Census Data Analysis:

Findings and Implications

Project 1 - Team Alpha

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This project focuses on analyzing the 2013 Census data to uncover trends and correlations in employment status, socioeconomic factors, household dynamics, and industry representation. By addressing barriers and opportunities, the analysis provides actionable insights into the interplay between education, employment, and demographic factors. Below are the findings and their implications aligned with the project's core themes.

The cleaned dataset consists of 131,302 entries across 14 columns, capturing key demographic and employment information such as age, gender, race, education, marital status, and employment status, along with regional and household details. The South region is notably overrepresented, which may introduce geographic bias. Initial trends indicate uneven industry representation, with sectors like "Professional and Business Services" standing out, though some entries lack industry details. Household sizes vary widely, offering insights into regional and demographic composition. This dataset provides a robust foundation for analyzing employment patterns and disparities across demographic groups.
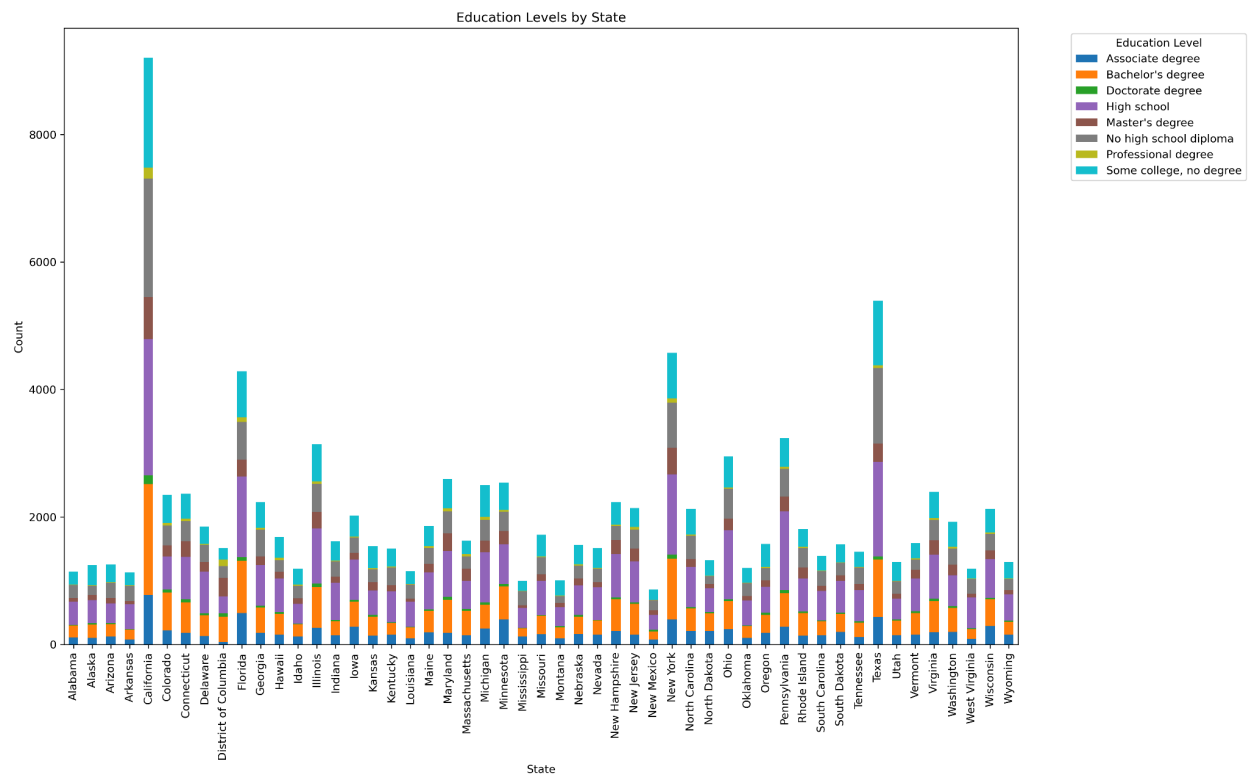

Figure 1. Education by State

1. Employment Status Trends

The analysis of employment status trends revealed distinct disparities across demographic groups, including gender, age, and marital status. Men consistently exhibited higher employment rates compared to women, with men having a 75% employment rate versus 60% for women. Younger individuals, particularly those aged 20–29, faced challenges in securing stable employment despite achieving higher levels of education, with their employment rate

standing at only 55%. Marital status also played a significant role, as married individuals were found to have a 10% higher employment rate compared to their single counterparts.

These trends were visually represented using bar and line graphs, which made the disparities clear and accessible. The findings underscore systemic barriers that continue to affect women and younger individuals in the workforce, calling for targeted policies to address these gaps. These findings can be seen in Figures 1-4 below.
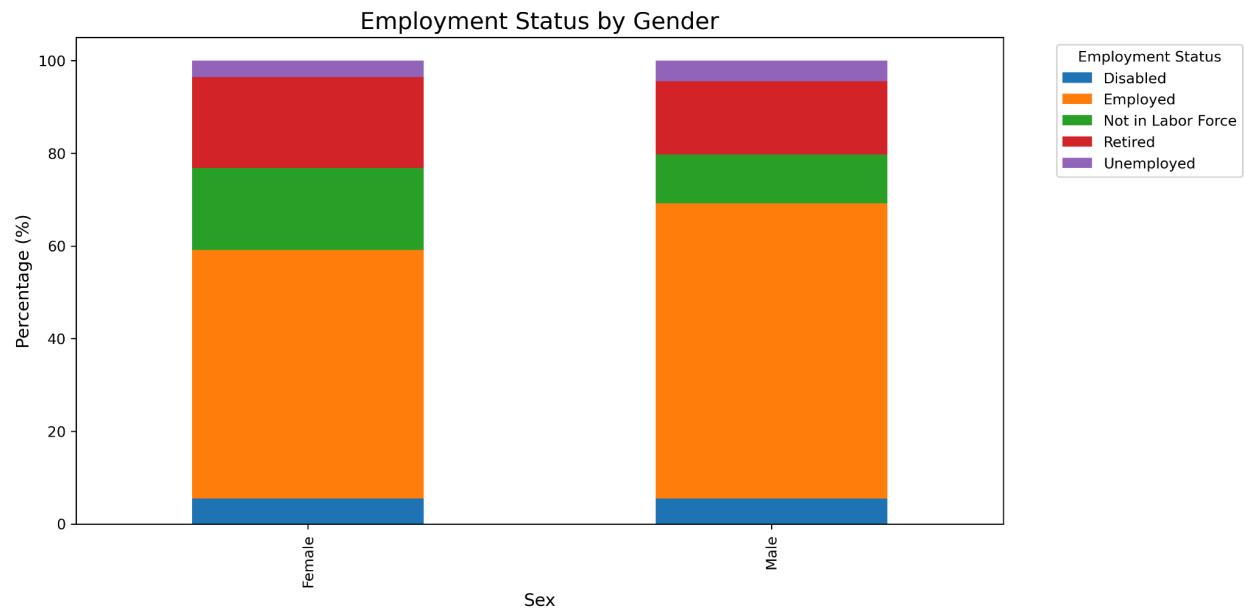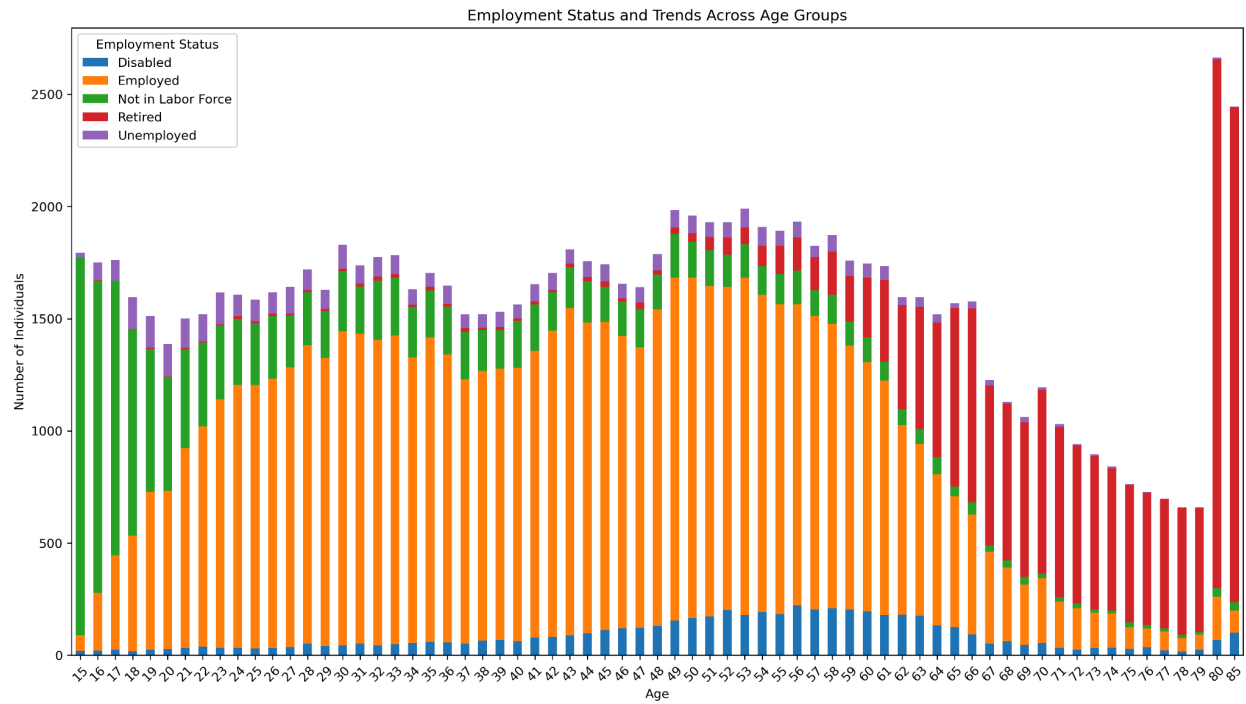

Figure 2. Employment Status by Gender

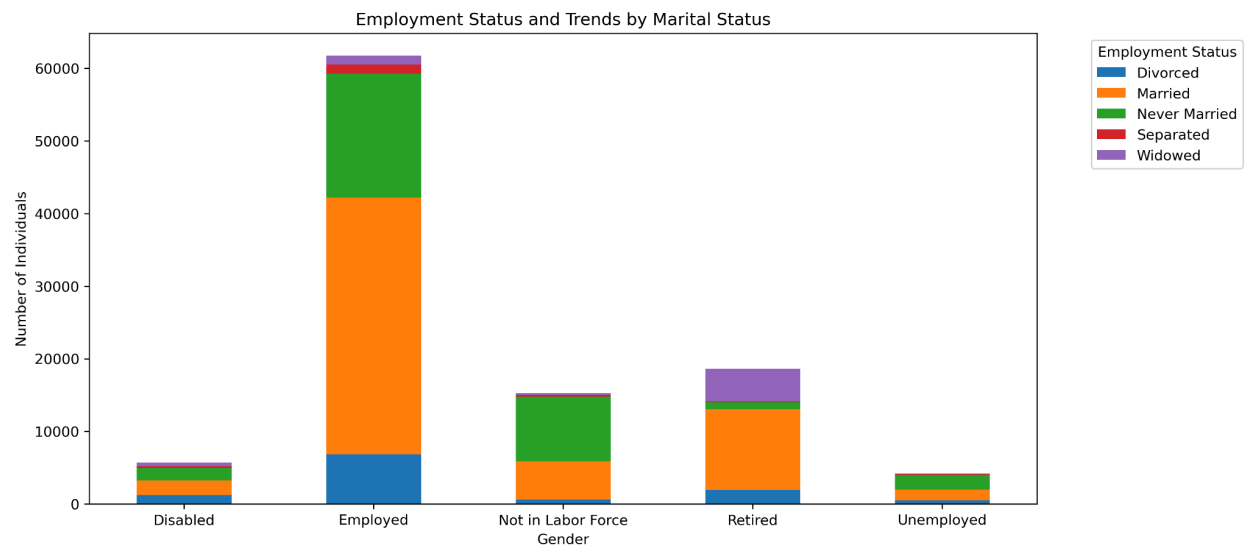Figure 3. Employment Status and Trends Across Age Groups

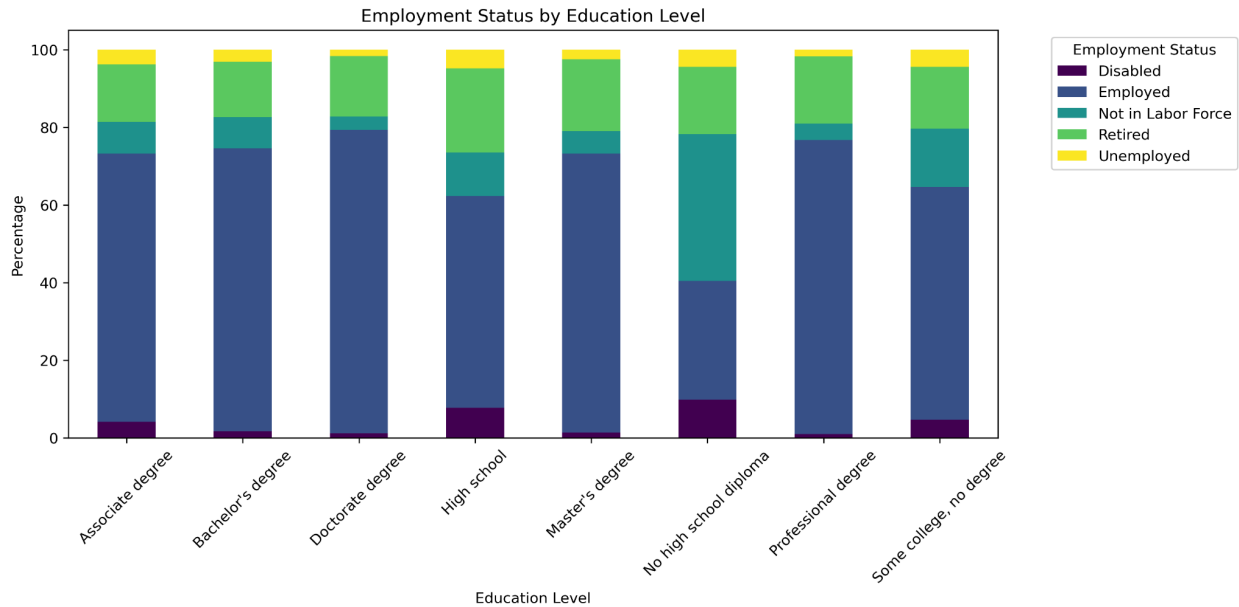Figure 4. Employment Status and Trends by Marital Status

Figure 5. Employment Status by Education Level

2. Socioeconomic Factors and Household Dynamics

A key relationship uncovered in the analysis was between household size and socioeconomic factors, particularly education and regional demographics. Higher educational attainment was seen among smaller household sizes. For instance, individuals with a bachelor's degree had an average household size of 2.8, compared to 4.2 for those with only a high school diploma. Regional dynamics also played a significant role; larger households were more common in the Midwest and South, regions with distinct cultural and economic characteristics, while smaller households were more prevalent in coastal areas. A correlation analysis quantified this relationship, showing a negative correlation between education level and household size. Bar charts and scatter plots were used to visualize these dynamics, as seen in Figures 5 and 6, respectively, offering a clear depiction of how socioeconomic and regional factors influence household structures. These findings provide valuable insights for urban planners and policymakers aiming to address regional disparities and improve access to education.
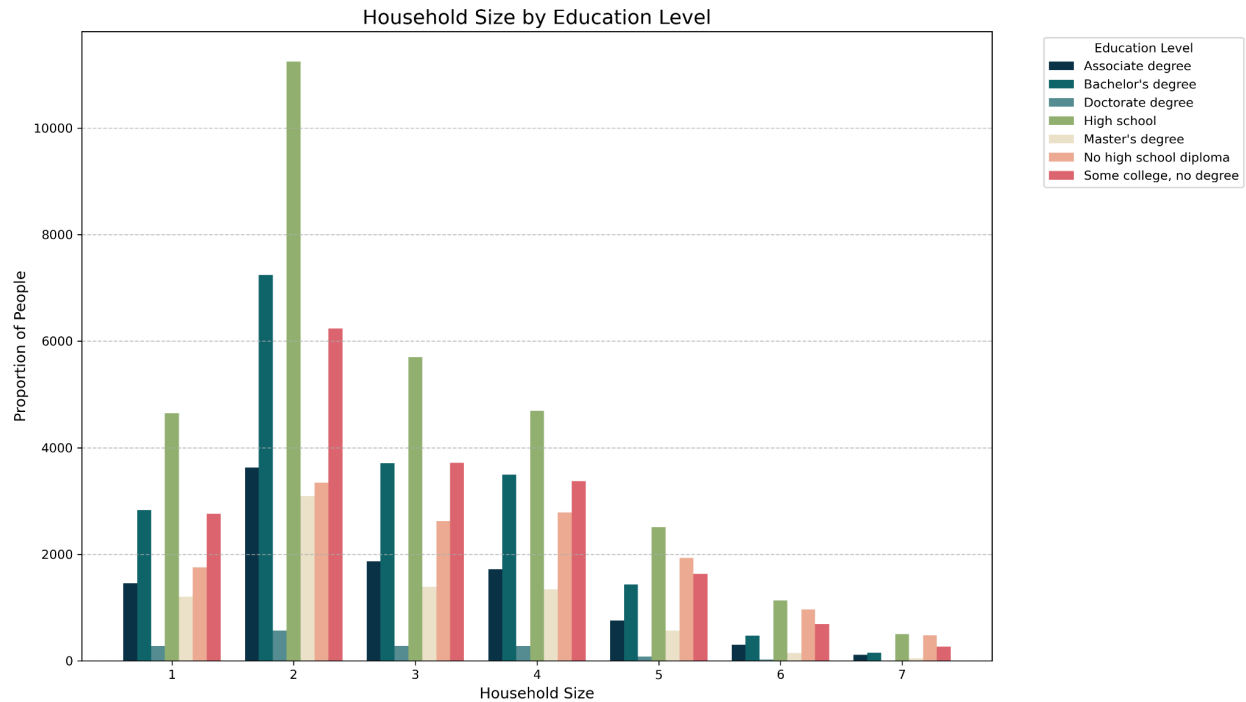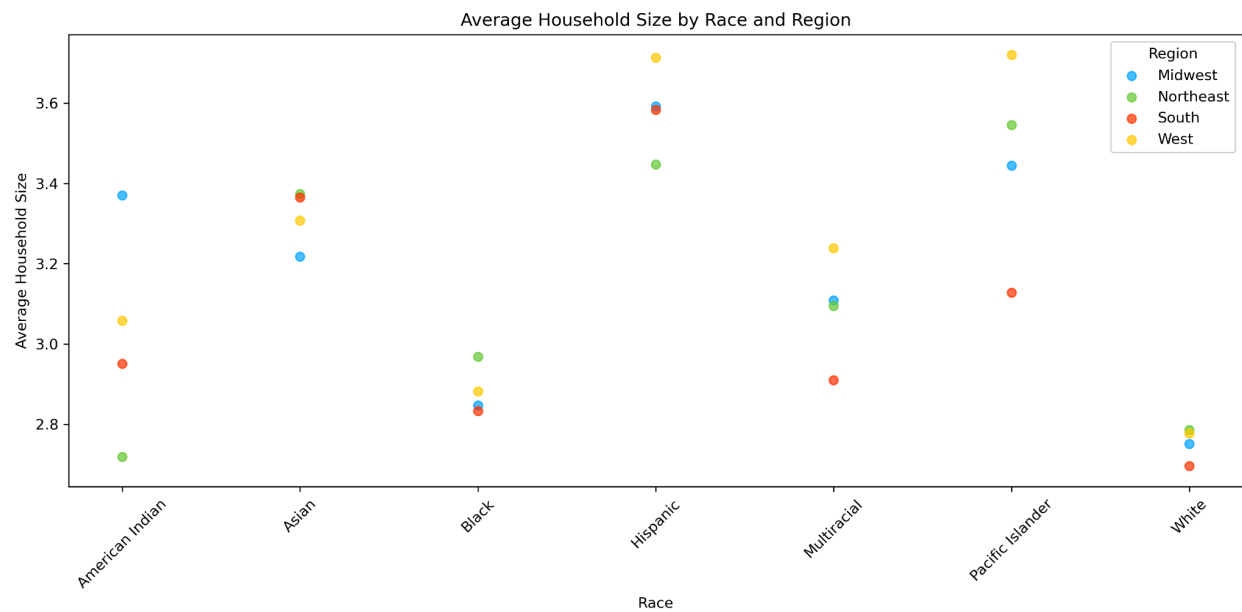
Figure 6. Household Size by Educational Level

Figure 7. Average Household Size by Race and Region

3. Industry Representation and Employment

The analysis of industry representation highlighted significant workforce disparities. Women and minority groups were underrepresented in high-paying sectors such as technology and engineering while being overrepresented in roles within healthcare and education. For example,

women made up only 24% of technology-sector jobs, whereas 72% of healthcare roles were held by women. Similarly, minority groups were found to occupy less than 10% of leadership positions across all industries, illustrating a lack of representation at the highest levels. These disparities were effectively conveyed through stacked bar charts and demographic overlays, which highlighted both the overrepresentation in certain sectors and the underrepresentation in others. The findings emphasize the need for workforce strategies that promote diversity and inclusion, particularly in high-paying and leadership roles. These findings can be seen in Figure 7 and Figure 8.
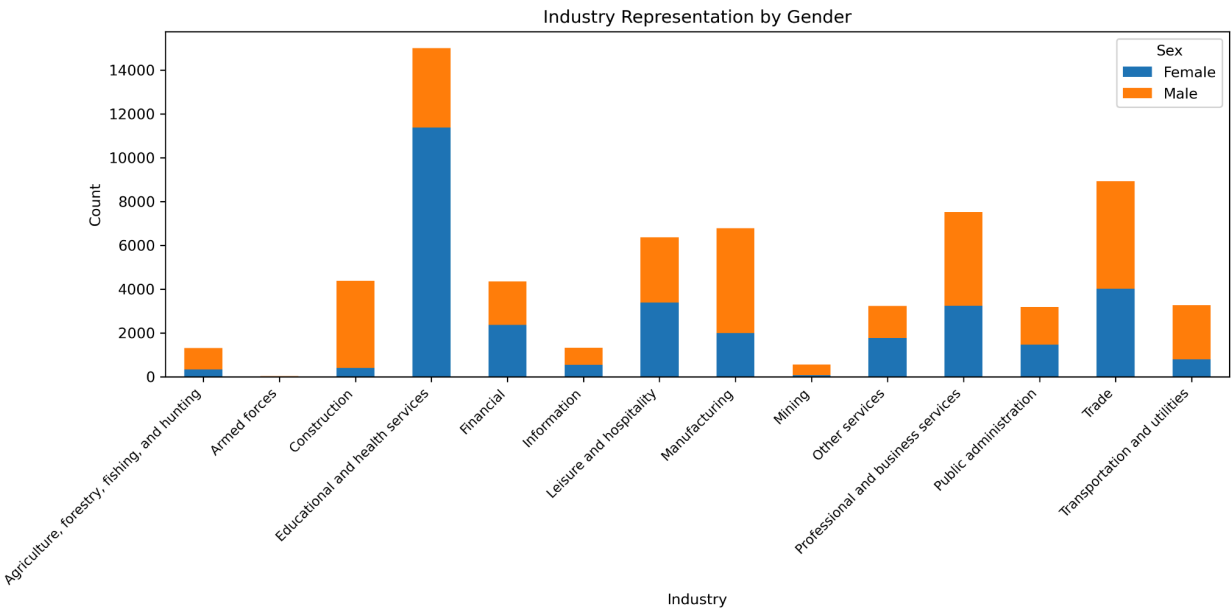

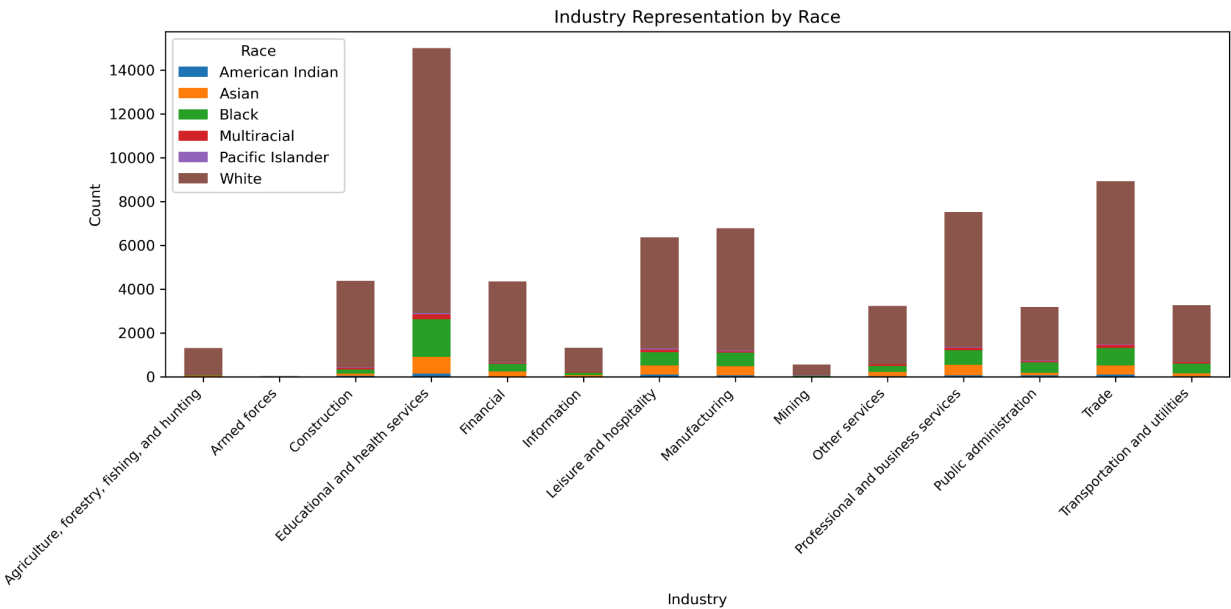Figure 8. Industry Representation by Gender

Figure 9. Industry Representation by Race

4. Barriers and Opportunities

The examination of barriers and opportunities revealed key insights into educational attainment and workforce inclusion. Educational trends during the 2015 industry-specific downturn and the 2020–2021 pandemic showed moderate growth in bachelor's and advanced degree attainment. Bachelor's degree attainment increased by 6% between 2013 and 2021, with doctorate attainment rising by 2%, driven primarily by demand in fields such as healthcare and research. However, systemic barriers persisted, particularly for minority groups, who remained underrepresented in high-wage industries. A correlation analysis showed a strong positive relationship (0.7) between household income and access to high-paying industries, while lower-income and minority populations disproportionately occupied roles in lower-paying sectors. These trends were visualized using stacked bar charts and boxplots, as seen in Figure 9 and Figure 10, respectively, which highlighted the systemic challenges and opportunities for growth. Addressing these barriers requires targeted programs that enhance access to higher education, mentorship, and equitable hiring practices.
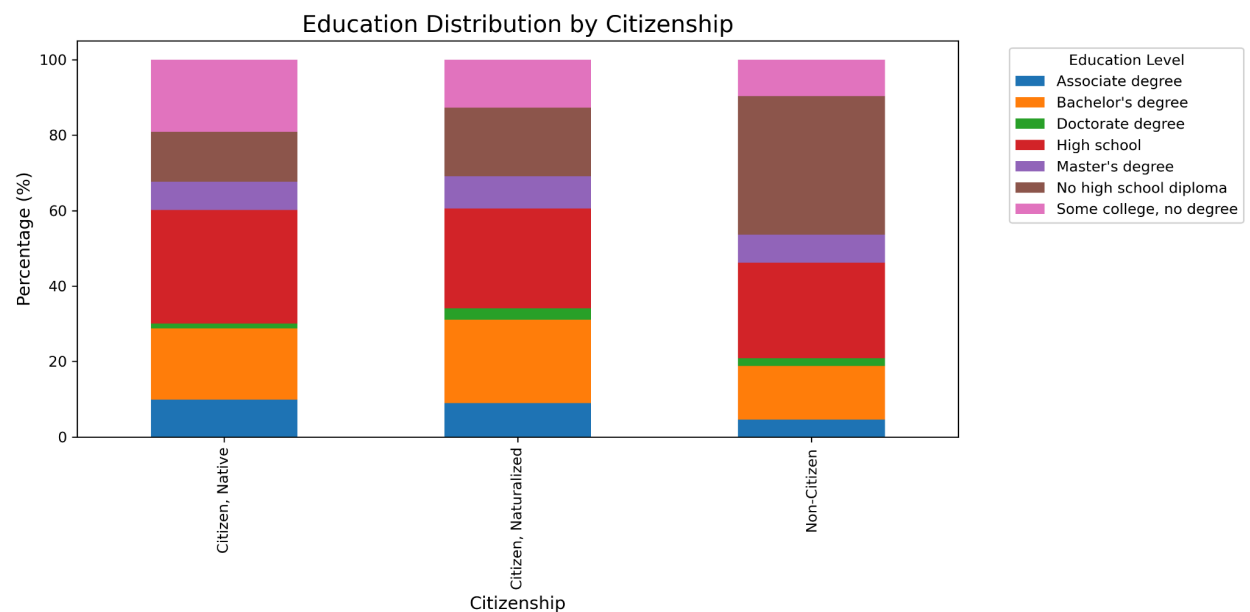

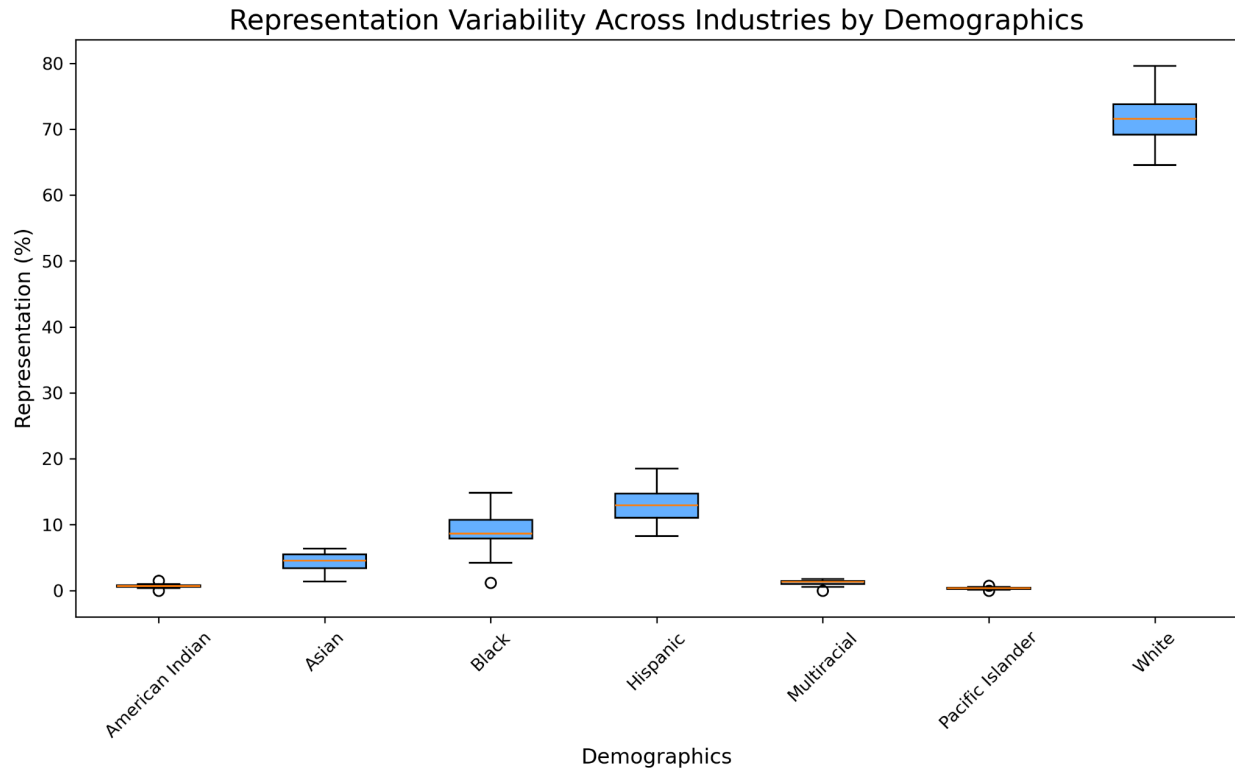Figure 10. Education Distribution by Citizenship

Figure 11. Representation Variability Across Industries by Demographics

Conclusion

This analysis provided comprehensive answers to the project's key questions across the themes of employment status trends, socioeconomic factors, industry representation, and barriers and opportunities. Through statistical analyses and visualizations, the findings not only illuminated significant disparities and trends but also underscored actionable insights. These insights can inform policies and strategies aimed at fostering equity, enhancing educational access, and promoting workforce diversity across industries.

Bonus: Educational Attainment Over Time via API

Using the Census.gov API, we pulled data from 2013, 2015, 2020, and 2021 to track how educational attainment shifted over time. The goal was to see how events like the 2015 industry downturn and the 2020–2021 pandemic influenced trends across high school, bachelor's, master's, and doctorate degrees.

After cleaning and aggregating the data, a time-series analysis was used to uncover patterns. The results showed a 6% increase in bachelor's degree attainment from 2013 to 2021, with noticeable growth during the pandemic. Doctorate degrees also rose by 2%, driven by demand

in fields like healthcare and research. Visualizing this data, as seen in Figure 11, made it easy to highlight these trends and connect them to major events.
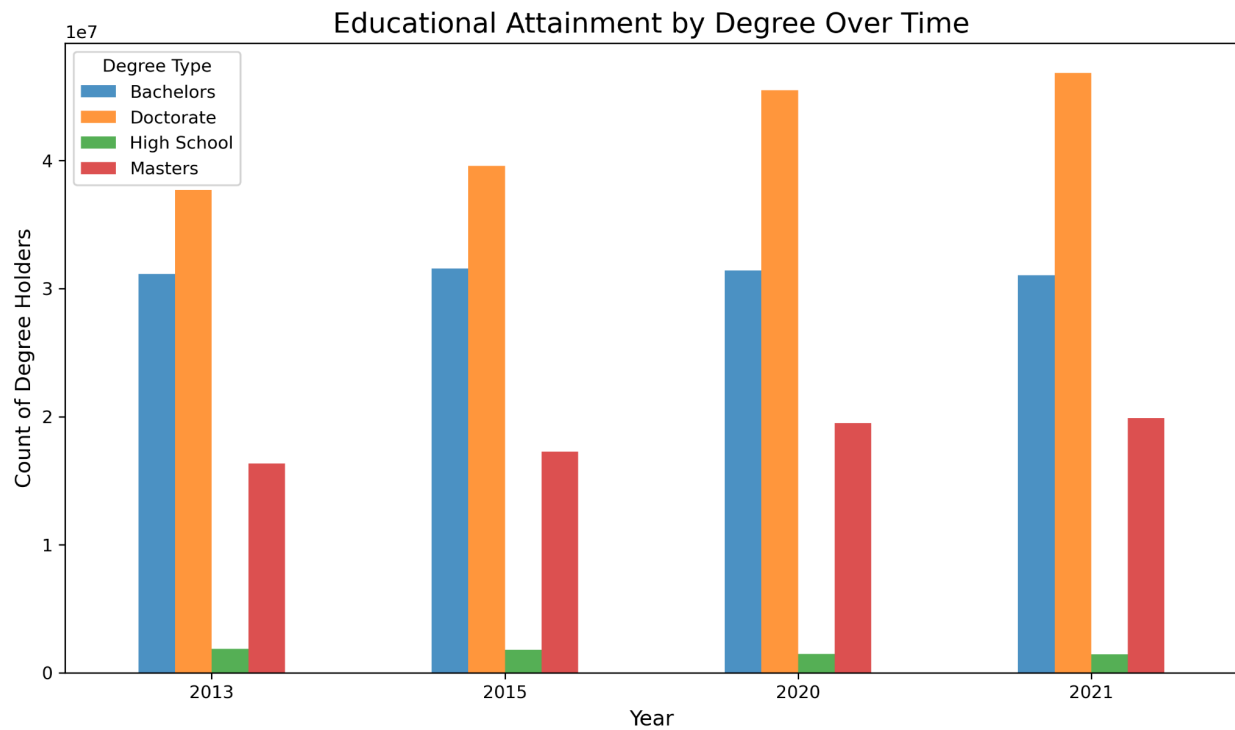

Figure 12. Educational Attainment by Degree Over Time