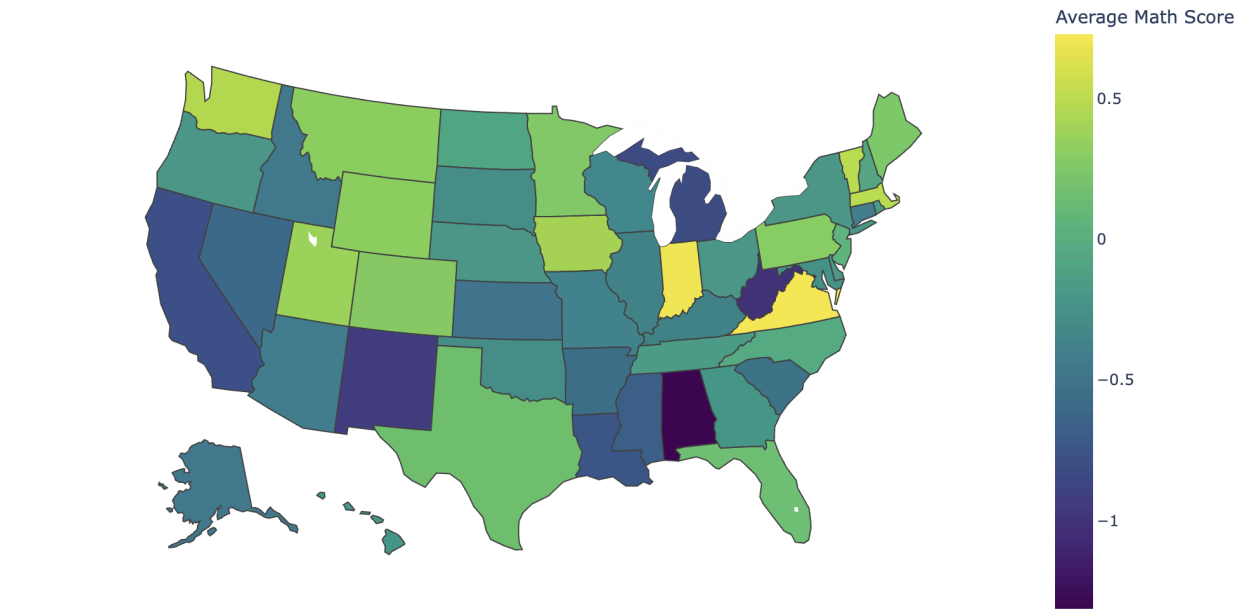

Description:
I created the choropleth map using Python, using the pandas library to process the data and the Plotly library to visualize it (code attached below). The data came from the The SEDA2023 dataset, which sources its data from the EDFacts data system, managed by the U.S. Department of Education. This dataset aggregates test score data from standardized testing programs across states. In particular, this data is 2023 math achievement scores by state. The map style chosen is a choropleth map of the United States. This map is useful for this discussion because it visualizes the variations in math scores across different states using a color scale, with dark purple and blue indicating low scores, and green and yellow indicating high scores. This map highlights differences in educational performance which helps us understand which states are performing below or above average. This map is relevant to our dataset because States with lower scores may have struggled more with the transition to remote learning, lacking the necessary infrastructure and resources to support students effectively. We could create another graph for before the pandemic and compare what the graph looks like to verify this. Additionally, different states responded to school closures and remote learning differently. States that did this effectively might show less decline or even improved scores.

Analysis:
For reference, a score of 0 (green) is equal to the average national NAEP average. Positive scores (e.g., 0.5) indicate performance above the average. A score of 0.5 would mean the state's average

math achievement is half a standard deviation above the mean. Negative scores (e.g., -1) indicate performance below the average. A score of -1 would mean the state's average math achievement is one standard deviation below the mean.

The average math score across all states is -0.1927, with a standard deviation of 0.4685. This is a moderate spread of scores around the mean.

The map reveals significant geographical and social disparities in math achievement scores across the United States for 2023. States in the Northeast, such as Massachusetts (0.4913) and Vermont (0.4887), and the Midwest, like Indiana (0.6977), have higher average scores. This reflects better performance potentially due to more robust educational infrastructures and socioeconomic advantages.

In contrast, Southern states like Alabama (-1.3136) and West Virginia (-1.0024), along with the District of Columbia (-1.1407), show significantly lower scores. This could be due to limited access to remote options during the pandemic or socioeconomic barriers.

These variations are visually represented through the gradient color scale, making it easy to identify high and low-performing regions. This map allows us to see the uneven impact of the pandemic on education, and how factors like socioeconomic status and geography impact this, as economically disadvantaged regions tend to see lower scores.

This analysis is significant to our project which aims to discuss the impacts of the pandemic on education because we can visually see how math performance is related to geography after the pandemic. We could then use a map of the same data, but before the pandemic, as a baseline and compare it with this one to see which states saw improvements or declines in math scores. This can help us understand how the pandemic impacted education by state.

My Code:

```
import pandas as pd
import plotly.express as px

csv_file_path = './seda2023_state_poolsub_gys_updated_20240205.csv'
excel_file_path = './seda2023_codebook_state_updated_202402025.xlsx'


df_csv = pd.read_csv(csv_file_path)


df_excel = pd.read_excel(excel_file_path)


df_csv_head = df_csv.head()
df_excel_head = df_excel.head()

df_csv_head, df_excel_head


math_scores = df_csv[df_csv['subject'] == 'mth']


average_math_scores = math_scores.groupby('stateabb')['gys_mn_2023_eb'].mean().reset_index()



# Create the choropleth map
fig = px.choropleth(
    average_math_scores,
    locations='stateabb',
    locationmode='USA-states',
    color='gys_mn_2023_eb',
    color_continuous_scale="Viridis",
    scope="usa",
    labels={'gys_mn_2023_eb':'Average Math Score'},
    title="Average Math Achievement Scores by State (2023)"
)

# Show the map
fig.show()
```