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:
    - 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.
    - 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%
```