Web Dashboard Project Report

Md Zakir Hossain
NetID: mzh21002

April 8, 2025

1 Introduction

This project presents an interactive, browser-based dashboard developed as part of the GA position application data challenge. The goal was to explore and visualize various educational and labor market datasets through a user-friendly web application. The dashboard enables users to explore trends in university completions, job market demand, regional hiring patterns, and skill distributions.

The design emphasizes interactivity, adaptability, and accessibility for a diverse audience, making data insights intuitive and engaging.

2 Selected Worksheets

After reviewing all datasets, the following five worksheets were selected for focused development:

1. **Completions_by_Institution.csv**
   Used for university completion data and job market share comparisons.
2. **Job_Postings_Top_Companies.csv**
   Analyzed to show top hiring employers based on job postings and hires.
3. **Top_Specialized_Skills.csv**
   Used to identify the most in-demand technical and professional skills.
4. **Job_Postings_Timeseries.csv**
   Enabled monthly trend analysis of job posting activity over time.
5. **Job_Postings_by_Location.csv**
   Powered regional analyses including salary distribution and choropleth maps.

3 What I Did

- Developed a responsive web dashboard using **HTML**, **CSS**, and **JavaScript**.
- Loaded and processed five CSV worksheets to extract key insights.
- Built interactive charts using **Chart.js** and **Leaflet.js** for:
  - University completions vs job market share
  - Monthly job posting trends
  - Top hiring employers
  - Regional salary and job density
  - High-demand specialized skills
- Added dropdown filters for custom views and comparisons.
- Enabled dynamic content switching to avoid page reloads.

4 Project Directory Structure

```
project-root/
|- css/          # Contains CSS files for styling the web application
|- data/         # Contains CSV datasets (e.g., job postings, completions)
|- js/           # Contains JavaScript files for interactive functionalities
\- index.html
```

5 Steps to Run Dashboard in VS Code

1. Open project folder in **VS Code**.
2. Open the terminal in VS Code:
   - Use the shortcut: `Ctrl + ``, or
   - Go to `View > Terminal`
3. Run the command:

   ```
   python -m http.server
   ```

4. Open browser and go to: `http://localhost:8000`
5. Click on `index.html` to open the dashboard.

6 Feature Enhancement Plan

To further enhance the interactivity, scalability, and real-world utility of the dashboard, I have identified several strategic improvements that were not fully implemented within the current timeline. These planned enhancements are aligned with user-centric design and advanced data visualization practices:

1. **Export & Print Functionality**
   - **Planned Feature:** Enable users to export charts as images (PNG/SVG) and download PDF reports or print views directly from the browser.
   - **Value:** Useful for academic reports, stakeholder presentations, or offline sharing.
   - **Approach:** Integration of libraries like `html2canvas`, `jsPDF`, or native `window.print()` combined with styled templates.
2. **Drill-Down Visualizations**
   - **Planned Feature:** Allow users to click on a university, skill, or region to explore deeper insights (e.g., department-level data, job titles, or employers).
   - **Value:** Empowers users to explore micro-level trends and make informed decisions.
   - **Approach:** Use nested modals or dynamic containers that fetch data contextually from relevant CSV worksheets.
3. **Interactive Filtering Across Charts**
   - **Planned Feature:** Synchronize filtering across visualizations (e.g., selecting a region filters job postings, salary trends, and specialized skills accordingly).
   - **Value:** Provides a seamless and integrated exploration experience.
   - **Approach:** Use a shared filter state or event-driven architecture (e.g., `EventEmitter`, Pub/Sub pattern) with `Chart.js` or `D3.js`.
4. **Responsive Design Optimization**
   - **Planned Feature:** Improve layout adaptability on mobile/tablet views by collapsing filters and reformatting charts.
   - **Value:** Increases accessibility and usability for a broader user base.

- **Approach:** Enhance CSS media queries and leverage CSS Grid or Flexbox for intelligent content reflow.

5. **User-Personalized Dashboards**
   - **Planned Feature:** Allow users to bookmark preferred views or customize default chart selections.
   - **Value:** Boosts engagement by catering to user-specific workflows.
   - **Approach:** Implement `localStorage` or simple session tracking with JavaScript to retain user preferences.
6. **Real-Time Data Integration**
   - **Planned Feature:** Replace static CSVs with live data feeds (e.g., from APIs or databases).
   - **Value:** Ensures decisions are based on the most current labor market data.
   - **Approach:** Use `fetch/axios` to pull JSON data periodically or connect with real-time job feeds (where available).
7. **Accessibility Compliance (WCAG 2.1)**
   - **Planned Feature:** Add keyboard navigation, ARIA labels, and high-contrast mode.
   - **Value:** Makes the dashboard inclusive for users with disabilities.
   - **Approach:** Use semantic HTML, ARIA roles, and contrast checks with tools like `Axe` or `Lighthouse`.

7 Conclusion

This Dashboard serves as a powerful tool to explore and analyze educational completions, job market trends, regional hiring demand, top employer activity, and skill requirements. Through an intuitive, interactive web interface, it empowers stakeholders to make data-informed decisions by visualizing complex workforce datasets in a digestible manner.

This project demonstrates the integration of five diverse datasets, dynamic filtering mechanisms, and customizable plots — all designed with responsiveness and user engagement in mind. Although some advanced features were beyond the initial implementation window, a well-documented plan has been proposed to guide future enhancements, including data interactivity, export options, and improved accessibility.

Overall, this dashboard provides a strong foundation for ongoing data storytelling and workforce planning in higher education and economic development contexts.