CSC 220 Data Structures
Final Exam

Basic Instructions:

1. In every file submitted you MUST place the following comments:
    a. File Name.
    b. Full name
2. Each student is required to submit the assignment on iLearn.
3. Please download the support files - if any - provided with this assignment and use them when implementing your project.
4. **A plagiarism detection tool will be used to check for code cheating among students. If a case of plagiarism is detected you will fail the exam and the course.**
5. Submission details:
    a. The file name is very important and should follow the following format:

[YOUR_ID]@Final.zip

    b. You should submit the assignment through iLearn: Submit the zip file.
6. **Failure to follow the above instructions will result in point deductions.**

Part1: US 2020 Elections Statistics Dashboard

First: During this semester all of you have shown a great degree of resilience and I salute for that!
The year 2020 has been interesting in different ways. One major event that happened this year is the U.S. Presidential elections. Millions in the country and around the world have been watching the election results. Presidential, Governor, Senate, and House voting results are collected and aggregated in several ways. In this project, you will work on presidential and governor elections result accumulated by counties in states. You will read the data and load it into one or more data structures of your choice to help you calculate and display statistics about voting results as required.
You are provided with 2 CSV files that are collected recently (See reference at the end of the document).
The files:

File Name	Fields	Content
president_county_data.csv	State, county, candidate, party, no. votes, won	Voting numbers of presidential candidates of all parties aggregated by county , state
governer_country_data.csv	State, county, candidate, party, no. votes, won	Voting numbers of governors candidates of all parties aggregated by county , state

You will use several data structures of your choice to process these data to help get the statistics required. Your implementation should target the most efficient algorithms and data structures. You will be graded based on the efficiency of your implementation. The data structures I have chosen to use are Lists, HashMaps, and HashSets. However, you can use different data structures. The point is to justify your decision.

If there is any detail that is not explicitly described then, it is left intentionally for your own judgment.

Program Sample Run:

The first step would be loading the files into data structures of your choice. You need to open the two files and load them. Display to the user messages that shows the status of loading the files as follows:

```
Loading presidential candidates county data.....
Presidential candidates county data loading is complete!
Loading governor candidates county data.....
Governors candidates county data loading is complete!
```

While many statistics can be calculated based on this data, we will perform only 6

```
*************************************************************************
**********      U.S. Elections 2020 Data (last update Dec 2020)      **********
*************************************************************************
[1] For every state, display democratic counties that won both presidential and governors ordered by name of county in ascending order
[2] For every state, display republication counties that won both presidential and governors ordered by name of county in ascending order
Presidential Elections Options:
[3] For every state, display top 10 democratic counties ordered by count in descending order
[4] For every state, display top 10 republication counties ordered by count in descending order
Governors Elections Options:
[5] For every state, display top 10 democratic counties and governor name ordered by count in descending order
[6] For every state, display top 10 republication counties and governor name ordered by count in descending order
[7] To Exit!
Enter your choice:
```

operations. When the user runs your program the following menu should appear:Menu Items Explanation:
[1] For every state, display up to 10 **democratic** counties that won both **presidential and governors** ordered by the ***name*** of the ***county*** in ***ascending*** order.
You need to find the intersection of counties that won the democratic party in both presidential and governor elections. You should display every state and its counties sorted based on counties' names in descending order. Sample run:

```
1
*** Democratic States that Won Both ***
North Carolina:
1. Anson County
2. Bertie County
3. Buncombe County
4. Chatham County
5. Cumberland County
6. Durham County
7. Edgecombe County
8. Forsyth County
9. Guilford County
10. Halifax County
Vermont:
1. Brattleboro
2. Burlington
3. Marlboro
4. Putney
West Virginia:
Montana:
```

Note *that some states may have no counties, less than ten, more than ten counties that satisfy the conditions: 1. Democratic Party 2. Won the election. You need to display up to 10. The same applies to the next options.*

[2] For every state, display up to 10 **republican** counties that won both **presidential and governors** ordered by the ***name*** of county in ***ascending*** order. Similar to the previous item but for republican party. Sample run:

```
2
*** Republican States that Won Both ***
North Carolina:
1. Alamance County
2. Alexander County
3. Alleghany County
4. Ashe County
5. Avery County
6. Beaufort County
7. Bladen County
8. Brunswick County
9. Burke County
10. Cabarrus County
Vermont:
```

[3] For every state, display the top 10 **democratic** counties and number of votes ordered by ***the count*** of votes in ***descending*** order. This menu item is based only on the **presidential** country data file. Sample run:

```
3
*** Presidential Democratic States ***
North Carolina:
1. Wake County 393336
2. Mecklenburg County 378107
3. Guilford County 173086
4. Durham County 144688
5. Forsyth County 113033
6. Buncombe County 96515
7. Cumberland County 84469
8. New Hanover County 66138
9. Orange County 63594
10. Pitt County 47252
```

[4] For every state, display the top 10 **republican** counties and number of votes ordered by the ***count*** of votes in ***descending*** order. This menu item is based only on the **presidential** country data file. Sample run:

```
4
*** Presidential Republican States ***
North Carolina:
1. Union County 80382
2. Gaston County 73033
3. Johnston County 68353
4. Iredell County 67010
5. Davidson County 64658
6. Cabarrus County 63237
7. Randolph County 56894
8. Catawba County 56588
9. Brunswick County 55850
10. Rowan County 49297
```

[5] For every state, display top 10 **democratic** counties, candidate name, and number of votes ordered by ***count*** of votes in ***descending*** order. This menu item is based only on the **governor** country data file. Sample run:

```
5
*** Governor Democratic States ***
North Carolina:
1. Wake County, candidate name:Roy Cooper, total votes:410386
2. Mecklenburg County, candidate name:Roy Cooper, total votes:382726
3. Guilford County, candidate name:Roy Cooper, total votes:180160
4. Durham County, candidate name:Roy Cooper, total votes:147110
5. Forsyth County, candidate name:Roy Cooper, total votes:118663
6. Buncombe County, candidate name:Roy Cooper, total votes:99395
7. Cumberland County, candidate name:Roy Cooper, total votes:88278
8. New Hanover County, candidate name:Roy Cooper, total votes:69554
9. Orange County, candidate name:Roy Cooper, total votes:65042
10. Pitt County, candidate name:Roy Cooper, total votes:48995
```

[6] For every state, display top 10 **republican** counties, candidate name, and number of votes ordered by ***count*** of votes in ***descending*** order. This menu item is based only on the **governor** country data file. Sample run:

```
6
*** Governor Republican States ***
North Carolina:
1. Union County, candidate name:Dan Forest, total votes:77305
2. Gaston County, candidate name:Dan Forest, total votes:69158
3. Johnston County, candidate name:Dan Forest, total votes:64310
4. Iredell County, candidate name:Dan Forest, total votes:63962
5. Davidson County, candidate name:Dan Forest, total votes:60771
6. Cabarrus County, candidate name:Dan Forest, total votes:59682
7. Catawba County, candidate name:Dan Forest, total votes:53802
8. Randolph County, candidate name:Dan Forest, total votes:53176
9. Brunswick County, candidate name:Dan Forest, total votes:51703
10. Rowan County, candidate name:Dan Forest, total votes:46676
```

Part 2: Reflection Essay

In this essay, you will reflect on your experience working on this project. I am particularly interested in knowing the following:

- What design/ coding decisions you made while working on your project. There are choices and decisions you had to take because it was not explicitly mentioned in the requirements of the project. Justify your decisions?
- Where did you encounter struggles? what did you do to deal with it?
- What did you learn?
- Did you give your best effort? If not, why?
- What are the things you did well? What are the things that you think can be improved?
- Do you think remote-teaching affected your learning (negative or positive)? If so, how?

CSV Source:

US Election 2020: Race to Presidential Election 2020 by County
(https://www.kaggle.com/unanimad/us-election-2020?select=president_county_candidate.csv)