Climate Change Data Visualization

Em Greene, Geoffrey Hoehn, Tim Matanick, Eric Martin

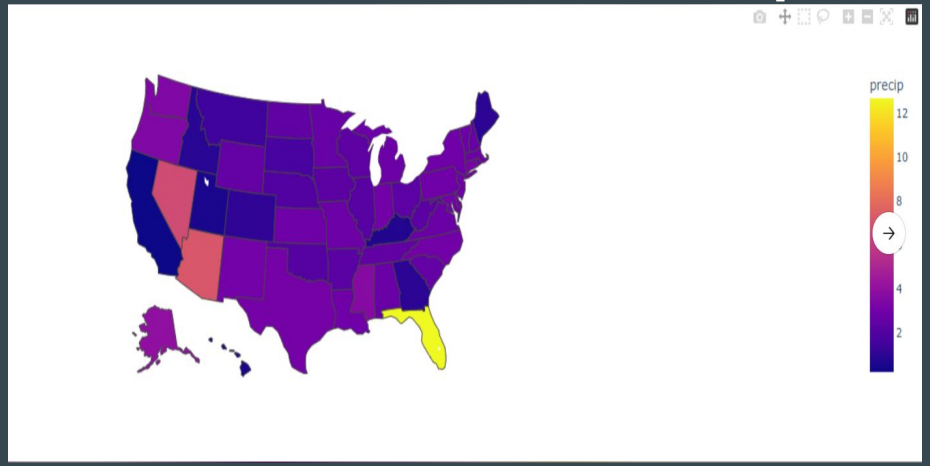
Research Questions

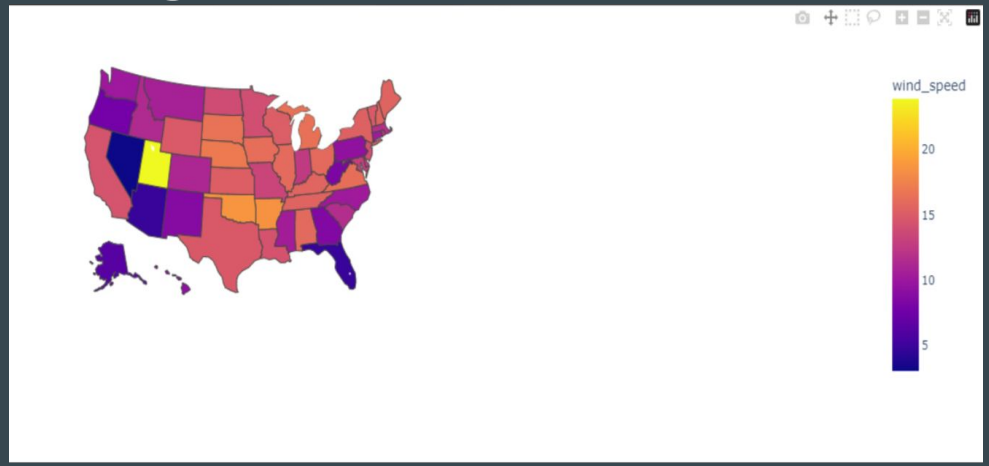
- Average Max and Min Temperatures: How has the average temperature changed over time?

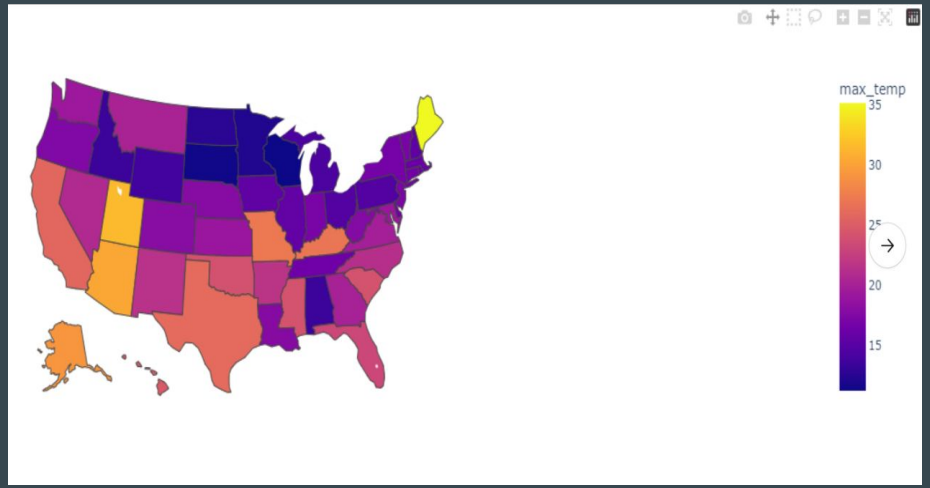
- Average Precipitation: How has the average precipitation changed over time?

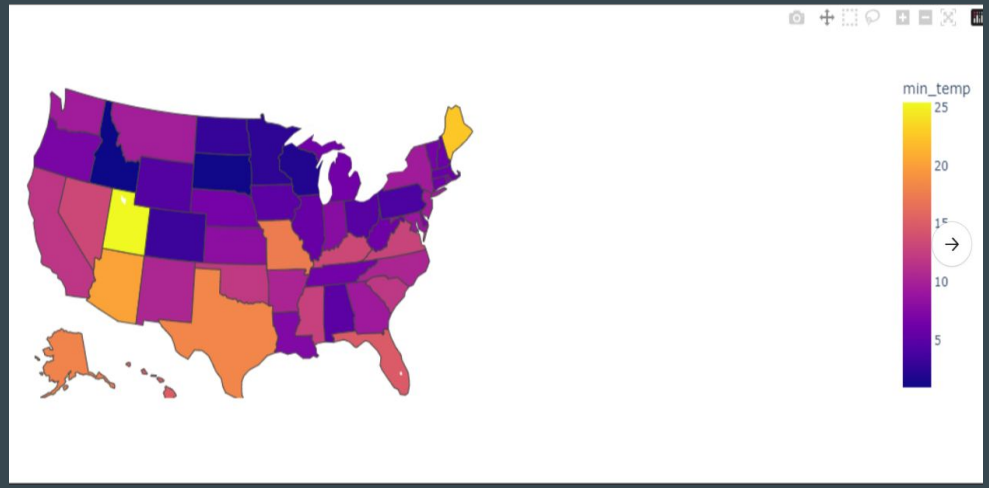
- Average wind speed: How has the average wind speed changed over time?

2022 Weather Data Choropleth through Python









```python
#import dependices
from wwo_hist import retrieve_hist_data
import os
```

```python
#working directory
os.chdir(r"C:\Users\EMARTIN8169\OneDrive\Desktop\OSUFOLDER\ClimateChangeExplorer_Group2\StateWeatherFolder")
```

```python
#data pull
frequency=24
start_date = '01-JAN-2010'
end_date = '30-MAR-2023'
api_key = 'd5468568b45b48ca92c13659230206'
location_list = ['wyoming']

#'tennessee','texas','utah','vermont','virginia','washington'

hist_weather_data = retrieve_hist_data(api_key,
                                location_list,
                                start_date,
                                end_date,
                                frequency,
                                location_label = False,
                                export_csv = True,
                                store_df = True)
```

```
Retrieving weather data for wyoming


Currently retrieving data for wyoming: from 2010-01-01 to 2010-0
c:\Users\EMARTIN8169\anaconda3\lib\site-packages\wwo_hist\__init
```

ETL

Extracted data from OpenWeatherMap through an API. Transformed data through a merge and panda cleanup. Loaded data into a MongoDB

```python
import os
import csv, glob

Dir = r"D:\ClimateChangeExplorer_Group2\StateWeatherFolder"
Avg_Dir = r"D:\ClimateChangeExplorer_Group2"

csv_file_list = glob.glob(os.path.join(Dir, '*.csv')) # returns the file list
print (csv_file_list)

with open(os.path.join(Avg_Dir, 'Output.csv'), 'w', newline='') as f:
    wf = csv.writer(f, lineterminator='\n')

    for files in csv_file_list:
        with open(files, 'r') as r:
            next(r)                    # SKIP HEADERS
            rr = csv.reader(r)
            for row in rr:
                wf.writerow(row)
```

```
['D:\\ClimateChangeExplorer_Group2\\EricPlayground\\alabama.csv', 'D:\\ClimateChangeExplorer_Gro
```

Running Flask

(Tim)

```python
from flask import Flask, render_template
from pymongo import MongoClient
from bson.json_util import dumps, ObjectId
import json

app = Flask(__name__, static_url_path='')

# Mongo connection parameters
mongo_uri = 'mongodb://localhost:27017/'
db = 'climate'
collection = 'climate'

# Connect to MongoDB
client = MongoClient(mongo_uri)
db = client[db]
collection = db[collection]

# Retrieve the data from the collection
data = list(collection.find())

# Convert the data to JSON
json_data = dumps(data)


# Remove the _id field from json_data
json_data = json.loads(json_data)
for i in json_data:
    i.pop('_id', None)


@app.route('/')
def index():
    return render_template('ClimateChangeDashboard.html',data=json_data)


if __name__ == '__main__':
    app.run()
```

Building the Dashboard

(Em)

```
// match the dropdown to a function
var dropdown = document.getElementById("selDataset")
dropdown.onchange = function optionChanged() {

  var selectedValue = document.getElementById("selDataset").value


  let years = Object.keys(data[0].alabama.precip)
  let precipValue = Object.values(data[0][selectedValue].precip)
  let maxTemp = Object.values(data[0][selectedValue].max_temp)
  let minTemp = Object.values(data[0][selectedValue].min_temp)
  let windSpeed = Object.values(data[0][selectedValue].wind_speed)

  console.log(maxTemp)

  let Bar1 = [{
    type: 'bar',
    x: years,
    y:precipValue,
    name: "Precipitation by Year"
  }]
```

I used the basics of the Plotly challenge homework to build our dashboard.

Data Limitations

(Em)

1. Only 13 years of data.
2. Averaging for entire states, which some have different climates within the state.
3. Only focusing on US, where some other countries have seen more changes.

Viewing our Results

(Em)

Let’s go to the Dashboard and talk about our results.