Python Programming Section 1832 & 1833

Deadline Dec 18, 2020 by 11:59 PM PST

Extra Credit Programming Assignment 6 (100 Points):
Visualization and UI for Data Analysis (draft as of December 11, 2020)

Assignment Description:
Create a class Plot UI (PLUI) that creates a tkinter interface for plotting data on a pie chart. The **PLUI** class has several methods including init and draw_piechart() that will use the data from the **Election-Data** class. Refer to page 3 and 4 of this handout for the PUI interface. The figure to create will be a pie chart where the first slice is the presidential party winner's percentage of popular vote in the queried state. The second slice is the percent of popular vote of the the other candidates. Only presidential data is used in this assignment but download all three files president_dictionary.dat,house_dictionary.dat and electoral_results.dat because the class **ElectionData** will load the binary files using the **pickle** Python module.

Use program 13-19 in our course textbook for reference about creating pie-charts using the **create_arc()** canvas method. For the data provided you will need to compute a percentage of a circle. For example, given two values 40 and 60, a pie chart could be generated by computing start and end angles for each slice. The first slice could go from 0 to 144^0 (144 = 40/100*360). The second slice would go from 144^0 to 360^0 (144 + (216 = 60/100*360)).

The slice order goes from the presidential winner to the other candidates. For each winner be sure to select the slice color as red for a republican winner (Fig. 1a. red) , blue for a democrat winner (Fig. 1b) and then use green for the other slice (Fig. 1) .

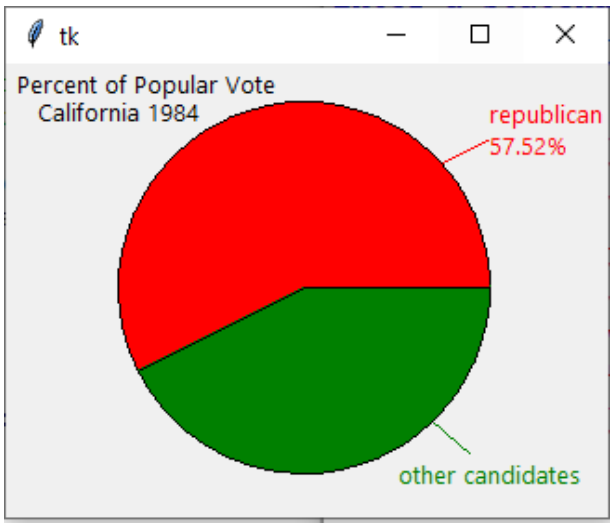

Fig 1a. California 1984

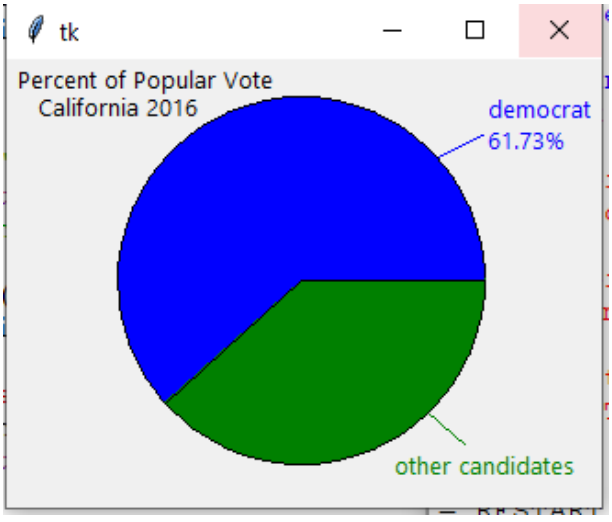

Fig 1b. California 2016

Figure 1: Example pie charts for republican and democrat winners.

Where to do the assignment
You can do this assignment on your own computer, or from the SMC Virtual labs via Citrix. In either case, ensure the code runs on Windows and in IDLE. Submit one **.py** file named **A06.py**. Do not use any other name or else points will be deducted.

Submitting the Assignment
Include your name, your student id, the assignment number, the submission date, and a program description in comments at the top of your files. Submit the assignment on Canvas (`https://online.smc.edu`) by **uploading your .py file** to the Assignment 6 entry as an attachment. Do not cut-and-paste your script into a text window. Do not hand in a screenshot of your program's output. Do not hand in a text file containing the output of your program. Do not save and turn in the interpreter session (e.g. the one with >>>).

Saving your work
Save your work often on a flash-drive or to the cloud (e.g., GoogleDrive, Microsoft OneDrive, Canvas, etc.). Always save a personal copy of your files (e.g. .py, etc.). Do not store files on the lab computers.

Do your own work
Do not distribute this handout. Do not upload to chegg, coursehero, or any other online platform. Do not pay someone to write the code and submit their code as your solution. You are expected to do your own work. Turning in code that is not your own work will result in a referral to Student Judicial Affairs.

Example usage:

```
Enter a statename (capitalized): Wyoming
Enter an election year between 1976-2016: 2000
Close the figure window to create another pie chart or exit
Do you want to see another figure (yes or no)? yes

Enter a statename (capitalized): North Dakota
Enter an election year between 1976-2016: 2016
Close the figure window to create another pie chart or exit
Do you want to see another figure (yes or no)? yes

Enter a statename (capitalized): Montana
Enter an election year between 1976-2016: 2016
Close the figure window to create another pie chart or exit
Do you want to see another figure (yes or no)? yes

Enter a statename (capitalized): California
Enter an election year between 1976-2016: 1984
Close the figure window to create another pie chart or exit
Do you want to see another figure (yes or no)? yes

Enter a statename (capitalized): California
Enter an election year between 1976-2016: 2016
Close the figure window to create another pie chart or exit
Do you want to see another figure (yes or no)? no
goodbye
```

ElectionData and Plot UI (PLUI) classes:
Below is a class with data that can be used in the drawing:

```
class ElectionData:

    def __init__(self):
        file = open("president_dictionary.dat","rb")
        self.president_data = pickle.load(file)
        file.close()

        file = open("house_dictionary.dat","rb")
        self.house_data = pickle.load(file)
        file.close()

        file = open("electoral_results.dat","rb")
        self.electoral_data = pickle.load(file)
        file.close()

class PLUI:
    def __init__(self):
        self.__CANVAS_WIDTH = 320  # Canvas width
        self.__CANVAS_HEIGHT = 240 # Canvas height

        self.__election_data = ElectionData()
        self.__president_data =  self.__election_data.president_data
        self.__house_data     =  self.__election_data.house_data
        self.__electoral_data =  self.__election_data.electoral_data

        self.__state = "California" #default value
        self.__election_year = 1976 #default value

        # Create the main window.
        self.main_window = None
        self.canvas = None

    def close_window(self):
        self.main_window.destroy()

    def set_state(self,st):
        self.__state= st

    def set_election_year(self,year):
        self.__election_year = year

    def draw_piechart(self):
        self.main_window = tkinter.Tk()
        # Create the Canvas widget.
        self.canvas = tkinter.Canvas(self.main_window,
                                     width=self.__CANVAS_WIDTH,
                                     height=self.__CANVAS_HEIGHT)
```

```
        #
        # Todo A6: get the election_year entered
        #  determine the slice color and slice extent (width)
        #          from the self.__president_data dictionary
        #


        # Todo A6 - create the pie chart
        # your code for drawing the pie charts goes here
        # use program 13-19 as an example for how to use
        # the create_arc method of the tkinter
        # canvas drawing object
        #

        # Todo A6 draw the arcs
        #draw slice 1
            #draw slice 2

            # Optional Todo A6: create figure title and slice labels
            # optional figure title using create_text
            # optional lines to labels using create_line and create_text
            #

        self.canvas.pack()
        tkinter.mainloop()

# Create an instance of the Plot UI class.
while True:
    state = input("Enter a statename (capitalized): ")
    year = int(input("Enter an election year between 1976-2016: "))
    print("Close the figure window to create another pie chart or exit")
    plui = PLUI()
    plui.set_state(state)
    plui.set_election_year(year)

    # Create an instance of the PLUI class.
    plui.draw_piechart()
    response = input("Do you want to see another figure (yes or no)? ")

    if(response == "no"):
        print("goodbye")
        break
```