SI 206 Final Report
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Our Goals:

Our goal was to collect solar radiance data from the Solar Resource Data API and compare it to temperatures across the U.S. from the NOAA website in order to determine if there was a correlation between radiation and temperature anomalies.

Goals Achieved:

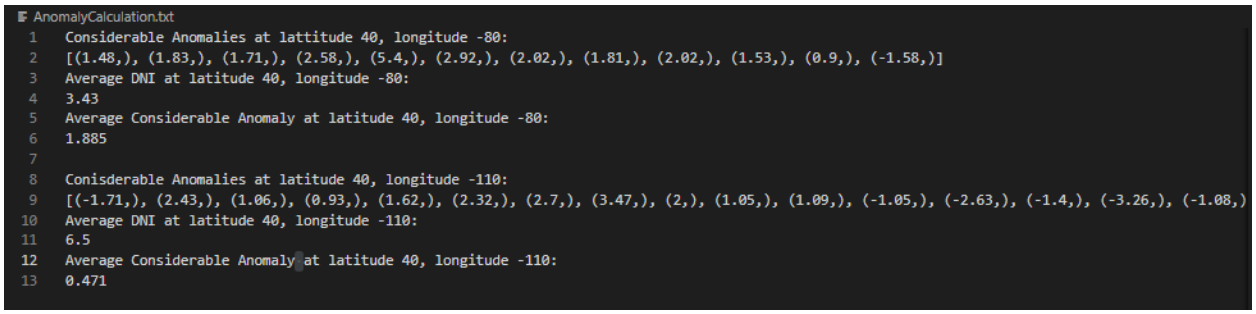
We successfully gathered enough data to compare the radiation and temperature anomalies across four locations in the U.S. using the Solar Resource Data API and the NOAA website. We came to the conclusion that there is no correlation between GHI/DNI radiation and temperature anomalies.

Problems Faced:

A problem we faced was that it was difficult to separate a lot of the data we pulled from our API, leading us to make a lot of tables. Our biggest problem was trying to web scrape from a site that was made using JavaScript, leading us to using Selenium and PhantomJS to gather the data.

Calculations:

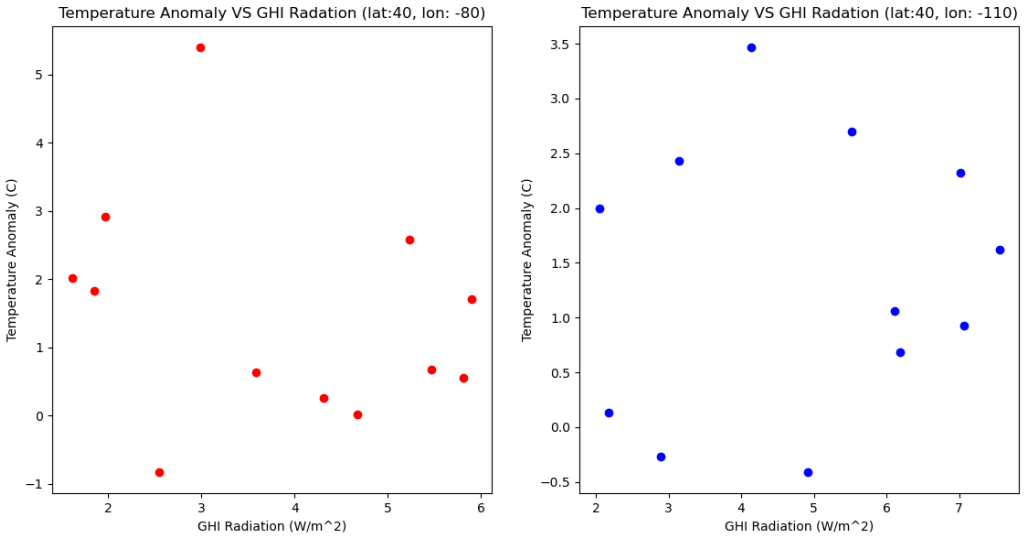
Our calculations included calculating the average annual DNI radiation at two locations, the annual average considerable anomalies at two locations, and the list of considerable anomalies at two locations. All show below:


AnomalyCalculation.txt

```
1  Considerable Anomalies at lattitude 40, longitude -80:
2  [(1.48,), (1.83,), (1.71,), (2.58,), (5.4,), (2.92,), (2.02,), (1.81,), (2.02,), (1.53,), (0.9,), (-1.58,)]
3  Average DNI at latitude 40, longitude -80:
4  3.43
5  Average Considerable Anomaly at latitude 40, longitude -80:
6  1.885
7
8  Conisderable Anomalies at latitude 40, longitude -110:
9  [(-1.71,), (2.43,), (1.06,), (0.93,), (1.62,), (2.32,), (2.7,), (3.47,), (2,), (1.05,), (1.09,), (-1.05,), (-2.63,), (-1.4,), (-3.26,), (-1.08,)
10 Average DNI at latitude 40, longitude -110:
11 6.5
12 Average Considerable Anomaly at latitude 40, longitude -110:
13 0.471
```

Visualizations:

We had two graphs that showed the temperature anomalies vs GHI radiation at two locations, as shown below:



Instructions for running code:

Delete or rename the Radiation.db database if it exists and then run AlphaCentauriMain.py nine times. The first eight times it will gather data and insert it into the Radiation.db database, and on the ninth it will output the data shown above. Make sure you have the Selenium module so that WebScrape.py works properly. If you accidentally stop the code from running, edit constraint.txt so that there is only a "1" and try again; this will restart the cycle.

Function Documentation:

1. **DataPull():**
    a. This function takes one argument which is a query string or integer representing a longitude
    b. It creates a webserver and scrapes data off of a background run website. It then scrapes data and creates a list of tuples in the form of (date, anomaly)
2. **Radiation_insert():**
    a. Takes in a cursor, connection, and a dictionary of radiation data pulled from the Solar Resource Data API
    b. It will check the dictionary for the information's coordinates and then insert the data into its proper table

3. **api_request():**
    a. Takes in an API request, dictionary, and a list.
    b. It will request the API, store the API data into a dictionary and then add that dictionary to a pre-existing list.

4. **anomaly_insert():**
    a. Takes in a cursor, connection, longitude integer, and a list of tuples of anomaly data
    b. It will check what longitude the information relates to and insert the anomaly data into the correct table
5. **calc_avg_anomaly_per_annual_rad():**
    a. Takes in a cursor
    b. Uses select and join statements to get annual DNI radiation data and considerable (> abs(0.85)) anomaly data that then goes onto AnomalyCalculation.txt. Then, it gets a year's worth of GHI radiation and anomaly data at two locations and creates scatter plots displaying the data.

Resources Used:

Date	Issue Description	Location of Resource	Result
4/19	Needed To be able to scrape data from a dynamically loaded javascript table .	https://selenium-python.readthedocs.io/ https://phantomjs.org/download.html	I learned that selenium can be used to create and pull data from a headless browser. Anytime that one is webscraping from a website with scripts, the scripts can be run with selenium. PhantomJs is used for javascript.
4/19	Needed website to pull data from	"https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/global/time-series/40,"+-11	Was able to pull data

		0+"/land_ocean/all/1/2011-2013"	
4/19	Had trouble using API parameters	https://www.dataquest.io/blog/python-api-tutorial/	I learned how to use variables to add onto API requests, allowing me to change what data I was pulling.
4/10	Needed an API to get data from	Solar Resource Data API: **https://developer.nrel.gov/docs/solar/solar-resource-v1/**	Was able to get the necessary data

PART 5

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Report (100 points)

In addition to your API activity results, you will be creating a report for your overall p

The report must include:

1.
The goals for your project
including what APIs/websites you
planned to work with
and

what data you planned to gather
(10 points)

2.
The goals that were achieved
including what APIs/websites you actually worked with
and

what data you did gather
(10 points)

3.
The problems that you faced (10 points)

4.
The
calculations from
the data in the database
(i.e. a screen shot)
(10 points)

5.
The visualization that you created (i.e. screen shot or image file) (10 points)

6.
Instructions for running your code (10 points)

7.
Documentation for each function that you wrote. This includes
describi

ng
the input and

output for each function (20 points)

8.
You must also clearly document all resources you used. The documentation should

the following form (20 points)

Date
Issue Description
Location of Resource
Result

(did it solve the issue?