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CMPSC 463, Section 1

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Project 2: Crime Tracker

Goal

The goal of this project was to utilize the skills and knowledge of this course to create an application to help solve a real-world problem. In this case, we created a crime tracker application, where users could enter any zip code in Philadelphia County to view its crime statistics.

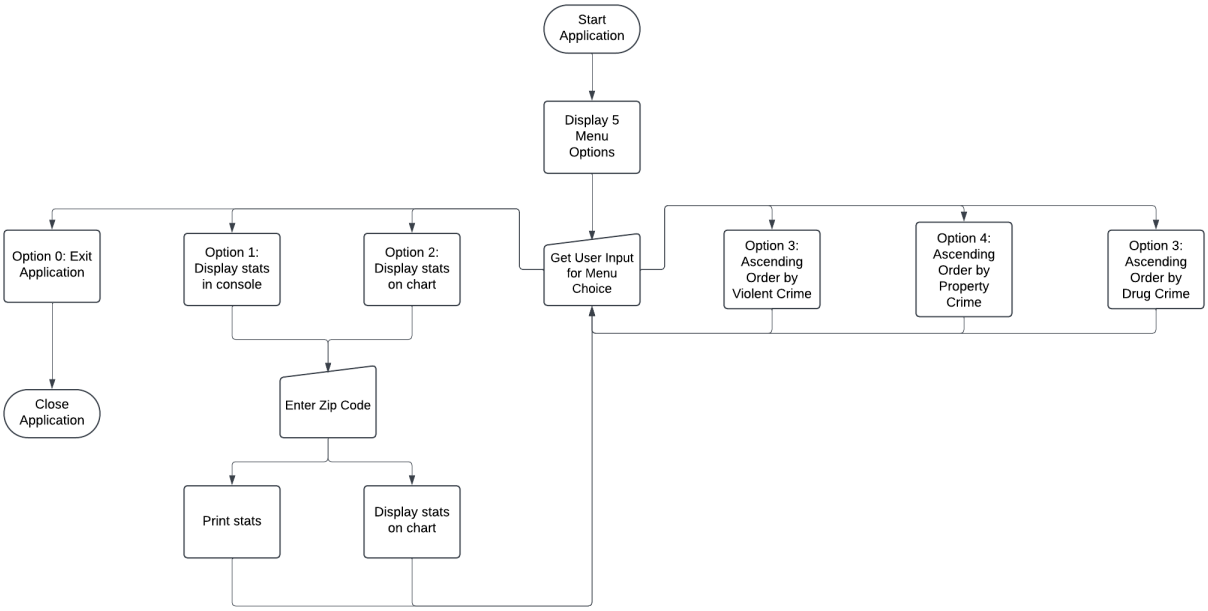
Significance

This application is primarily intended for residents, students, and employees of Philadelphia. By allowing users to obtain the crime statistics of any Philadelphia zip code, users can make decisions on areas they deem unsafe and plan accordingly. This is especially important for Philadelphia residents, tourists, students, and employees.

Installation and Instruction to Use:

Installation is quick and easy. The latest version of python will need to be installed and the main.py file is available on the GitHub repository.

Structure of the Code:



The application begins by initializing the lists containing the zip codes, town names, and their crime statistics. The options are printed for the user on the console and a while loop is activated, where users select options on what functions to run. The user also has the option to close the program, which will break the loop.

List of Functionalities and Verification Results:

- The console prints the options available to the user

```python
# Main menu and program loop
while True:
    print("\n--- Crime Data Options ---")
    print("1. View Crime Data for a ZIP code")
    print("2. View Crime Data Chart for a ZIP code")
    print("3. Sort neighborhoods by Violent Crime Rate")
    print("4. Sort neighborhoods by Property Crime Rate")
    print("5. Sort neighborhoods by Drug Crime Rate")
    print("0. Quit")

    choice = int(input("Enter your choice: "))

```

- Print statistics in the console:

```python
    if choice == 1:
        zip_code = int(input("Enter ZIP code: "))
        for neighborhood, zip_code_mapping in neighborhood_zip_mapping.items():
            if zip_code == zip_code_mapping:
                crime_rates = crime_data.get(neighborhood, None)
                if crime_rates:
                    print(f"\nCrime Data for {neighborhood} (ZIP: {zip_code}):")
                    print(f"Violent Crime Rate: {crime_rates[0]} per 1,000 residents")
                    print(f"Property Crime Rate: {crime_rates[1]} per 1,000 residents")
                    print(f"Drug Crime Rate: {crime_rates[2]} per 1,000 residents")
                break
        else:
            print("No neighborhood found for that ZIP code.")
```

- Display statistics on a chart:

```python
    elif choice == 2:
        zip_code = int(input("Enter ZIP code to view chart: "))
        for neighborhood, zip_code_mapping in neighborhood_zip_mapping.items():
            if zip_code == zip_code_mapping:
                crime_rates = crime_data.get(neighborhood, None)
                if crime_rates:
                    plt.bar( x: ['Violent Crime', 'Property Crime', 'Drug Crime'], crime_rates)
                    plt.title(f"Crime Rates for {neighborhood} (ZIP: {zip_code})")
                    plt.ylabel("Crimes per 1,000 residents")
                    plt.show()
                break
        else:
            print("No neighborhood found for that ZIP code.")
```

- Sort by Violent Crime, Property Crime, or Drug Crime:

```
135  # Function to sort neighborhoods by a specific crime rate
136  def sort_by_crime_rate(criterion):  3 usages  thomasmclinden
137      sorted_df = df.sort_values(by=criterion, ascending=True)
138      print(f"\nNeighborhoods sorted by {criterion}:")
139      print(sorted_df)
```

```
180      elif choice == 3:
181          sort_by_crime_rate('Violent Crime Rate')
182      elif choice == 4:
183          sort_by_crime_rate('Property Crime Rate')
184      elif choice == 5:
185          sort_by_crime_rate('Drug Crime Rate')
```

- Exit the application:

```
186      elif choice == 0:
187          print("Exiting the program.")
188          break
189      else:
190          print("Invalid choice, please try again.")
```

Showcasing the Achievement of Project Goals:

- Print statistics in the console:

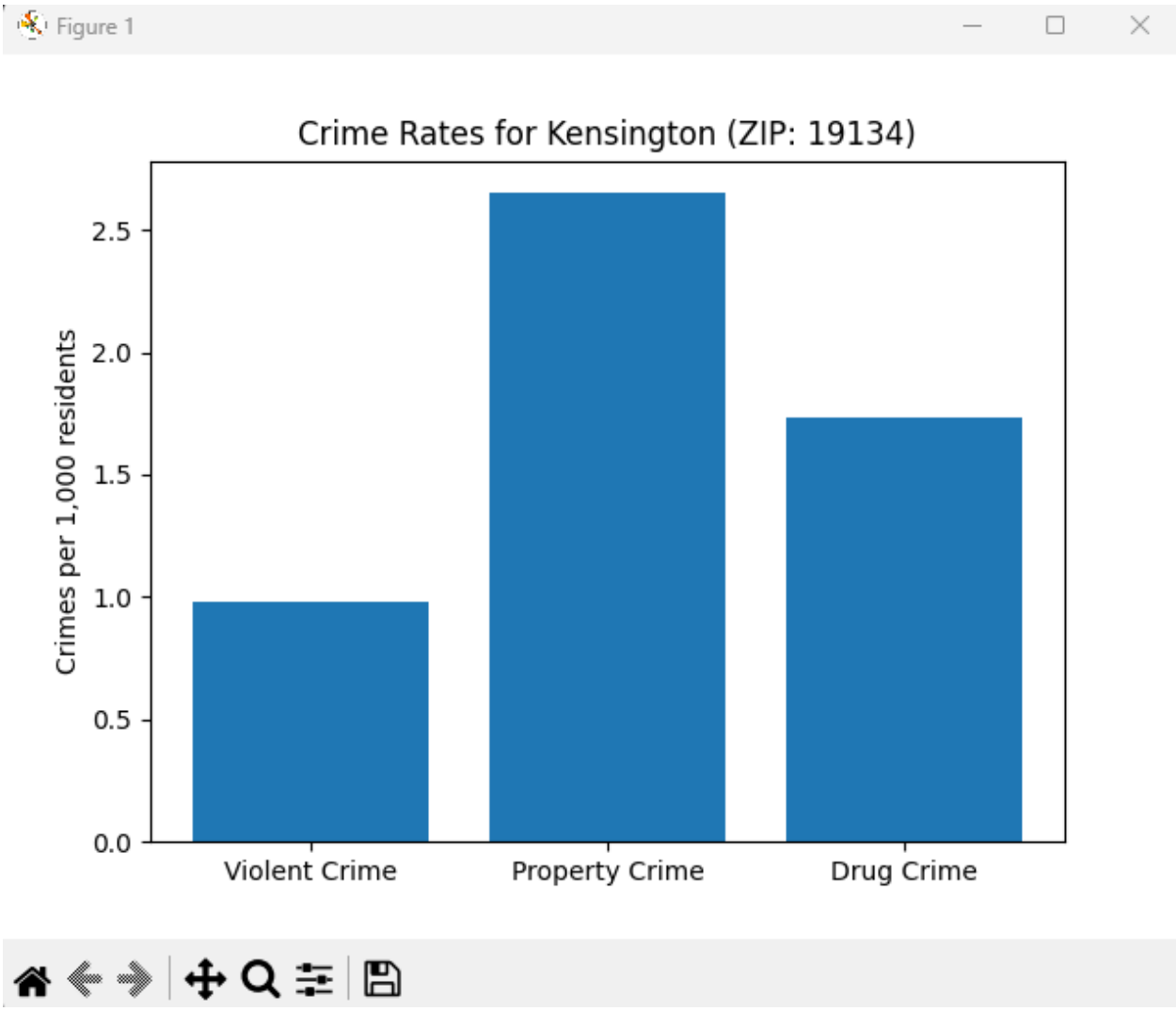
```
Enter your choice: 1
Enter ZIP code: 19116

Crime Data for Byberry (ZIP: 19116):
Violent Crime Rate: 0.05 per 1,000 residents
Property Crime Rate: 1.5 per 1,000 residents
Drug Crime Rate: 0.0 per 1,000 residents

--- Crime Data Options ---
1. View Crime Data for a ZIP code
2. View Crime Data Chart for a ZIP code
3. Sort neighborhoods by Violent Crime Rate
4. Sort neighborhoods by Property Crime Rate
5. Sort neighborhoods by Drug Crime Rate
0. Quit
Enter your choice:
```

- Display Statistics on the Chart:

```
--- Crime Data Options ---
1. View Crime Data for a ZIP code
2. View Crime Data Chart for a ZIP code
3. Sort neighborhoods by Violent Crime Rate
4. Sort neighborhoods by Property Crime Rate
5. Sort neighborhoods by Drug Crime Rate
0. Quit
Enter your choice: 2
Enter ZIP code to view chart: 19134
```



- Sort by Violent Crime:

```
Enter your choice: 3

Neighborhoods sorted by Violent Crime Rate:
                            Violent Crime Rate  Property Crime Rate  Drug Crime Rate
Neighborhood
Torresdale                                0.04                 1.47             0.00
Byberry                                   0.05                 1.50             0.00
Schuylkill Southwest                      0.08                 3.26             0.00
Roxborough                                0.11                 3.82             0.00
Riverfront                                0.12                 1.50             0.00
Girard Estates                            0.12                 2.21             0.00
Marconi Plaza-Packer Park                 0.12                 2.12             0.00
Poplar-Ludlow-Yorktowne                   0.12                 2.29             0.00
Fox Chase                                 0.14                 2.24             0.00
Brewerytown                               0.14                 3.20             0.00
Mount Airy                                0.14                 1.64             0.00
Somerton                                  0.16                 2.73             0.00
Bustleton                                 0.17                 2.33             0.00
Cedar Brook                               0.21                 1.91             0.06
Pennsport-Whitman-Queen                   0.22                 3.08             0.00
Manayunk                                  0.25                 3.58             0.00
Chestnut Hill                             0.28                 3.88             0.09
```

- Sort by Property Crime:

```
Neighborhoods sorted by Property Crime Rate:
                            Violent Crime Rate  Property Crime Rate  Drug Crime Rate
Neighborhood
Bridesburg                                0.32                 1.27             0.00
Torresdale                                0.04                 1.47             0.00
Riverfront                                0.12                 1.50             0.00
Byberry                                   0.05                 1.50             0.00
Mount Airy                                0.14                 1.64             0.00
Cobbs Creek                               0.93                 1.65             0.00
Fairhill                                  1.58                 1.88             0.94
Cedar Brook                               0.21                 1.91             0.06
South Philadelphia                        0.65                 1.98             0.00
Logan-Fern Rock                           0.77                 2.00             0.15
Oak Lane                                  0.28                 2.09             0.00
Olney                                     0.56                 2.11             0.05
Marconi Plaza-Packer Park                 0.12                 2.12             0.00
Morris Park                               0.39                 2.12             0.00
Girard Estates                            0.12                 2.21             0.00
Fox Chase                                 0.14                 2.24             0.00
Poplar-Ludlow-Yorktowne                   0.12                 2.29             0.00
Bustleton                                 0.17                 2.33             0.00
Bella Vista/Southwark                     0.50                 2.48             0.00
Hartranft                                 0.89                 2.50             0.10
```

- Sort by Drug Crime:

```
Neighborhoods sorted by Drug Crime Rate:
                          Violent Crime Rate  Property Crime Rate  Drug Crime Rate
Neighborhood
Alleghany West                          1.82                 4.52             0.00
Bella Vista/Southwark                   0.50                 2.48             0.00
Bridesburg                              0.32                 1.27             0.00
Brewerytown                             0.14                 3.20             0.00
Bustleton                               0.17                 2.33             0.00
Byberry                                 0.05                 1.50             0.00
Cobbs Creek                             0.93                 1.65             0.00
East Falls                              0.41                 3.45             0.00
Elmwood                                 1.45                 2.60             0.00
Marconi Plaza-Packer Park               0.12                 2.12             0.00
Manayunk                                0.25                 3.58             0.00
Harrowgate                              0.50                 3.00             0.00
Girard Estates                          0.12                 2.21             0.00
Grays Ferry                             0.61                 3.81             0.00
Haddington-Carroll Park                 0.70                 2.55             0.00
Fox Chase                               0.14                 2.24             0.00
Poplar-Ludlow-Yorktowne                 0.12                 2.29             0.00
Schuylkill Southwest                    0.08                 3.26             0.00
Roxborough                              0.11                 3.82             0.00
Wynnefield                              0.93                 3.14             0.00
```

- Exit the Application:

```
--- Crime Data Options ---
1. View Crime Data for a ZIP code
2. View Crime Data Chart for a ZIP code
3. Sort neighborhoods by Violent Crime Rate
4. Sort neighborhoods by Property Crime Rate
5. Sort neighborhoods by Drug Crime Rate
0. Quit
Enter your choice: 0
Exiting the program.

Process finished with exit code 0
```

Discussion and Conclusions:

While the application serves its main purpose, by providing users with crime-related data in an easily accessible manner, it is not without its limitations. The application does not

have access to a database to update these statistics; Each value is hard coded into the application itself, which would require developers to manually edit these values for them to be updated. In terms of classroom materials implemented into this project, the application utilizes *matplotlibs*, a library frequently used during homework assignments. Furthermore, the *pandas* library utilizes the Timsort algorithm, a hybrid between merge sort and insertion sort. Both of these sorting algorithms were discussed during classroom lectures and are especially useful when sorting real-world data.