Project 2: Data Processing and Visualisation

Due: Week 6 Friday

Project Description

You have been provided with two different kinds of json files containing weather data for Perth. One contains the 5 day forecast, the other contains historical data for a 24 hour period. Your job is to convert this data into something useful.

Project Requirements

Part 1: Forecast Summary

You are to write a Python script that produces:

- A summary of the forecast including:
 - o The overall min temperature, and the date this will occur.
 - The overall max temperature, and the date this will occur.
 - The mean minimum temperature.
 - The mean maximum temperature.
- A summary of each day, including:
 - The maximum and minimum temperatures.
 - o Daytime:
 - The Long Phrase description.
 - The % chance of rain.
 - Nighttime:
 - The Long Phrase description.
 - The % chance of rain.

This section expects specifically formatted output (see "Part 1 Expected Output" in Appendix for an example).

This section also has tests to check your code. These tests check the following functions run correctly:

- convert_f_to_c
- calculate_mean
- process_weather

To run the tests, use the following command from the part1 directory: python run tests.py

Part 2: Forecast Graphs

You are to a Python script that produces the following graphs:

- A single time series graph that contains both the minimum and maximum temperatures for each day.
- A single time series graph that contains the minimum, minimum "real feel", and minimum "real feel shade" temperatures.

Part 3: Historical Data Graphs and Summary

You are to write Python code that produces the following graphs:

- A single graph that contains two box plots, one for the temperature and one for the real feel temperature.
- A bar graph showing the number of times each "WeatherText" category occurs.

You are to write Python code that produces a text file that contains a summary of the day:

- When the minimum and maximum temperatures occurred.
- The amount of precipitation that fell in the 24 hours.
- The number of hours that precipitation was recorded for.
- The number of daylight hours in the past 24 hours.
- The maximum UV index, and what hour(s) this occurred.

Additional Notes

- Dates and times should be in a human readable format.
- By default, all temperatures are in Fahrenheit, you must convert them to Celcius.
- All graphs should have:
 - A suitable main title and suitable titles for the x and y axes.
 - A legend where appropriate.
- Data for each part is provided in a "data" folder. Do not amend this data.

Submission

Please submit the following:

- A link to the GitHub repository containing the code for your project.
- A screenshot of each graph.
- A screenshot of the text output.
- A screenshot of your code passing my tests (for Part 1).

Appendix

Part 1 Expected Output

```
5 Day Overview
     The lowest temperature will be 8.3°C, and will occur on Friday 19 June 2020.
     The highest temperature will be 22.2°C, and will occur on Sunday 21 June 2020.
     The average low this week is 11.7°C.
     The average high this week is 20.1°C.
----- Friday 19 June 2020 ---
Minimum Temperature: 8.3°C
Maximum Temperature: 17.8°C
Daytime: Sunshine mixing with some clouds
     Chance of rain: 1%
Nighttime: Clear
     Chance of rain: 0%
----- Saturday 20 June 2020 -----
Minimum Temperature: 10.6°C
Maximum Temperature: 19.4°C
Daytime: Plenty of sunshine
     Chance of rain: 0%
Nighttime: Clear
     Chance of rain: 1%
----- Sunday 21 June 2020 ------
Minimum Temperature: 14.4°C
Maximum Temperature: 22.2°C
Daytime: Pleasant with sunshine
     Chance of rain: 1%
Nighttime: Mainly clear
```

Chance of rain: 1%

----- Monday 22 June 2020 -----

Minimum Temperature: 14.4°C

Maximum Temperature: 22.2°C

Daytime: Increasing clouds and breezy; periods of rain late in the afternoon

Chance of rain: 63%

Nighttime: Breezy in the evening with periods of rain; otherwise, clouds breaking

Chance of rain: 71%

----- Tuesday 23 June 2020 -----

Minimum Temperature: 10.6°C

Maximum Temperature: 18.9°C

Daytime: A shower; plenty of clouds in the morning, then times of clouds and sun in the

afternoon

Chance of rain: 56%

Nighttime: Partly cloudy with a shower in spots late

Chance of rain: 46%