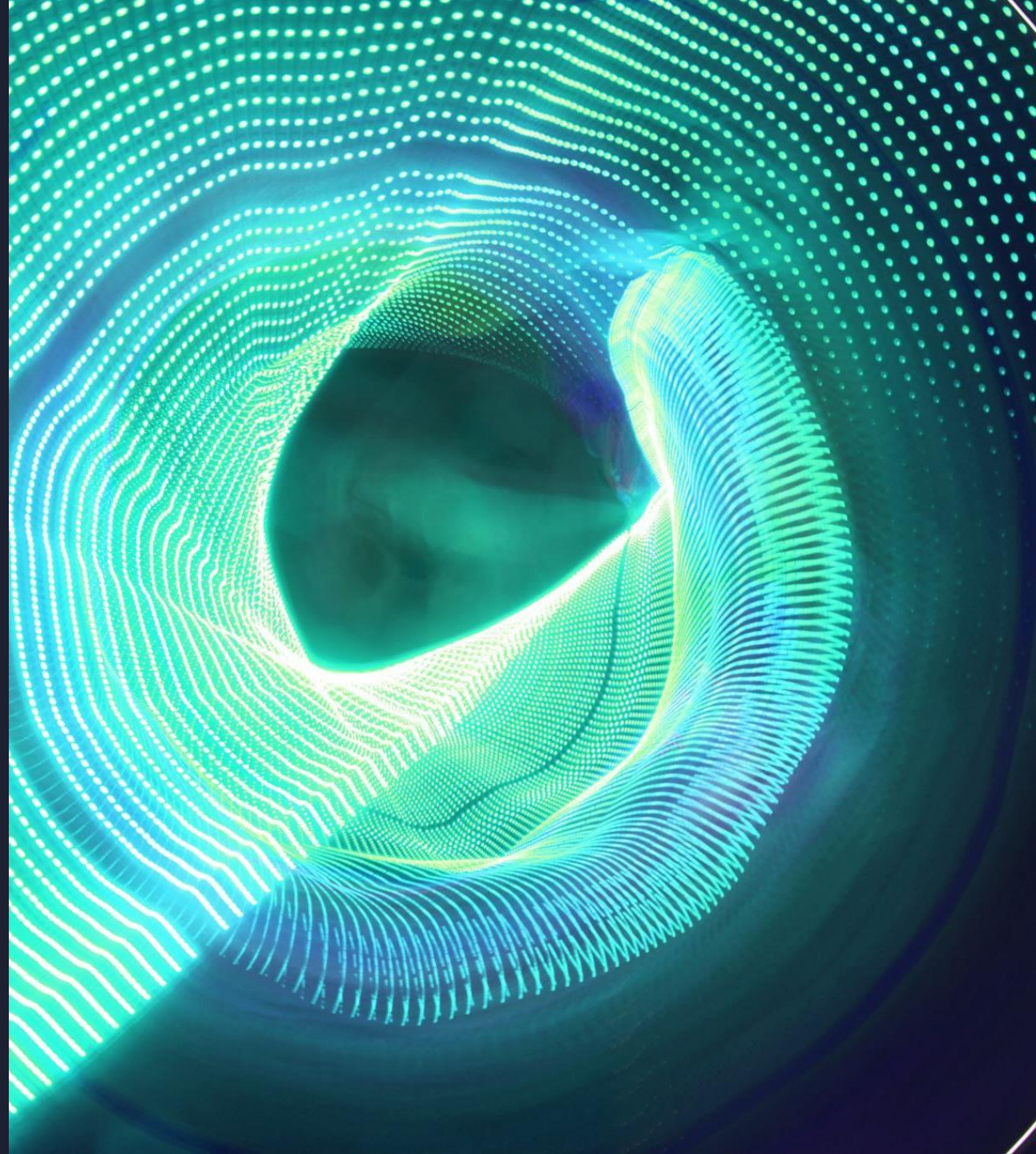
STEM Job Market Situation

Long Bui



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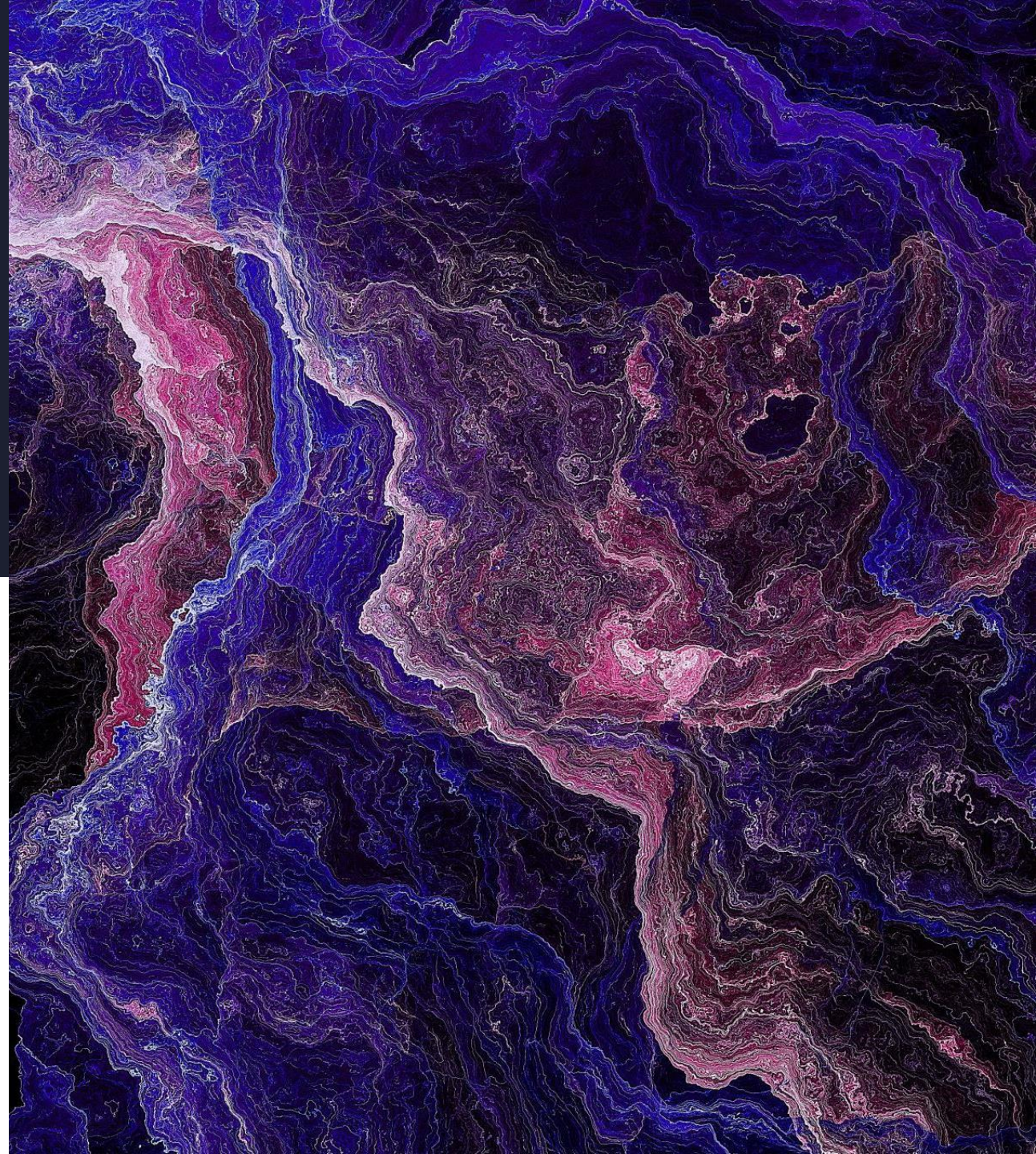
BACKGROUND

1) Why STEM ?

2) What questions should we focus in ?

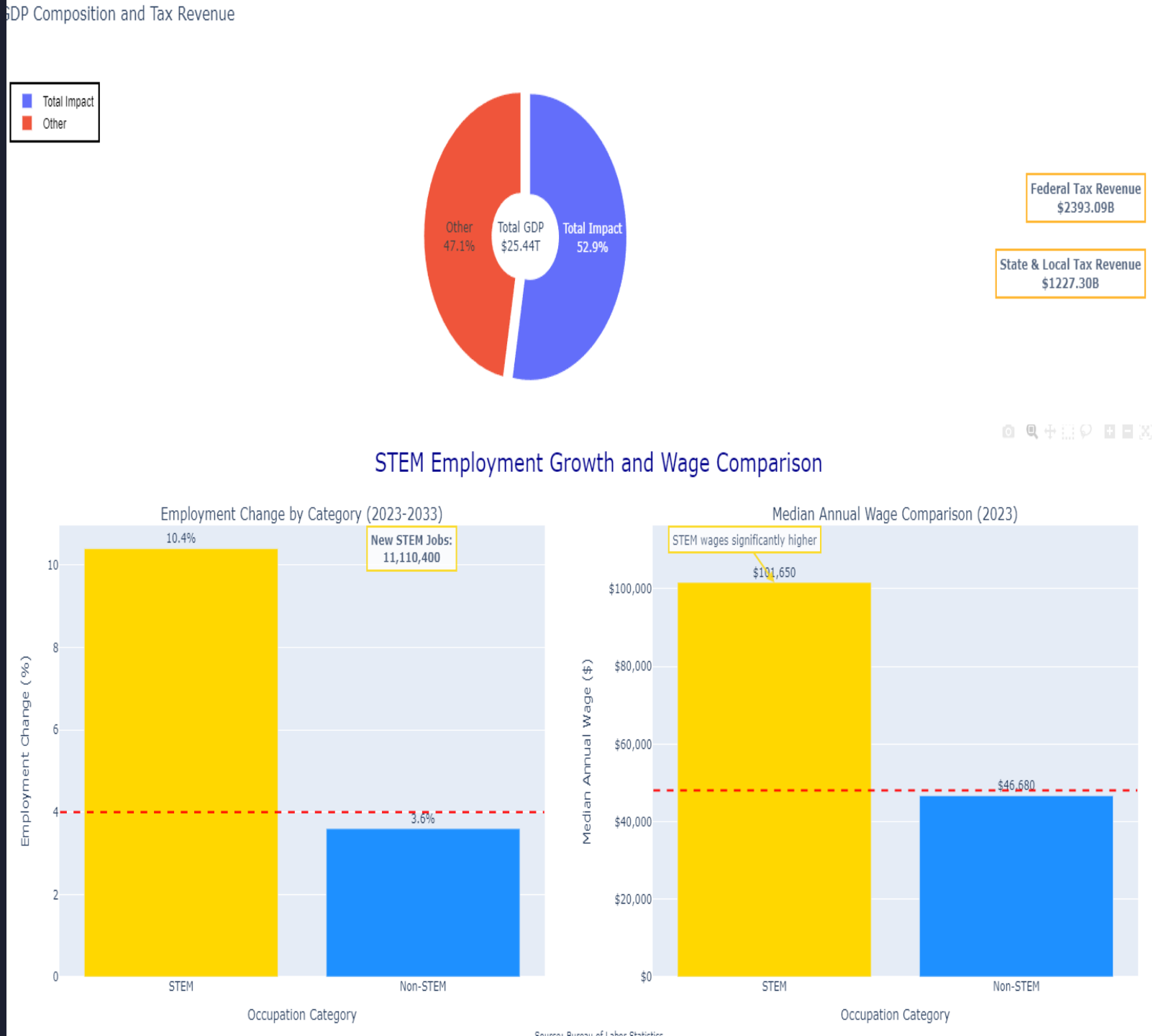


Why STEM ?

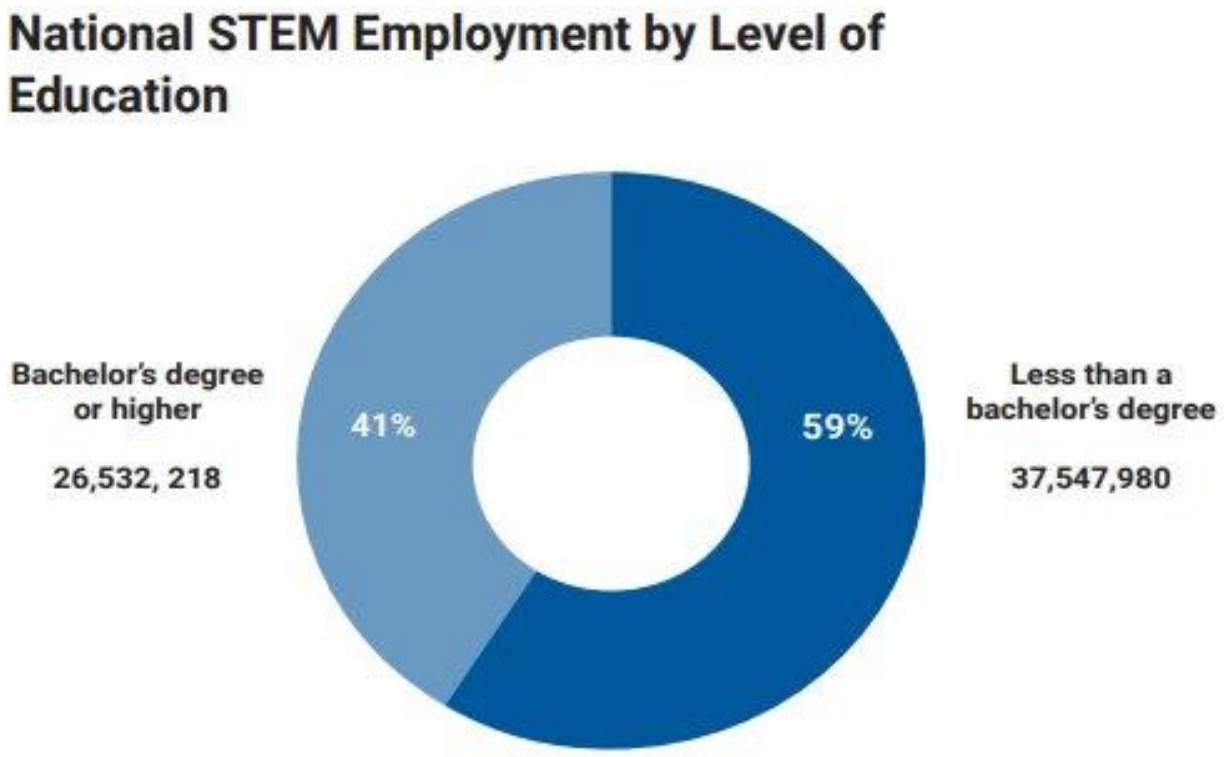
+ 11.110.400 jobs created next decade

+ 52% higher earning than average

+ Accounting for 60% of U.S. GDP



2. What is Happening?



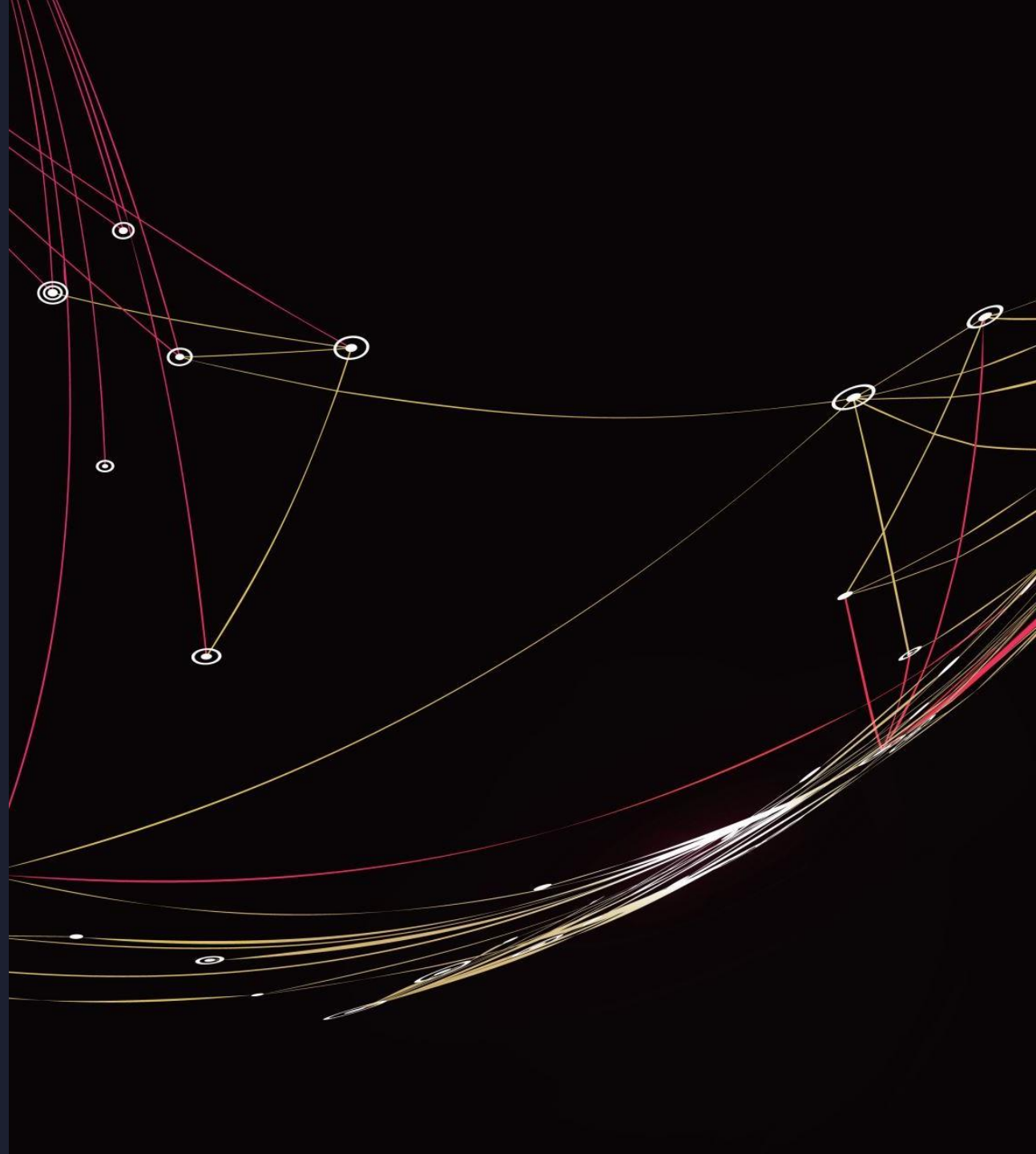
+ 6 out of 10 people in STEM workforces does not have a bachelor's degree or higher

Addressing 2 concerns:

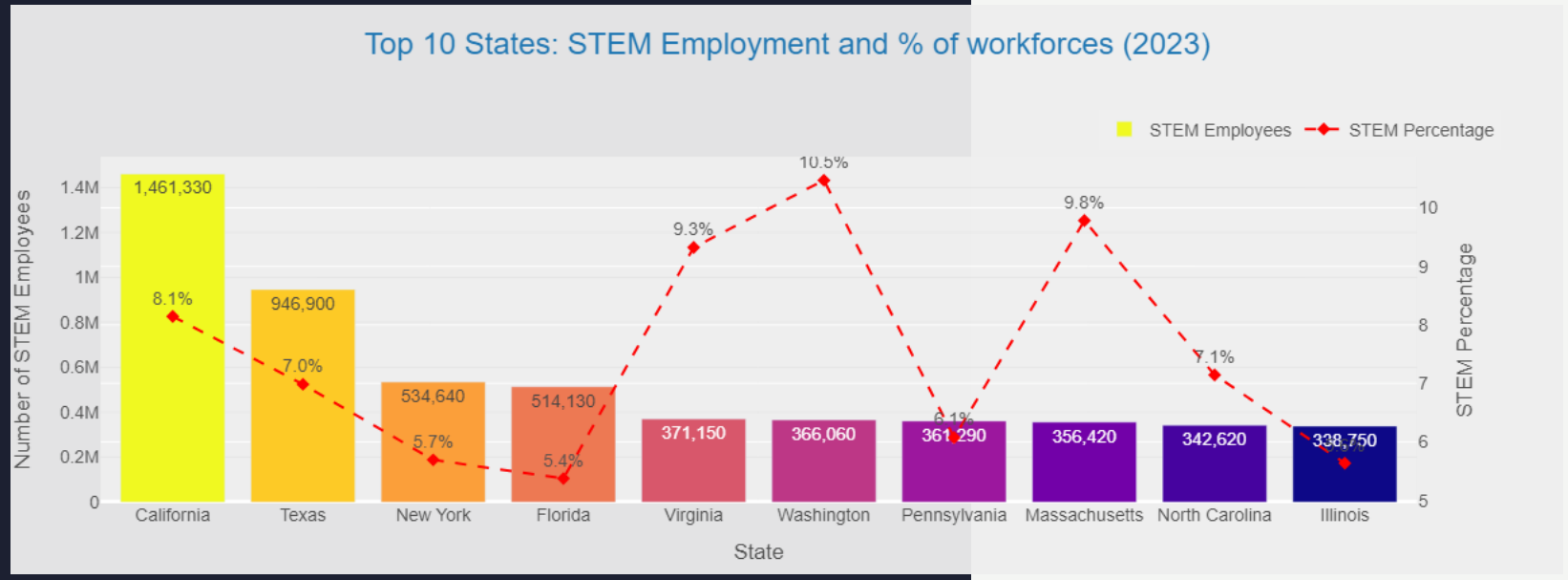
+ As a student, where should (not) to start your career when that person graduates in STEM majors ?

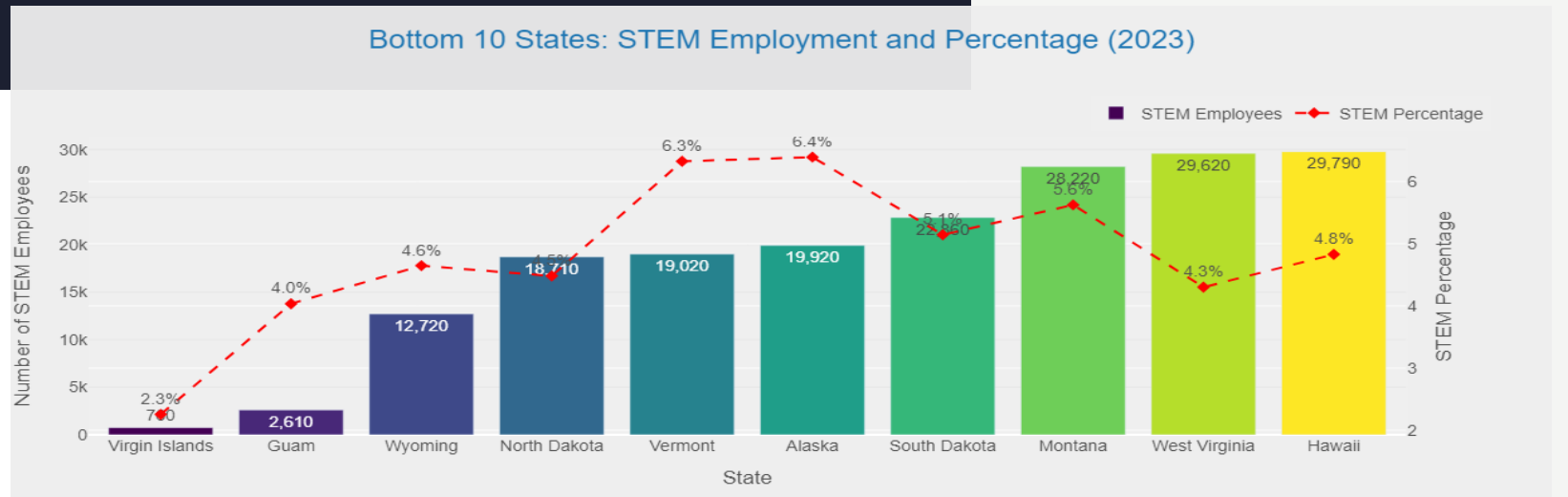
+ As government officials, how can we understand the overall STEM labor market trends in the US in recent years ?

GEOGRAPHICAL DISTRIBUTIONS



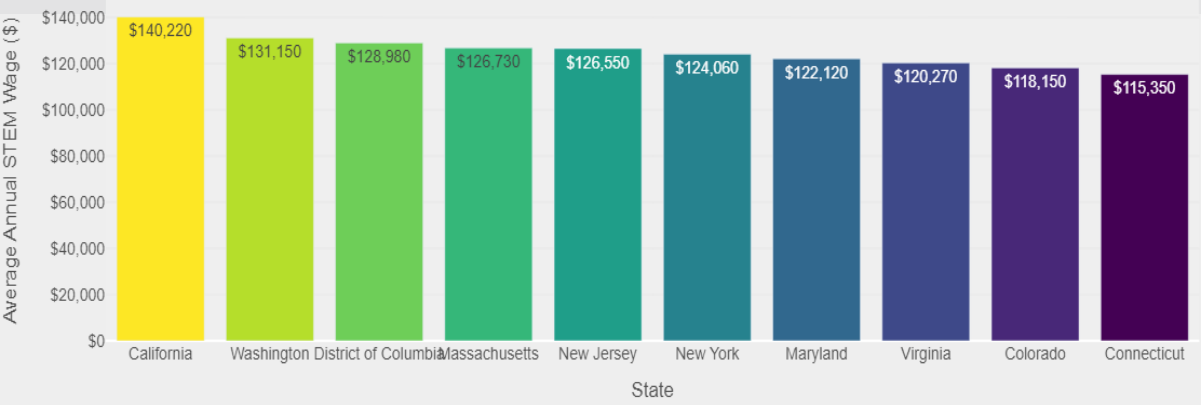
Which states should you start out ?



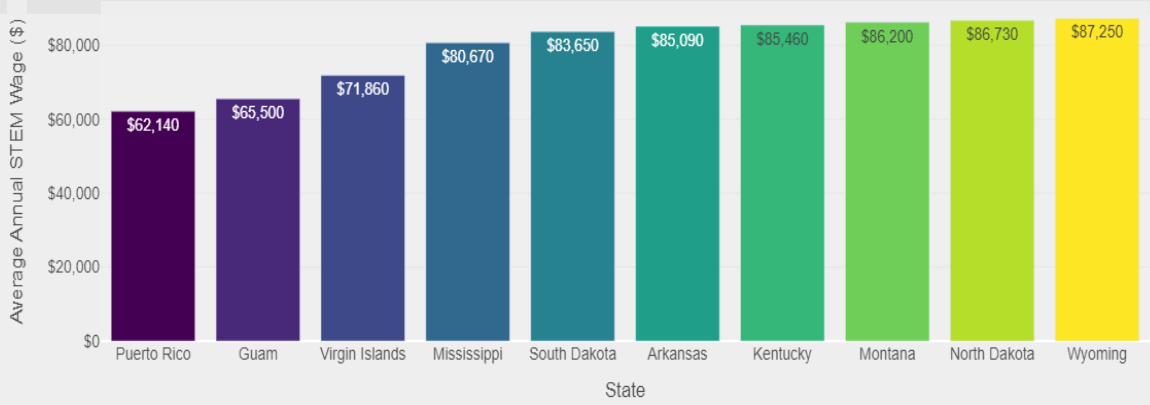


Wage & Living Standard

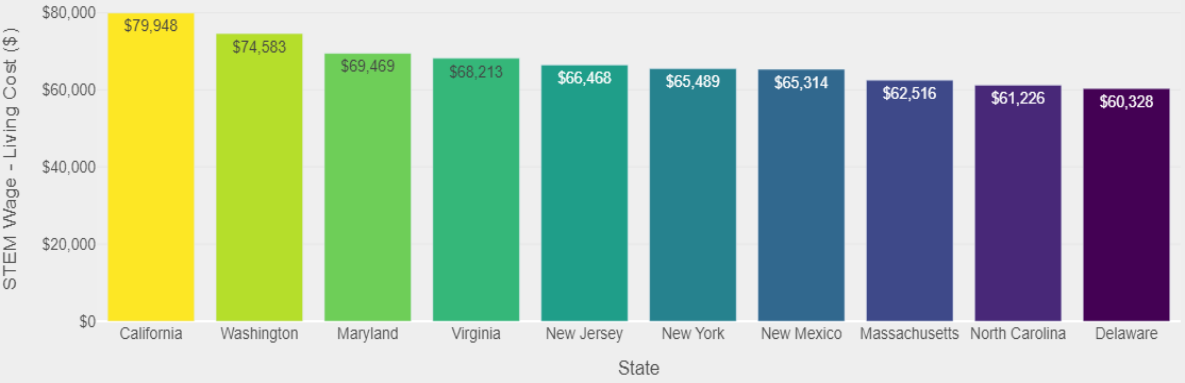
Top 10 States: Average Annual STEM Wage and STEM Percentage (2023)



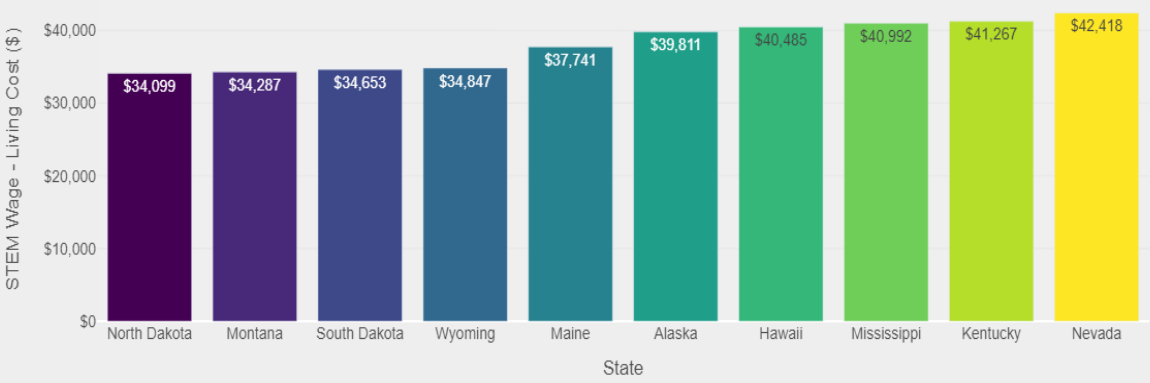
Bottom 10 States: Average Annual STEM Wage and STEM Percentage (2023)



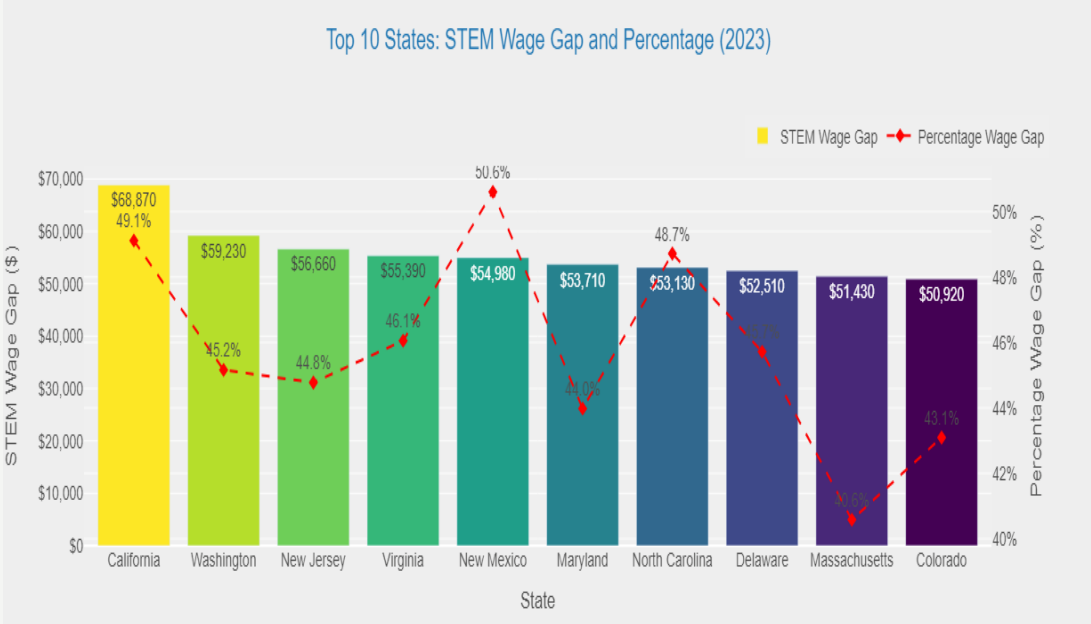
Top 10 States: STEM Wage - Avg Living Cost (2023)

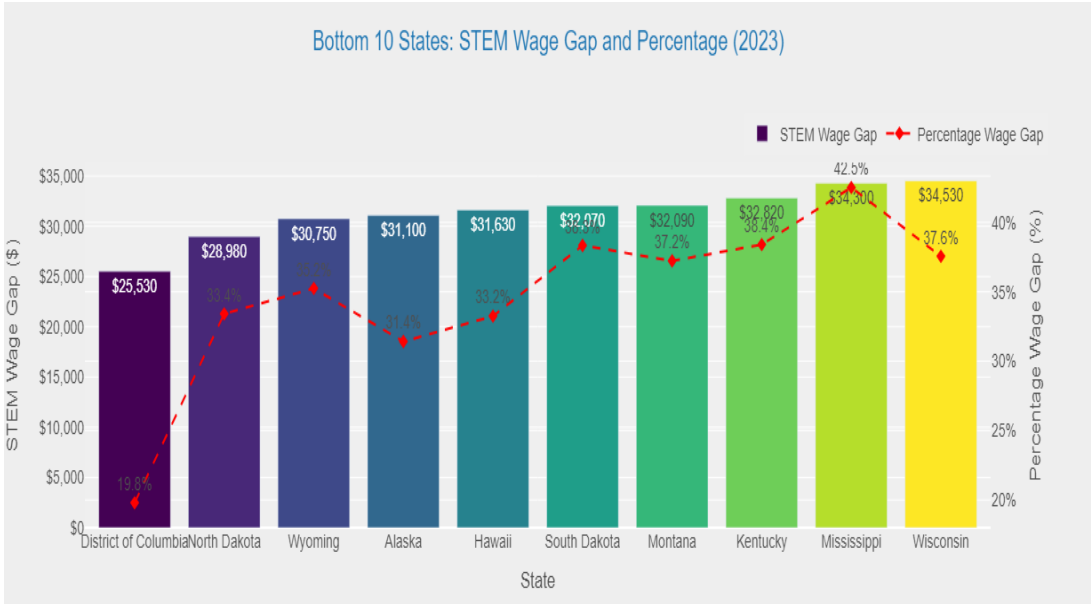


Bottom 10 States: STEM Wage Profit (2023)

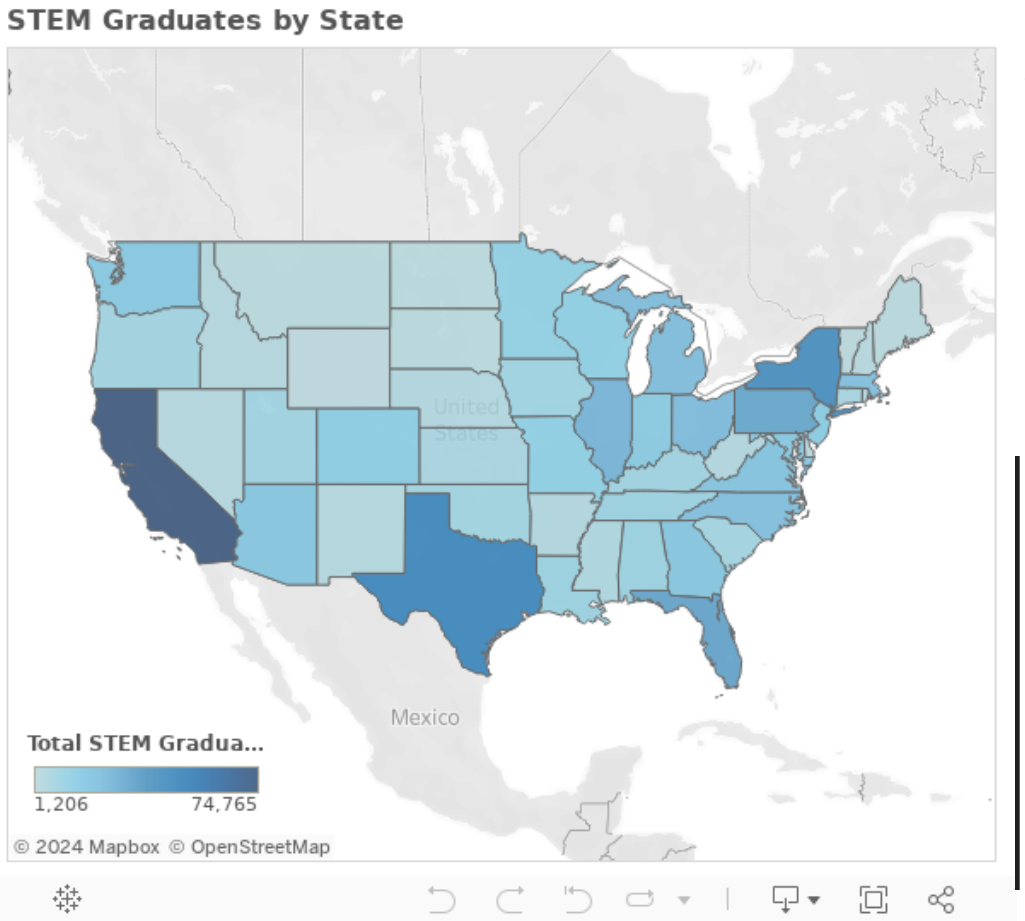


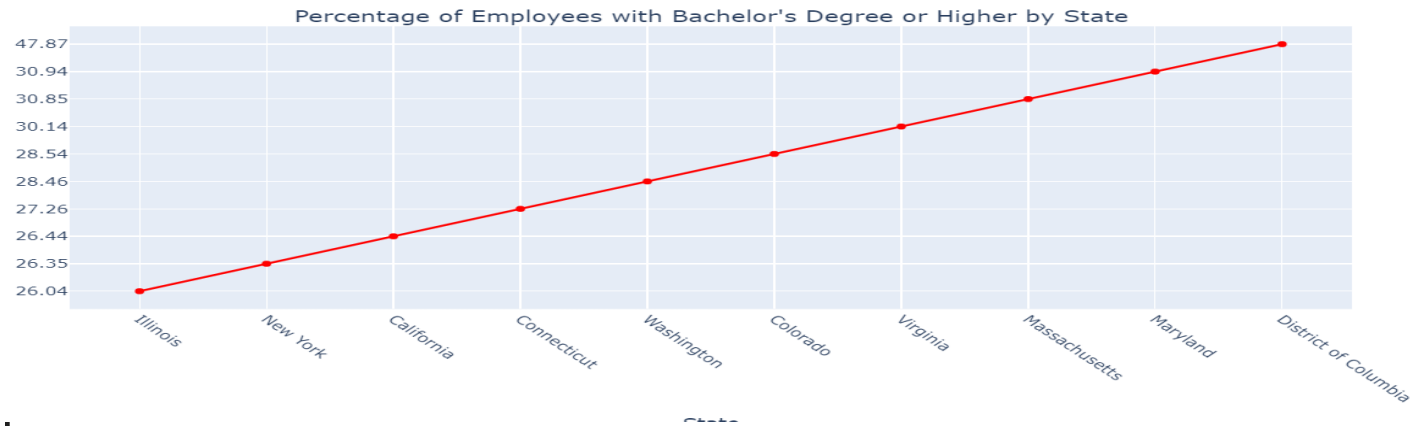
Is that the real value of STEM education? (stem avg wage – non avg)

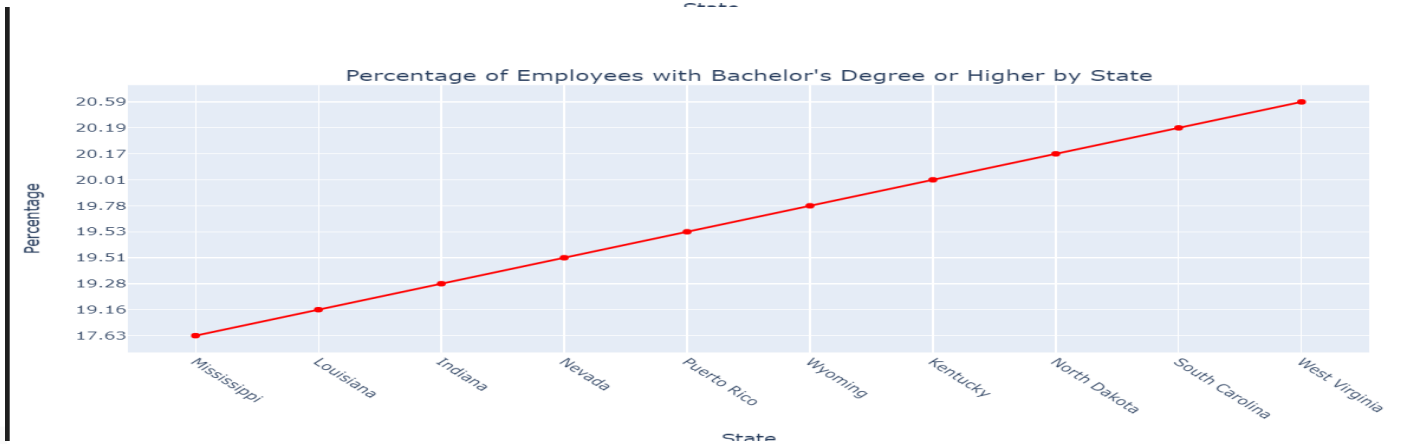




STEM Education Level







III. Takeaways

- U.S. STEM job markets are increasing rapidly
- High disparities between STEM and nonSTEM jobs
- Low barriers to enter STEM markets
- High chance of salary increase in the near future in STEMs

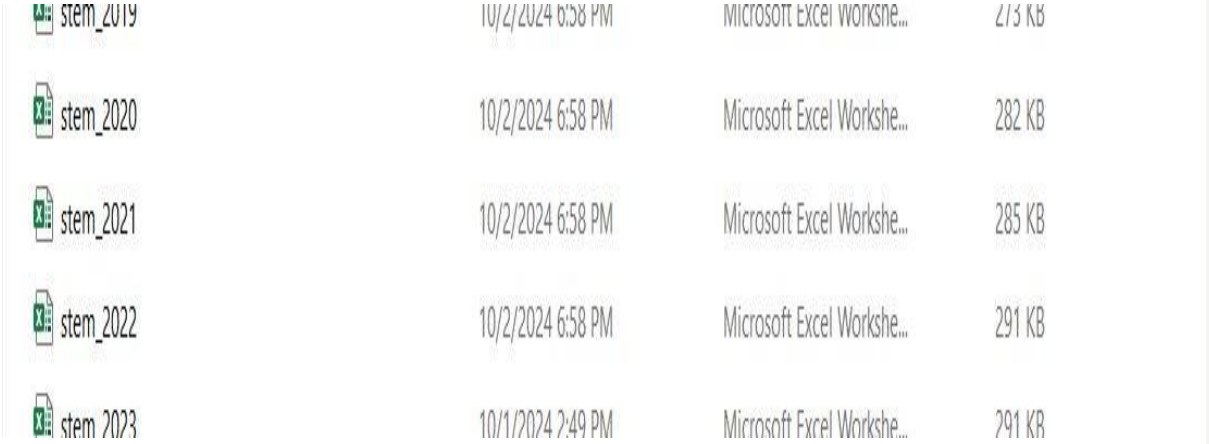
Future Directions

- Research on county levels
- Case study in a state: District of Columbia, California, Washington
- Machine learning model to rank best places to start new-grad jobs for STEMs
- Dive in specific STEMs fields such as Software Engineer, Data Engineer, Bio Chemistry
- Gathering data on patents, Phds enrollment

Behind The Scene

Data Sources

- Bureau Labor of Statistics
- Census Bureau

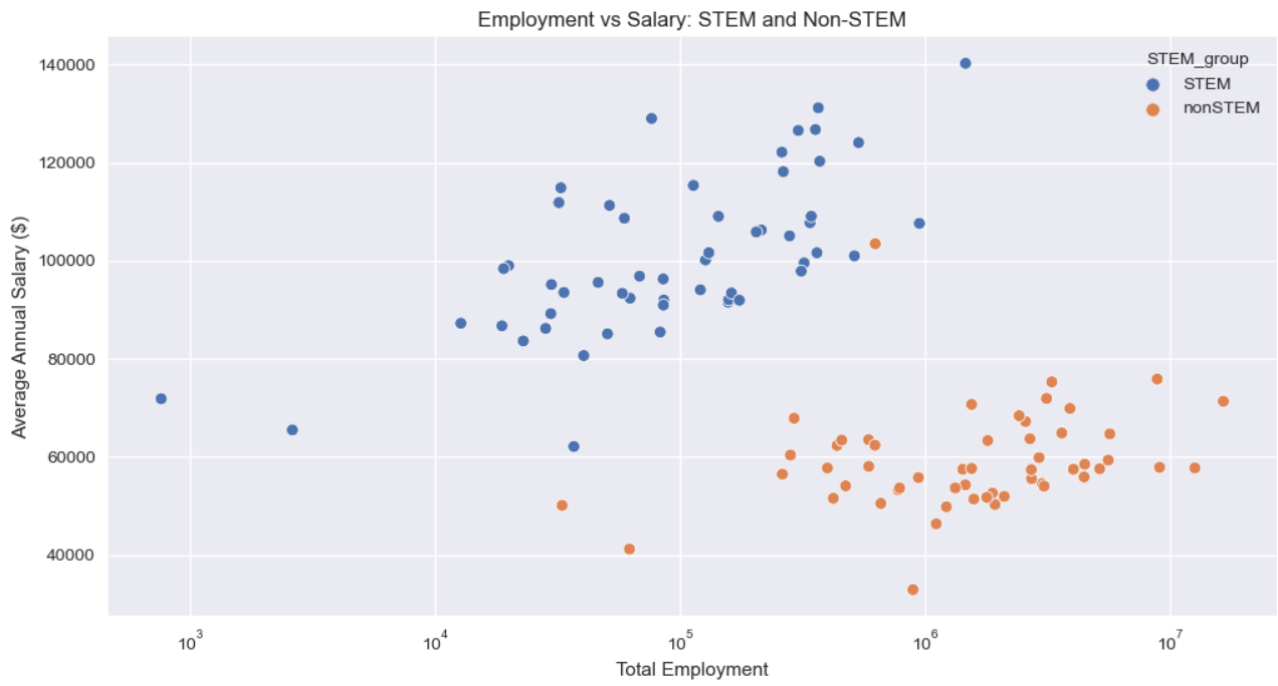


Data Gathering & Preporcessing

```
# Merge the two dataframes to calculate the percentage of STEM employees
employment_merged = pd.merge(total_employment_by_state, stem_employment_by_state, on='area_name', suffixes=('_total', '_STEM')

# Calculate the percentage of STEM employees
employment_merged['STEM_percentage'] = (employment_merged['tot_emp_STEM'] / employment_merged['tot_emp_total']) * 100

# Calculate average state income
df['tot_hr_earn'] = df['h_mean'] * df['tot_emp']
df['tot_yr_earn'] = df['a_mean'] * df['tot_emp']

sumup = df.groupby('area_name').agg({"tot_hr_earn": "sum", "tot_yr_earn": "sum", "tot_emp": "sum"})

sumup['state_avg_hr_earn'] = sumup['tot_hr_earn'] / sumup['tot_emp']
sumup['state_avg_yr_earn'] = sumup['tot_yr_earn'] / sumup['tot_emp']

# Merge
state = pd.merge(employment_merged, sumup, on='area_name', suffixes=('_total', '_STEM'))
state = state[['area_name', 'tot_emp_STEM', 'STEM_percentage', 'state_avg_hr_earn', 'state_avg_yr_earn']]

# New additions
df_stat = df[df['STEM_group']=="STEM"][['area_name','h_mean','a_mean']]
df_m = pd.merge(df_stat, state, on='area_name', suffixes=('_total', '_STEM'))

df_m['avg_wagegap(hr)_STEM_vs_state'] = df_m['h_mean'] - df_m['state_avg_hr_earn']
df_m['avg_wagegap(yr)_STEM_vs_state'] = df_m['a_mean'] - df_m['state_avg_yr_earn']

df_m = df_m[['area_name','h_mean','avg_wagegap(hr)_STEM_vs_state','a_mean','avg_wagegap(yr)_STEM_vs_state','tot_emp_STEM','STE

return df_m
```

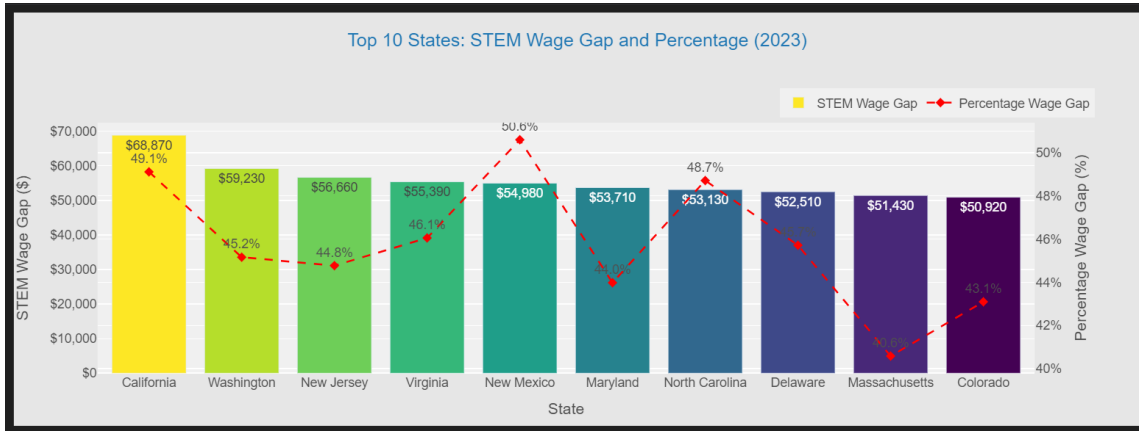
+ Implemented Pandas to modfiy/extract data from different files, compose into a single file, and design key metrics for analysis

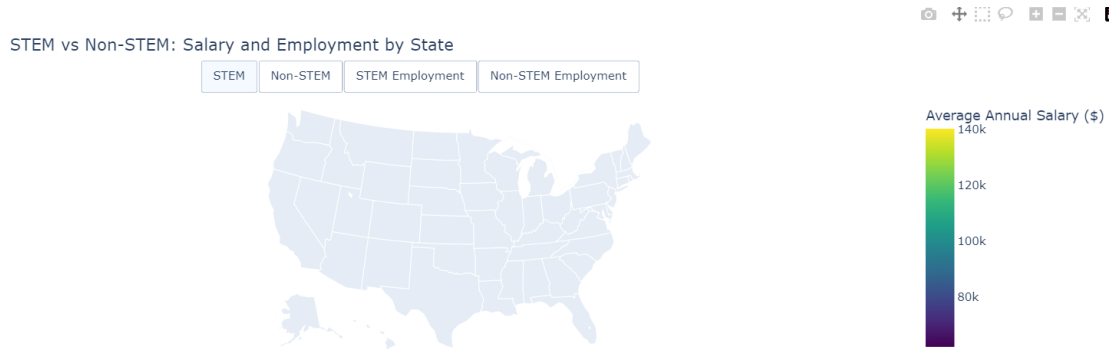
+ Utilized matplotlib to draw basic visualizations for data exploration and data quality check



Data Visualization

Optimize Plotly and PowerBI to draw interactive charts where I could interact and compare stats of each states to each others + look more lively





THANK YOU FOR LISTENNING!