

Motivation

The US economy has faced unprecedented disruptions in recent years due to economic shifts, technological advancements, and unforeseen events like the COVID-19 pandemic. These disruptions have triggered widespread layoffs across multiple industries, impacting not only the economy but also the lives of millions of workers. Despite the availability of raw layoff data from sources like layoffs.fyi, Statista, and the US Bureau of Labor Statistics, the information remains unstructured and challenging to interpret quickly. Economists, HR professionals, and job seekers struggle to derive insights that could inform critical decisions. This project aims to bridge this gap by providing an interactive tool that visualizes layoff trends across time, sectors, and regions, offering a comprehensive and intuitive overview of the current employment landscape.

Introduction

The project is designed to create a comprehensive dashboard that provides stakeholders with a clearer understanding of layoff trends and patterns in the United States. By leveraging interactive visualizations, the dashboard allows users to analyze data across various dimensions such as time periods, industries, and geographical locations. This tool is valuable for anyone seeking actionable insights into the US labor market, from policymakers aiming to identify at-risk sectors to job seekers strategizing their career paths. The dashboard includes features like time-range selection, sector filtering, and geographical drill-downs, which enable users to analyze historical trends, understand the impact of layoffs across different regions, and forecast future developments in the job market.

Methodology

- Data Collection:**
We used web scraping tools such as Selenium and BeautifulSoup to extract layoff data from various online sources like layoffs.fyi, Statista, and the US Bureau of Labor Statistics. These tools enabled us to gather relevant, real-time information on layoffs across different industries and geographical regions.
- Data Pre-Processing:**
The raw data collected through web scraping was cleaned and transformed into a structured tabular format using Python. This involved handling missing values, removing duplicates, and converting the data into a time-series structure that was suitable for analysis and visualization. The processed data was stored in Excel files for easy access and management.
- Backend Development:**
We implemented the backend using JavaScript to serve as the foundation for data handling and storage. It provided a lightweight and flexible framework to facilitate data processing and streamline the integration with the frontend.
- Frontend Development:**
For the frontend, we used D3.js and React to create interactive visualizations and a user-friendly interface. React ensured a smooth user experience, while D3.js helped generate compelling visualizations that allowed users to interact with and explore the data in various ways.

Dashboard

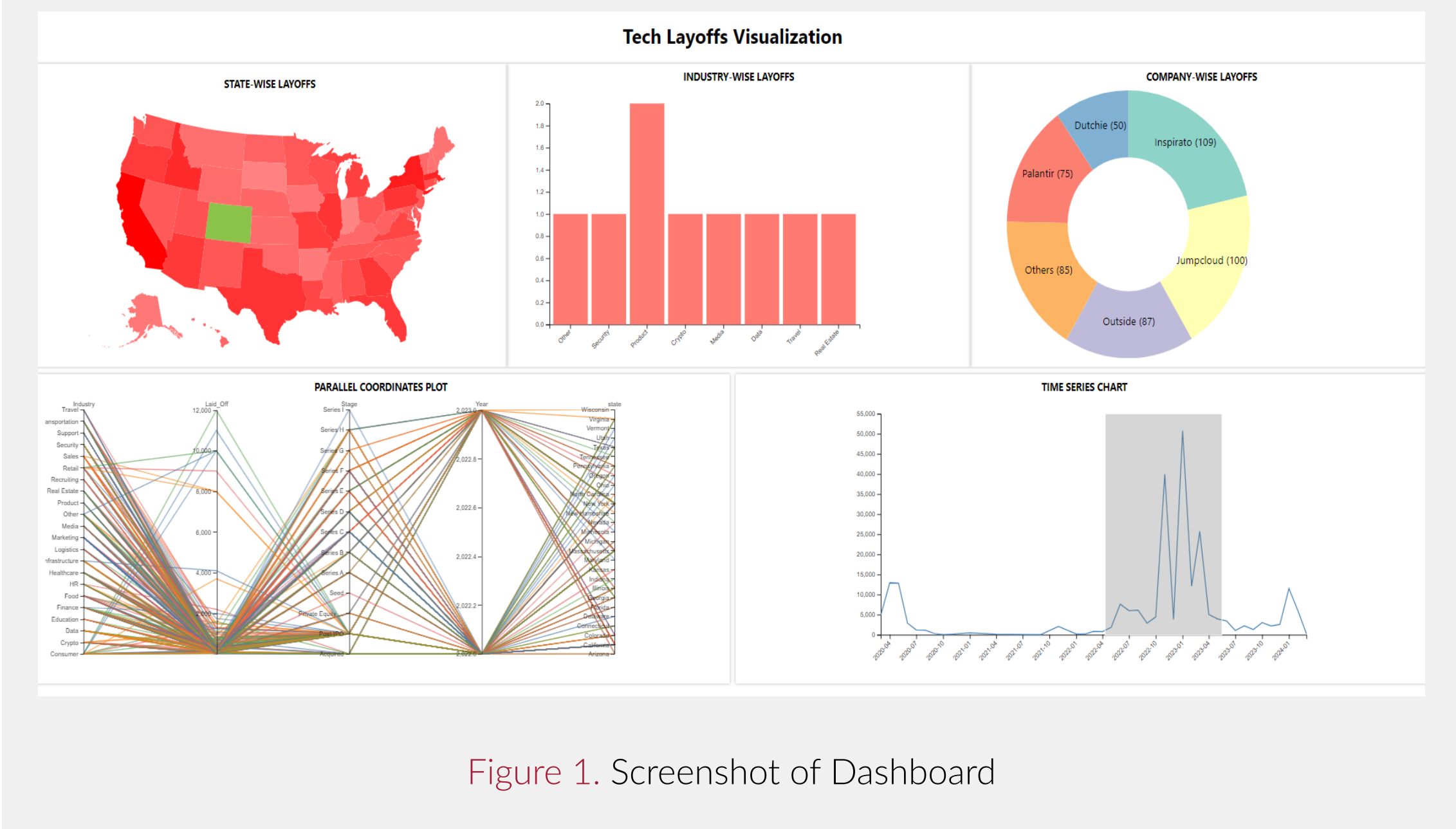


Figure 1. Screenshot of Dashboard

Dashboard Features

We designed a range of visualizations that offered multiple perspectives on the layoff data. Key visualizations included:

- Choropleth Map:** An interactive map displaying layoff patterns across the US states.
- Bar Charts:** To highlight layoffs by sectors and compare their distribution.
- Donut Chart:** To display company-wise layoffs. To improve clarity and reduce clutter, this chart highlights the top five companies with the most layoffs, grouping all other companies into an "Others" section.
- Time Series Chart:** Showing trends in layoffs over time to identify significant changes.
- Parallel Coordinate Plot:** Enabling users to explore relationships between different variables and sectors.

We implemented the following interactions:

- Time-Range Selection:** Allows users to filter data by specific periods through a slider, helping identify periods of significant layoffs.
- Geographical Drill-Down:** Users can select specific states to analyze location-specific layoffs and compare the vulnerability of jobs across the locations.
- Responsive Tooltips:** Detailed information, including exact numbers and percentages, appears when hovering over graph elements.
- Industry-Specific Selection:** Users can choose an industry from the bar chart to analyze layoffs within specific sectors.
- Parallel Coordinate Plot Customization:** In the PCP plot, users can drag the axes to reorder features and choose intervals for each feature, enabling more specific analysis.

How to read the dashboard

In the shown snap of the dashboard, the selected state is highlighted in green on the choropleth map, allowing users to focus on specific geographic regions. In the Time Series chart, the selected time range is set from May 2022 to May 2023, offering a concentrated analysis period.

Once these filters are applied, the dashboard dynamically adjusts the remaining visuals, including the bar chart, donut chart, and Parallel Coordinate Plot (PCP). These charts update in real-time, reflecting data that is filtered based on the selected state and time frame. The interconnected visuals provide valuable insights into trends and correlations across various sectors, regions, and periods, empowering users to draw strategic, data-driven conclusions.

Observations

Here are additional observations and insights based on the information provided:

- Sector Impact Variability:** Certain sectors like finance, retail, and tech have been disproportionately affected by layoffs due to their reliance on consumer spending and market growth. Technological advancements also led to significant automation in these industries, reducing the need for human labor.
- Regional Differences:** Layoffs were not uniform across all regions in the US. Some states experienced more job losses due to their economic dependence on vulnerable industries, while others were less affected due to a more diversified economic structure.
- Startups vs. Established Companies:** Smaller startups with less financial cushioning were often hit harder by layoffs than well-established corporations. However, even large tech companies like Amazon, Google, and Facebook had to implement layoffs post-IPO to maintain profitability due to economic shifts post-COVID.
- Time Trends:** Analyzing layoffs over time revealed that job cuts peaked during specific periods, correlating with global or local economic downturns. Post-COVID trends indicate a gradual recovery, although certain sectors remain sluggish.
- Predictive Insight:** By identifying correlations between layoffs and specific economic events, predictive analysis can aid policymakers and businesses in mitigating future risks. This could involve strengthening support for at-risk sectors or diversifying business models to minimize the impact of economic shifts.

References

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