Assignment 9: Libraries Pandas and Matplotlib

Objectives: Be able to use libraries for common tasks in research like loading, cleaning, and analyzing data.

For this assignment, since it is using libraries and not building off of previous assignments you will create a new directory in your GitHub repository entitled “UsingLibraries”. The report portion of this assignment will be submitted as a README in that directory. All scripts and code files used for this assignment should be kept in that directory.

Tasks:

Your Uncle John is attending Thanksgiving this year. You like Uncle John well enough, but he is a staunch climate change denier. In preparation for Thanksgiving, you need to be ready to show Uncle John data about the change in temperatures in North America and its relation to our environment, especially agriculture.

1. Develop a written report to present to Uncle John using the data from `Agrofood_co2_emission.csv` and `IMF_GDP.csv`. This document should come in the form of a README that includes a 4-panel plot showing the following items:
    a. Top left (A): Line plot of Year vs Average Temperature. Only plot mainland countries of North America, (United States, Mexico, Canada, and Guatemala). Lines should be colored according to the country and there should be a legend.
    b. Top right (B): Scatter plot of year vs total emissions. Only plot mainland countries of North America - they should be colored to match the line plots in panel A and include a legend.
    c. Bottom left (C): Scatter plot of GPD (from IMF_GDP.csv) vs Total emissions for those countries colored by year.
    d. Bottom right (D): An additional figure of your choosing to support your narrative.

    Ensure the following
    a. This should be a single file with 4 panels in it, not 4 separate files.
    b. All panels should be labeled A, B, C, and D
    c. The panels should *not* have top or right borders
    d. All x and y axes should have descriptive labels
    e. Should be loaded and processed using pandas
    f. All plotting should be done with matplotlib

    Your README should briefly explain and interpret each panel of the figure.

2. Uncle John is a stickler for reproducible science. You need to create a separate snakemake pipeline for this assignment. The pipeline should have a rule that processes, cleans, and saves the data you need to a new file. There should also be a rule that takes the output from the first rule and produces your 4-panel plot.
3. Unfortunately, Uncle John will probably be unconvinced by your amazing report, and you will need to bolster it for next year’s Thanksgiving. If you had all the resources imaginable, what extra data and figures would you include in your report to strengthen your argument? Include your answer to this question in the README.
4. Create a release from master tagged as 6.0