

**COS30045 – Data Visualization**

**Healthcare Employment Analysis and Visualization**

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1. **Introduction**

* Project Purpose: This project analyzes and visualizes healthcare employment across different countries and years, focusing on understanding trends and disparities in healthcare resources. It aims to provide insights for policymakers and healthcare planners.
* Objectives:
* Explore healthcare employment trends across multiple countries.
* Create an interactive data visualization to analyze changes in employment over time.
* Provide insights that could support strategic healthcare resource planning.
* Target Audience: This project serves healthcare policymakers, analysts, and government agencies aiming to understand healthcare employment trends and resource allocation.

1. **Project Planning**

* Timeline:
* Week 8: Gathering datasets, Project planning and setup (GitHub, Communication channels, Shared documents).
* Week 9: Research and understand the datasets. Start designing the visualisation
* Week 11 - 12: Development of data visualizations and working on report drafts.
* Week 13: Finish the Implementation of key features and continued testing.
* Week 14: Finalise the project, documentation, and preparing for submission
* Meeting schedule:
* Time: Every Friday, 3:00 PM - 4:00 PM  
  Day: Weekly on Fridays
* Roles & Responsibilities:
* Ta Nam Khanh: Conducts data analysis, prepares insights, and creates visualizations.
* Luong Anh Cuong: Handles backend development, data processing, and database integration.
* Ha Duc Trung Kien: Coordinates project tasks, manages documentation, and compiles the report.

1. **Methodology**

* Data Source: Historical NVIDIA stock price data was sourced from Kaggle
* Data Preprocessing:
* Loaded data and handled missing values by [e.g., removing or interpolating missing data points].
* Normalized date formats and standardized price fields (e.g., adjusted close, opening prices).
* Analysis Approach:
* Conducted preliminary analysis, calculating moving averages, volatility, and daily returns to understand stock trends.
* Prepared data for visualization by summarizing monthly and yearly price trends.
* Technologies Used:
* Frontend: HTML, CSS, and JavaScript for building the web interface.
* Backend: Nodejs for data processing and API development.
* Data Visualization: Libraries like Matplotlib or D3.js to create charts and interactive graphs.

1. **Design Choices**
   1. **Interface Design**

* Clean and straightforward layout to support intuitive navigation through year-selectable data visuals.
  1. **Color Scheme**

Blue and orange color scheme, where blue represents the data bars, and orange highlights interactions.

* 1. **Data Visualization Types**
* A bar chart visualizing healthcare employment by country, with options to select different years.
* Tooltip: Displays employment data when hovering over each country’s bar.
* Year Selector: Enables users to switch between years, dynamically updating the visualization.

1. **Technical Implementation**

* Using D3.js, the bar chart was implemented with the following structure:
* X-axis: Displays the countries for the selected year.
* Y-axis: Represents the number of healthcare employees, scaled linearly.
* Tooltip and Interactivity: A tooltip shows exact employment numbers when hovering over bars.

  var svg = d3.select("#chart")

    .append("svg")

    .attr("width", w)

    .attr("height", h);

var bars = svg.selectAll(".bar")

    .data(dataset)

    .enter()

    .append("rect")

    .attr("x", (d, i) => xScale(i))

    .attr("width", xScale.bandwidth())

    .attr("y", d => yScale(d.value))

    .attr("height", d => height - yScale(d.value))

    .attr("fill", "steelblue")

    .on("mouseover", (event, d) => { /\* Tooltip logic \*/ });

1. **Challenges and Solutions**

* Data Consistency: Encountered inconsistencies in data for some countries over different years.
* Solution: Filtered and cleaned data to focus on complete and reliable data entries.
* Dynamic Data Binding: Ensuring smooth transitions between years was challenging.
* Solution: Used D3.js transitions for smooth updates of the bar chart when changing years.
* Performance Optimization: High interactivity led to minor delays.
* Solution: Optimized by limiting unnecessary re-renders and reducing the displayed data for smoother transitions.

1. **Results and Analysis**

* Summary of Findings:
* Identified variations in healthcare employment by country, highlighting disparities in resources.
* Observed trends showing increases or decreases in healthcare staff over years.
* Data Insights:
* The visualization effectively shows healthcare employment trends by country, aiding in understanding resource allocation.
* User Feedback: Initial feedback indicated that the year-selectable feature enhanced the usability of the visualization.

1. **Reflections and Future Work**

* Lessons Learned:
* Data preprocessing is crucial for producing reliable and clear insights.
* Interactivity enhances understanding, especially when analyzing year-over-year trends.
* Areas for Improvement:
* Enhance data loading efficiency for faster updates.
* Add more specific categories (e.g., midwives, doctors) to allow granular comparisons.
* Future Work:
* Expand analysis to include additional healthcare metrics.
* Integrate live data or recent updates to keep insights relevant for decision-makers.