**Project Title: Student Job Search & Career Readiness**

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**Fig. 1.** The visual abstract figure should show a visually engaging summary of the project--including the problem, data used, methods/algs/tools applied, and key visualizations. Use simple graphics and minimal text. Examples are at [IEEE VIS 2023.](https://virtual.ieeevis.org/year/2023/papers.html?filter=titles)

# **1. INTRODUCTION AND PRIOR WORK**

Finding suitable job opportunities is a critical challenge for students and recent graduates entering the labour market. Employment availability and wage levels vary significantly across U.S. states, making geographic awareness an important factor in career readiness. However, students often lack accessible tools to compare employment volume and wage potential across regions. This project, Student Job Search & Career Readiness, addresses this gap by using visual analytics to explore state-level employment and wage data. Building on prior coursework and peer feedback, the project refines earlier visualization concepts into an interactive prototype that helps students identify where job opportunities are concentrated and how wages differ geographically. Prior work such as U.S. Bureau of Labor Statistics (BLS) reports and O\*NET dashboards informed the choice of data, but this project emphasizes interpretability and visual clarity for student audiences.

**1.1** **Stakeholder Groups**

The primary stakeholder groups for this project include:

* **Undergraduate and graduate students** actively searching for jobs or internships.
* **Career advisors and university career services staff** supporting student career planning.
* **Academic researchers and educators** interested in labour market visualization and career analytics.

These stakeholders benefit from clear, interpretable insights into geographic employment trends and wage distributions.

**1.2** **Stakeholder Needs**

Stakeholders involved in student career planning require clear and actionable insights to support informed job search decisions. Students need to identify U.S. states with high employment opportunities to effectively target their job search. Understanding how median annual wages vary across states is also important for evaluating the financial attractiveness of different regions. Additionally, stakeholders seek to understand the relationship between employment volume and wage levels to assess trade-offs between job availability and earning potential. Career advisors rely on comparative views to guide students on relocation and career strategy. Geographic context helps reveal regional patterns that are not easily observed in tabular data. The visualizations address these needs through comparison, interactive exploration, and spatial analysis.

**2. DATA ACQUISITION**

The data used in this project was obtained from publicly available U.S. occupational employment and wage statistics. The dataset provides state-level information on total employment and median annual wages across multiple occupations, enabling comprehensive geographic comparison. Data was selected to ensure full coverage across all U.S. states, supporting nationwide analysis. The dataset was imported into Power BI for preprocessing and visualization development. Basic data cleaning was performed to handle missing values, standardize state identifiers, and ensure numeric consistency. Aggregated employment and wage measures were created to support state-level analysis and comparison, ensuring the data was suitable for visual analytics and interpretation.

**2.1** **Data Sources**

The data used in this project was sourced from publicly available U.S. occupational employment and wage statistics, like datasets published by the U.S. Bureau of Labor Statistics. The dataset includes state-level employment counts and median annual wage information across occupations, providing a reliable foundation for labour market analysis. These sources were selected due to their credibility, nationwide coverage, and relevance to student career planning and job market analysis. The data was accessed in a structured format and imported into Power BI for further processing and visualization. Direct links to raw data on GitHub are appreciated <https://github.com/Harish-m-07/My-Visualization-Project---Visual-Analytics-Proposal-and-Prototypes>

**2.2** **Data Description, Quality and Coverage**

# The dataset contains key variables including state name, total employment by state, median annual wage, and occupation category. It provides nationwide coverage across all U.S. states and selected territories, enabling comprehensive geographic analysis. To ensure data quality, issues such as missing values, inconsistent formatting, and duplicate records were addressed through aggregation and filtering during preprocessing. Summary statistics were applied to validate reasonable value ranges and confirm consistency across states. These steps ensured that the dataset was reliable and suitable for comparative visual analysis.

# **3. DATA ANALYSIS**

The analysis focused on descriptive and comparative techniques. Employment values were aggregated at the state level, and median wage measures were averaged to support state-level comparison. Relationships between employment and wages were explored visually rather than through complex statistical modelling, aligning with the goal of interpretability for non-technical users. Filtering by occupation allows users to explore how patterns change across different career paths, supporting personalized job search strategies.

**4. VISUALIZATIONS**

Two primary chart types were selected to support stakeholder insight needs:

**4.1 Bar Chart:**

A screenshot of a graph

AI-generated content may be incorrect.

**Figure 2.** **Top States by Total Employment.**

Interactive visualization is at[Bar Chart Power BI](https://app.powerbi.com/view?r=eyJrIjoiYWYxYWJlYTEtZWRkMS00Y2Y1LWFhZTQtMDgzNDY3NDI0YTc0IiwidCI6IjExMTNiZTM0LWFlZDEtNGQwMC1hYjRiLWNkZDAyNTEwYmU5MSIsImMiOjN9)

The bar chart ranks states by total employment, enabling quick identification of major employment hubs such as California, Texas, and Florida. This visualization supports straightforward comparison and highlights concentration effects in the labor market.

**4.2 Scatter Plot:**

**A screen shot of a computer

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**Figure 3.** Relationship Between Median Wage and Employment.

Interactive visualization is at [Scatter Plot Power BI](https://app.powerbi.com/view?r=eyJrIjoiMjQyYmVjMjktZjFiMi00NTgzLTgyZWEtYjJiYmEzNWFkZmVkIiwidCI6IjExMTNiZTM0LWFlZDEtNGQwMC1hYjRiLWNkZDAyNTEwYmU5MSIsImMiOjN9)

The scatter plot visualizes the relationship between median annual wage and total employment across states. Each point represents a state, allowing users to observe tradeoffs between job availability and wage levels. This chart reveals that higher wages do not always coincide with higher employment.

**4.3** **Geo Maps Visualization**

A filled geographic map was used to display total employment across U.S. states. Colour intensity encodes employment volume, making regional patterns immediately visible. This visualization supports spatial reasoning and helps users understand geographic clustering of job opportunities. The map complements the bar chart and scatter plot by providing geographic context that numeric charts alone cannot convey.

A map of the united states

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**Figure 4.** Geographic Distribution of Employment Across U.S. States. Interactive visualization is at [Geospatial Power BI](https://app.powerbi.com/view?r=eyJrIjoiODA0YmJkMzMtNjNkOC00Zjc3LWEyM2YtYzExMDNhMDgzODljIiwidCI6IjExMTNiZTM0LWFlZDEtNGQwMC1hYjRiLWNkZDAyNTEwYmU5MSIsImMiOjN9)

**5. USAGE AND CRITIQUE OF AI TOOLS**

AI tools were used throughout the project to support visualization planning, design refinement, and narrative development. Their effectiveness was evaluated based on clarity, relevance, and alignment with stakeholder needs. AI assistance helped speed up ideation and improve written explanations, but human oversight was necessary to ensure accuracy and contextual fit. Limitations included generic suggestions and the need for manual adjustments to meet assignment requirements. Overall, AI functioned as a supportive aid rather than a substitute for analytical judgment

**6. INTERPRETATION OF RESULTS**

The results show that employment opportunities are unevenly distributed across U.S. states, with a small number of states accounting for a significant share of total employment. Median wage levels vary independently of employment volume, indicating that students must balance opportunity availability with earning potential. These findings support the conclusion that informed job search decisions require both geographic and economic context. The combined visualizations enable stakeholders to make more strategic, data-driven career choices.

**ACKNOWLEDGEMENTS**

The author would like to acknowledge course instructors, peer reviewers, and publicly available data sources that supported this project. AI tools were used responsibly to assist with design and documentation.

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