333334
Average Number of Reported Homicides in Washington D.C. During April 2021: 0.5666666666666667
Average Amount of Precipitation (in) in Washington D.C. During April 2021: 57.84999999999999
Average Temperature in Washington D.C. During April 2021: 0.07200000000000001
Average Number of Reported Assaults in Washington D.C. During May 2021: 2.9655172413793105
Average Number of Reported Homicides in Washington D.C. During May 2021: 0.3448275862068966
Average Amount of Precipitation (in) in Washington D.C. During May 2021: 65.45172413793104
Average Temperature in Washington D.C. During May 2021: 0.09137931034482759
Average Number of Reported Assaults in Washington D.C. During June 2021: 2.9642857142857144
Average Number of Reported Homicides in Washington D.C. During June 2021: 0.17857142857142858
Average Amount of Precipitation (in) in Washington D.C. During June 2021: 75.95714285714287
Average Temperature in Washington D.C. During June 2021: 0.14785714285714288
```

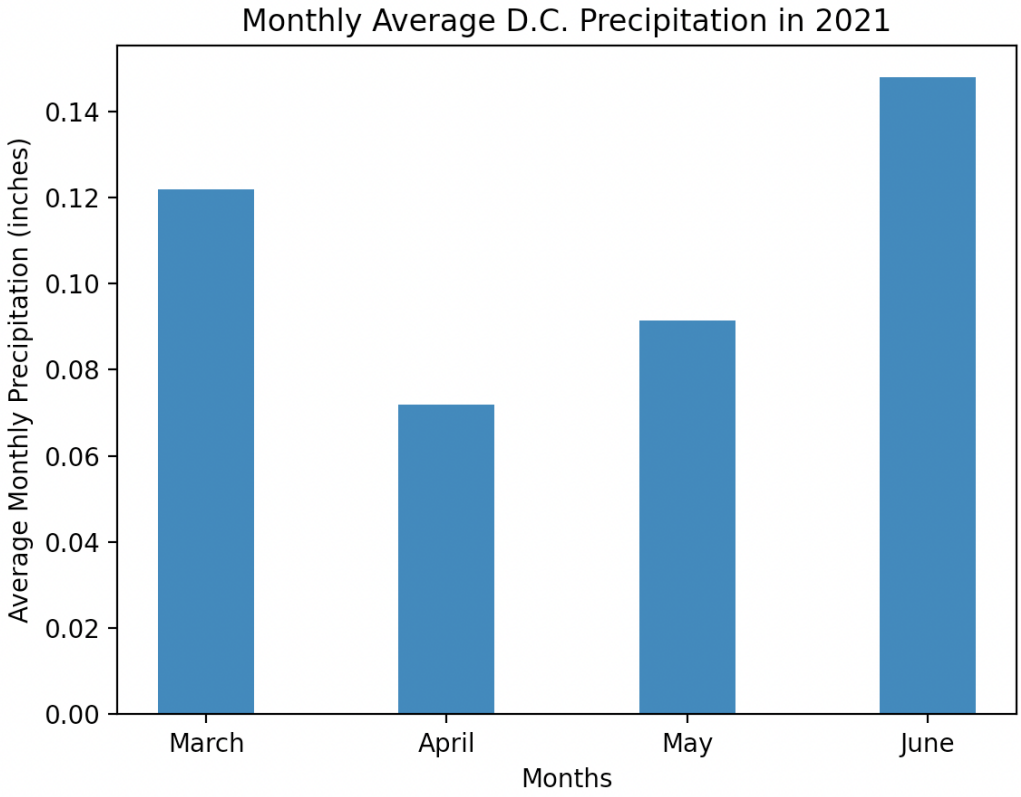
5. The visualization that you created (i.e. screenshot or image file) (10 points)






Monthly Average Number of Reported Violent Crimes in 2021
Assaults
Homicides
Average Number of Reported Violent Crimes
3.0
2.5
2.0
1.5
1.0
0.5
0.0
March
April
May
June
Months


Monthly Average D.C. Temperature in 2021
Average Monthly Temperature
70
60
50
40
30
20
10
0
March
April
May
June
Months



6. Instructions for running your code (10 points)

Running the python file named 'SI 206 Final Project.py' calls the functions necessary to call the API's and create the visualizations.

7. Documentation for each function that you wrote. This includes the input and output for each function (20 points)

def crime_api_call():

- This function calls the crime API and stores and returns the results in a JSON format

def get_crime_date_and_type(response):

- This function takes in the JSON created in crime_api_call and converts the format of the date and adds the date and type of crime to a dictionary. It returns the dictionary of dates and types of crime

def crime_org(list_of_dic):

- This function takes in the dictionary that is created by get_crime_date_and_type and organizes it to make it compatible to put in a data base. It also counts the number of incidences of crime that occur each day.
- It returns a dictionary of the crimes per day

def weather_api_call():

- This function calls the weather API and stores and returns the temperature results in a JSON format

def rain_api_call():

- This function calls the weather API and stores and returns the precipitation results in a JSON format

def setUpDatabase(db_name):

- This function takes in a database name and created a data base.
- It returns curr, con, the default database creation function return types

def setUpCrimeTable(data, cur, conn):

- This function takes in data (the crime dictionary created earlier) and creates a crime table in the data base

def setUpTemperatureTable(data, cur, conn):

- This function takes in data (the crime dictionary created earlier) and creates a temperature table in the data base

def setUpPrecipTable(data, cur, conn):

- This function takes in data (the crime dictionary created earlier) and creates a precipitation table in the data base

def crimeVtemp_plot(cur, conn):

- This function creates a scatter plot of the amounts of assaults and homicides versus temperature
- It creates a visualization

def crimeVprecip_plot(cur, conn):

- This function creates a scatter plot of the amounts of assaults and homicides versus the amount of precipitation
- It creates a visualization

def crimesPerDayPlot(cur, conn):

- This function creates a bar graph of the amounts of assaults and homicides that take place per day over the course of March 2021
- It creates a visualization

def FindAverages(cur, conn):

- This function calculates the average temperature, amount of precipitation, number of assaults and number of homicides.

def writeFile(filename, cur, conn):

- This function takes in a file name, calls the FindAverages functions and returns the results in an outfile. (text file)

8. You must also clearly document all resources you used. The documentation should be of the following form (20 points)

Date	Issue Description	Location of Resource	Result
04/07/22	Finding a free weather API that has historical data, not just future forecasts or data from the last 2 weeks	https://www.visualcrossing.com/weather/weather-data-services/DC?v=api	After trying 6 different API's we found one that works and has the data we were looking for
04/08/22	The crime API we were using was returning the dates in a format we were unfamiliar with	After doing some research we realized it was returning the dates in UNIX/ Epoch time. We converted the JSON into a dictionary and changed the dates to standard format. https://www.adamsmith.haus/python/answers/how-to-convert-epoch-time-to-datetime-in-python	We learned how to format the dates and they now display correctly
04/10/22	The weather API stopped working and was giving us mysterious errors	We realized we had gone over the limit for free API calls and made an account with another email and updated the API key throughout our files	The weather API worked with the new account
04/14/22	Scatterplots displayed wrong after adding a legend	We referenced the matplotlib website's tutorial for creating a scatterplot https://matplotlib.org/stable/gallery/lines_bars_and_markers/scatter_with_legend.html	Our scatterplots now display correctly and the legend works
04/20/22	Needed to figure out how to group by month in a date field in an SQL database	https://stackoverflow.com/questions/14565788/how-to-group-by-month-from-date-field-using-sql	