Are Droughts Only Popular in the West?

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Overview and Motivation

Climate change has caused several other regions to experience higher temperatures than usual, as well as other extreme weather events. I am convinced that droughts may be a common occurrence between states due to increased temperatures over the years. With data used from a drought monitor, I hope to find if droughts only occur in areas with higher temperatures and if the occurrence of droughts are increasing due to these yearly increases in temperatures.

Dataset(s)

I chose to stick with using data from the U.S. Drought Monitor Website, https://droughtmonitor.unl.edu/Data/DataDownload/ComprehensiveStatistics.aspx. Although this website contains drought data per each state from nearly every week from the year 2000 to now, I decided to only use data from 10 years. I had to use separate drought data files per state, as reading in all the data in one file caused the program to mess up at first. Each state's data contains data from November 2010 to November 2020, with each state's CSV having 523 rows. The states I chose were Arizona, California, Oregon, Texas, Pennsylvania, and Maine. I chose Arizona and California because they are states known for hot climates in the West as well as having much land that may be susceptible to dryness because of the lack of rainfall. As Oregon receives more rainfall than California, I decided to add Oregon to see if there would be any instances of low precipitation as Oregon receives rain at times but lies within the West. Texas was chosen as it lies within the South and is a southern state that receives high temperatures as well. Pennsylvania and Maine are states on the East that can experience quite low temperatures and also have much farmland. I chose these two states more so because I wanted to see if the amount of farmland would add to an increase on the drought monitor in case they experienced any instances of dryness.

Program Demonstration and Description

Part 1: Demonstration

```
Console 1/A  ×

Program finished.

In [7]: runfile('C:/Users/13233/Downloads/Final Project/weather_api_template.py', wdir='C:/Users/13233/Downloads/Final Project')
----------------------------------------
      Location        Latitude Longitude
----------------------------------------
    New York, NY      40.6943   -73.9249
 Los Angeles, CA      34.1139  -118.4068
    Chicago, IL       41.8373   -87.6862
     Miami, FL        25.7839   -80.2102
     Dallas, TX       32.7936   -96.7662
 Philadelphia, PA     40.0077   -75.1339
    Houston, TX       29.7863   -95.3889
    Atlanta, GA       33.7627   -84.4224
  Washington, DC      38.9047   -77.0163
     Boston, MA       42.3188   -71.0846
Loaded data from  New York, NY
Loaded data from  Los Angeles, CA
Loaded data from  Chicago, IL
Loaded data from  Miami, FL
Loaded data from  Dallas, TX
Loaded data from  Philadelphia, PA
Loaded data from  Houston, TX
Loaded data from  Atlanta, GA
Loaded data from  Washington, DC
Loaded data from  Boston, MA
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
----------------------------------------
****************************************
Weather for All Cities
```

```
Weather for All Cities
--------------------------------------------------
New York, NY Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     57
  Wind mph   13
  Forecast   Rain Showers Likely
--------------------------------------------------
Los Angeles, CA Weather
  for 2020-11-22T20:00:00-08:00
  Temp F     63
  Wind mph   5
  Forecast   Clear
--------------------------------------------------
Chicago, IL Weather
  for 2020-11-22T22:00:00-06:00
  Temp F     42
  Wind mph   10
  Forecast   Mostly Cloudy
--------------------------------------------------
Miami, FL Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     75
  Wind mph   5
  Forecast   Slight Chance Rain Showers
--------------------------------------------------
Dallas, TX Weather
  for 2020-11-22T22:00:00-06:00
  Temp F     50
  Wind mph   10
  Forecast   Mostly Cloudy
--------------------------------------------------
Philadelphia, PA Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     55
  Wind mph   5
  Forecast   Chance Rain Showers
```

```
--------------------------------------------------
Houston, TX Weather
  for 2020-11-22T22:00:00-06:00
  Temp F     68
  Wind mph   5
  Forecast   Mostly Cloudy
--------------------------------------------------
Atlanta, GA Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     57
  Wind mph   5
  Forecast   Mostly Cloudy
--------------------------------------------------
Washington, DC Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     55
  Wind mph   6
  Forecast   Chance Light Rain
--------------------------------------------------
Boston, MA Weather
  for 2020-11-22T23:00:00-05:00
  Temp F     47
  Wind mph   7
  Forecast   Cloudy

**************************************************
        The coldest city is: Chicago, IL
          with a temperature of 42 deg F
**************************************************
--------------------------------------------------
Cities with Temperatures over 70 deg F
   City Temperature (deg F)
--------------------------------------------------
        Miami, FL                       75

In [8]:
```
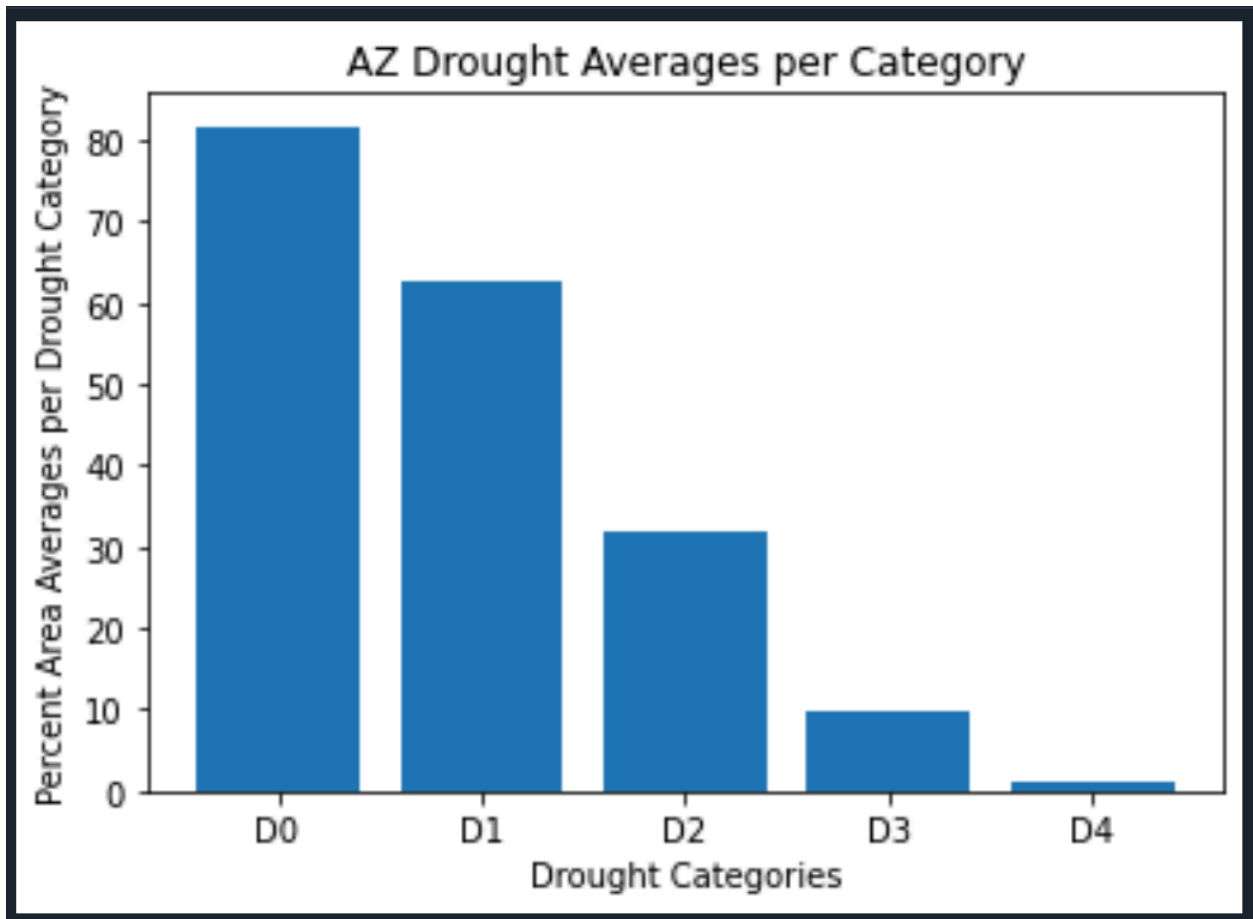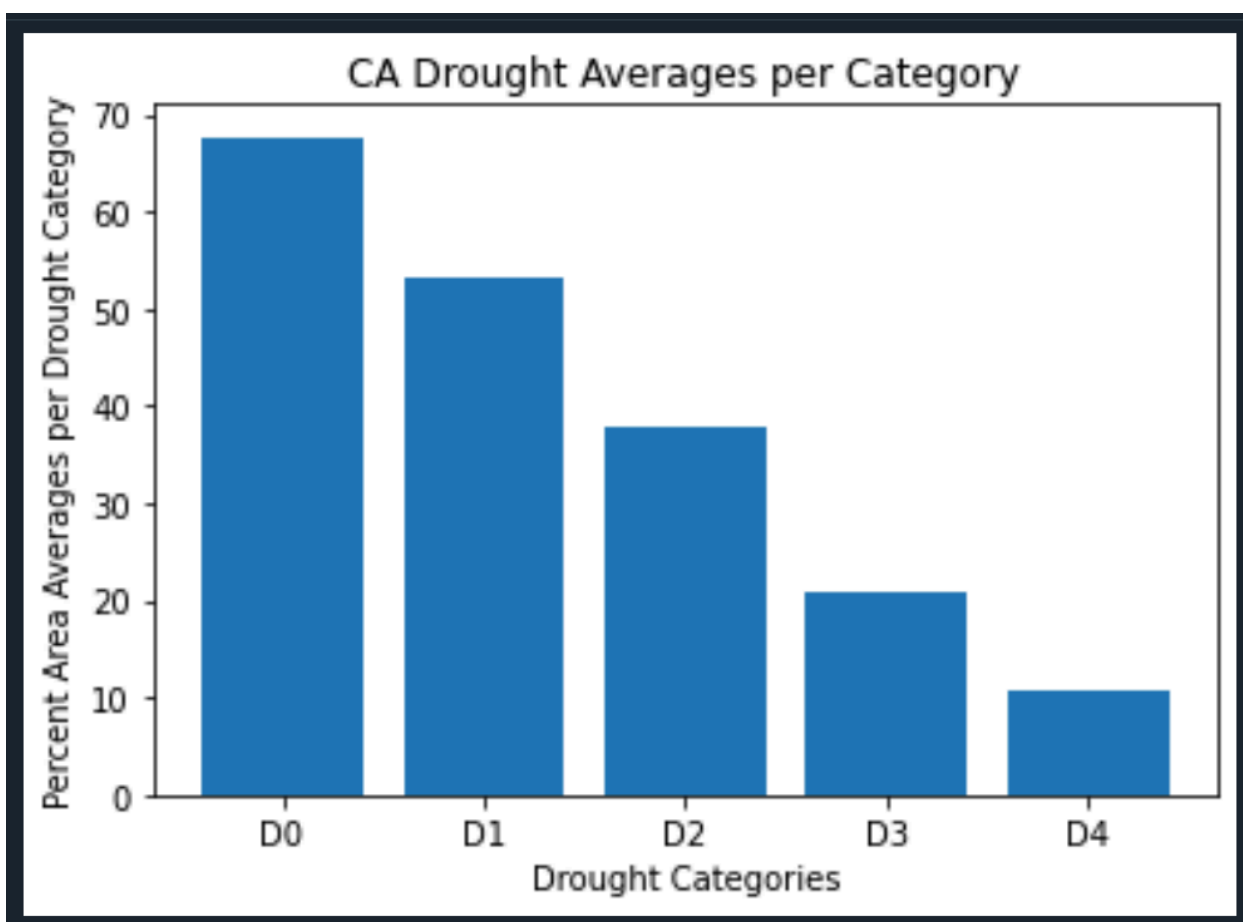
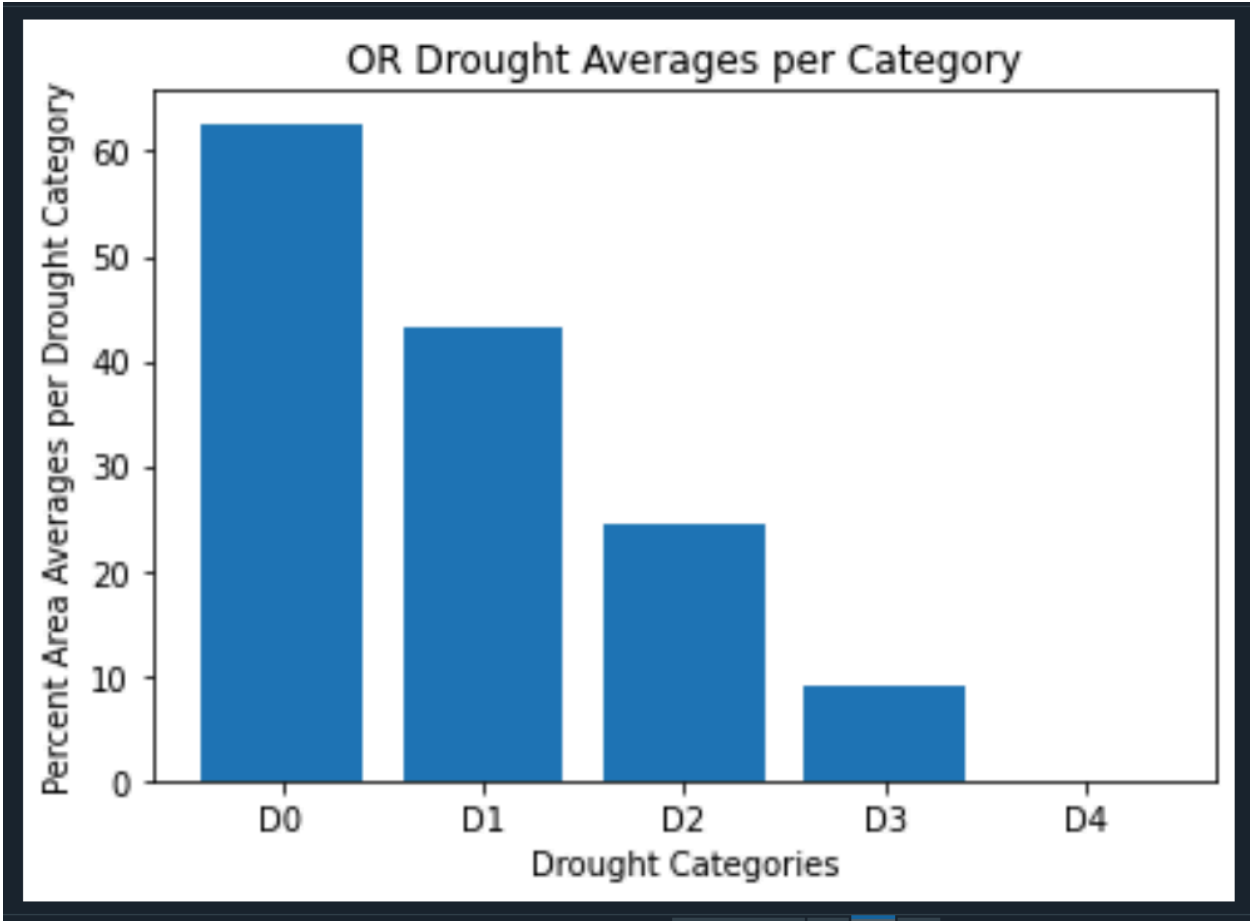## Part 1: Instructions for running your program

Because the code works, you just have to press run and have 'us_cities_10.csv' as the filename and make sure that file is in the same folder as weather_api_template.py.
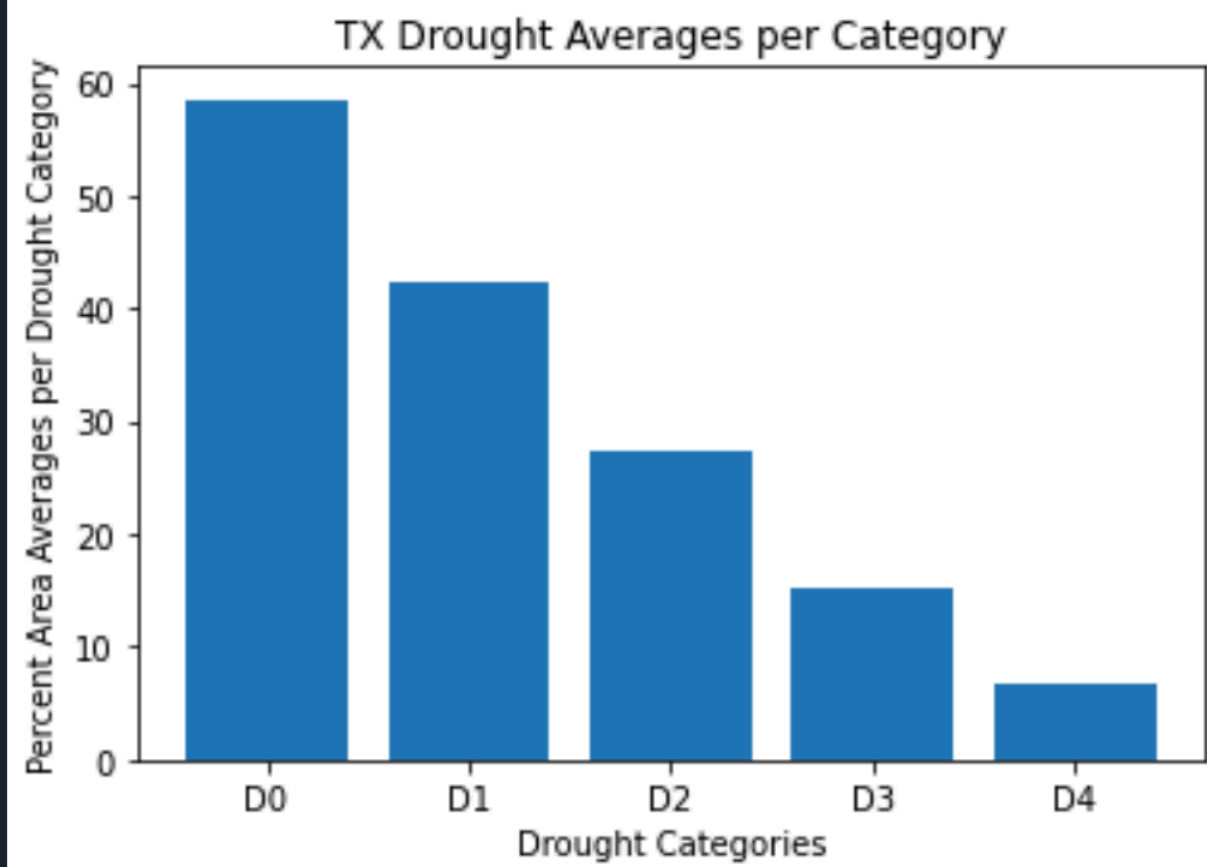
Part 2: Demonstration

```
In [5]: runfile('C:/Users/13233/Downloads/Final Project Part 2/my_analysis.py', wdir='C:/Users/13233/Downloads/Final Project Part 2')
{'AZ': [81.69, 62.77, 31.92, 9.64, 1.05]}
{'CA': [67.68, 53.26, 37.75, 20.77, 10.62]}
{'OR': [62.65, 43.08, 24.33, 8.94, 0.0]}
{'TX': [58.53, 42.38, 27.22, 15.12, 6.76]}
{'PA': [19.15, 3.64, 0.38, 0.0, 0.0]}
{'ME': [21.53, 7.64, 2.08, 0.17, 0.0]}

In [6]:
```
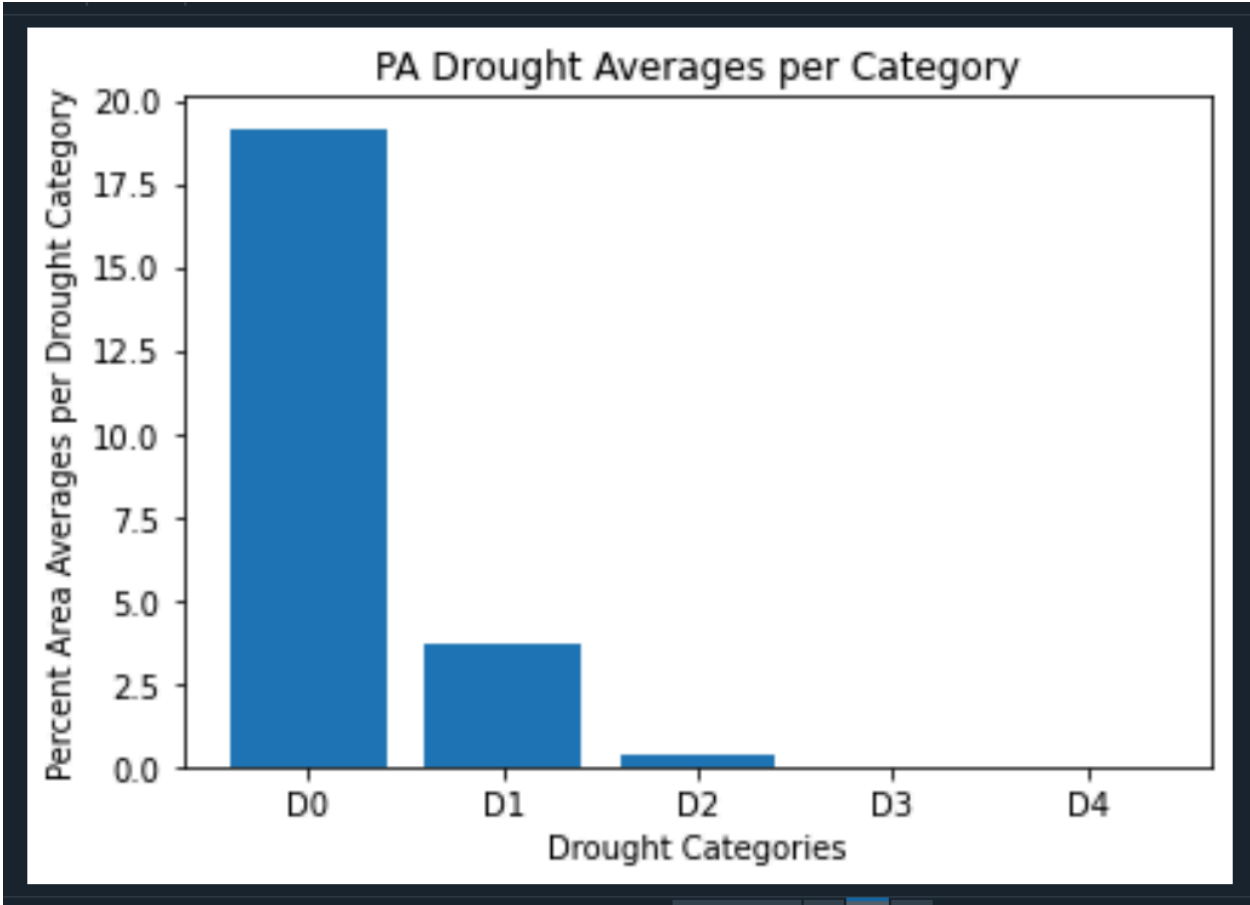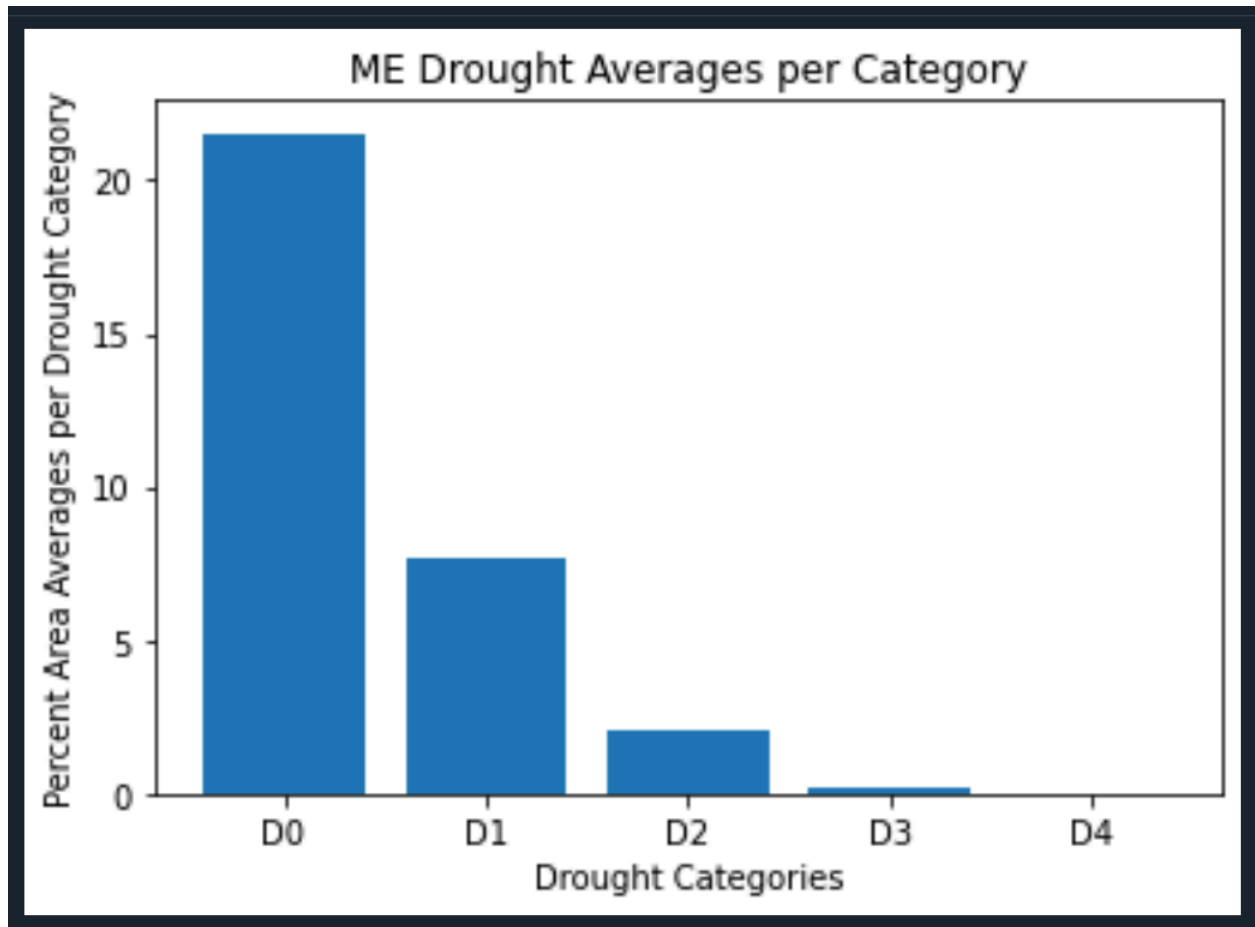
OR Drought Averages per Category

TX Drought Averages per Category

PA Drought Averages per Category

ME Drought Averages per Category

Part 2: Instructions for running your program

The variable filename must have 'az.csv', 'ca.csv', 'or.csv', 'tx.csv', 'pa.csv', and 'me.csv', as well as all of those csv files within the same folder as my_analysis.py. The code works, so when run is hit, the dictionaries will print in the console and the 6 graphs will print in the plot area.

What works? What doesn't?

The entire code works. I was able to get the percent area averages for each drought category for each state and put them into lists. The lists were put as values and the states were put as keys in the dictionary. The correct data is also reflected in the matplotlib graphs.

Analysis Discussion and Reflection

The question posed for my analysis was to see if droughts only happened often within states in the West. Based on the data collected, it was true for the most part as the western states, Arizona, California, and Oregon had most of the highest averages for certain drought categories. However, Texas, a southern state, also seemed to show signs of high averages especially for the more extreme drought categories. Texas had higher averages than Oregon for severe to exceptional drought categories, which is interesting because Oregon is in the

West. These statistics make sense as most of this data was up to the regions getting enough rainfall. The West definitely doesn't receive as much rainfall as the East and South and the West receives more sunshine. Because of these differences in climate, more intense droughts occur in the West or other regions that happen to have an increased amount of heat. Because Texas tends to get really hot whenever they experience warm temperatures, this can explain their increased averages, but of course they still remain below the western states.

Project Reflection

This project has definitely helped me improve on my Python skills as I was able to make good use of various skills we have learned throughout the semester. I tried to use my knowledge of for loops, nested loops, lists, dictionaries, and how to use the main() function within my project. I definitely feel more confident with handling multiple data sets or large data sets as this is the second time I was able to work with large data. I'm feeling somewhat more comfortable with Matplotlib, as this was also my second time using it. I'm still getting used to the different functions and how to read in large data properly into Matplotlib.

I had expected to read in all the data through one large data set, but it didn't work quite correctly in Spyder. Due to this, the TAs suggested I split up the data and read them in one at a time. Due to this, I wasn't sure how to get all 6 states plotted on one graph, so it was best to have them read in on 6 different graphs. However, the original motive of the project stayed the same.