

CS5630: Data Visualization Group Project Proposal

Basic Info:

- **Project Title:** NextGen Jobs - AI's Impact on Work
- **Team Members:**
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- **Link to Repository:**
<https://github.com/dataviscourse2024/NextGen-Jobs>

Background and Motivation:

The rapid advancement of artificial intelligence (AI) and automation technologies is reshaping the global job market. As AI becomes increasingly integrated into various industries, it brings both opportunities and challenges for the workforce. Our motivation for this project stems from a keen interest in understanding how AI adoption affects employment trends, skill demands, and the future of work.

We chose the "AI-Powered Job Market Insights" dataset because it offers a comprehensive and synthetic snapshot of modern job listings, focusing on AI adoption levels, automation risks, required skills, and job growth projections. By visualizing this data, we aim to uncover patterns and insights that can inform job seekers, employers, and policymakers about the evolving landscape of employment in the age of AI.

Project Objectives:

1. Analyze AI Adoption Across Industries

Identify which industries are leading or lagging in AI adoption.

2. Assess Automation Risks

Determine which job roles are at high risk of automation and the factors contributing to this risk.

3. Explore Salary Trends

Examine the correlation between AI adoption levels and salary ranges.

4. Understand Skills Demand

Highlight the most in-demand skills, especially in high AI adoption roles.

5. Visualize Job Growth Projections

Present future job trends based on growth or decline projections across different roles and industries.

Benefits:

- Provide valuable insights for job seekers to align their skillsets with market demands.
- Assist policymakers in understanding potential employment shifts due to AI.
- Help businesses strategize workforce development and training programs.

Data:

Data source: [**AI-Powered Job Market Insights**](#)

Data Processing:

1.Data Cleaning:

- The raw data collected from the job market insights dataset needs to be cleaned for consistency and accuracy. This includes handling missing values, removing duplicates, and addressing any outliers or erroneous entries.
- Special attention will be given to formatting issues, such as normalizing dates (if applicable), converting categorical variables (such as job titles, industries, or company names) into appropriate formats, and encoding text fields (e.g., job descriptions or locations) if necessary.

2.Data Transformation:

- We will transform raw data into more usable formats. For example, locations provided as text will be standardized, and we will convert job roles into broader categories based on industry or function.
- We'll also create new features, such as the average salary in each job category, or calculate trends like job demand by industry over time, by combining and transforming existing columns.

3.Data Aggregation:

- For visualization and analysis, the data will be aggregated at various levels, such as job type, industry, company size, or geographical location (e.g., city, state, or region).
- Key metrics, like average salary, number of job openings, and industry demand trends, will be calculated for better insights into job market dynamics.

4.Data Filtering:

- Filters will be applied to focus specifically on the desired segments, such as jobs in certain regions, industries, or job roles. Unnecessary or irrelevant records (e.g., out-of-scope job listings) will be discarded to refine the dataset.

Visualization Design:

1. Industry and AI Adoption Heatmap

- Visualize AI adoption levels across different industries.
- 2. Automation Risk Bubble Chart
 - Display job roles based on automation risk and industry.
- 3. Salary Distribution Box Plots
 - Compare salary ranges across AI adoption levels and industries.
- 4. Skills Demand Bar Chart
 - Highlight the most required skills in high AI adoption jobs.
- 5. Job Growth Projection Line Graph
 - Show trends of job growth or decline over time.

Prototype Designs

Design 1: Dashboard with Multiple Tabs

- Tab 1: Industry Overview
 - Heatmap of AI adoption levels by industry.
- Tab 2: Role Risk Analysis
 - Bubble chart of job roles vs. automation risk.
- Tab 3: Salary Insights
 - Box plots of salaries segmented by AI adoption levels.
- Tab 4: Skills Demand
 - Interactive bar chart showing required skills frequency.

Design 2: Storytelling Visualization

- A scrollable narrative that guides the user through the data.
- Uses a combination of charts and infographics.
- Emphasizes the impact of AI on specific industries and roles.

Design 3: Interactive Map

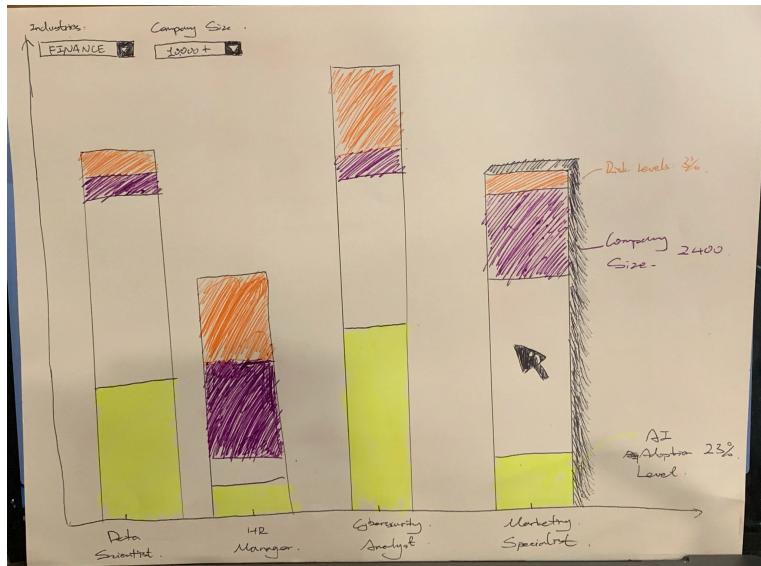
- Geographic map showing job locations.
- Layers to filter by AI adoption level, automation risk, and remote friendliness.
- Pop-up windows with job details on click.

Final Design

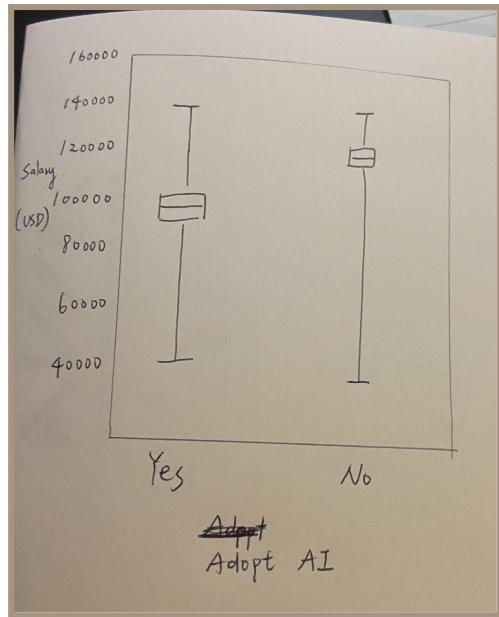
FutureWork Interactive Dashboard

Our final design combines the best elements of the prototypes:

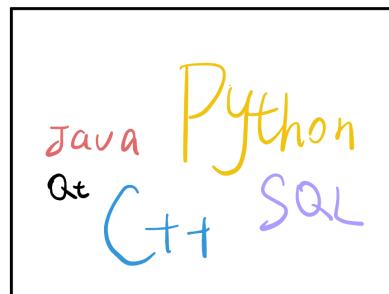
- Home Page: Overview of AI adoption across industries using an interactive heatmap.
- Automation Risk Analysis:
 - Users can hover over data points to see detailed automation risk levels, industry names, and company size/AI adoption level.
 - Dropdown filters will allow users to select specific industries or company sizes to dynamically update the chart for more focused analysis.



- Salary and AI Adoption:
 - Box plots showing the relationship between salary, AI adoption.

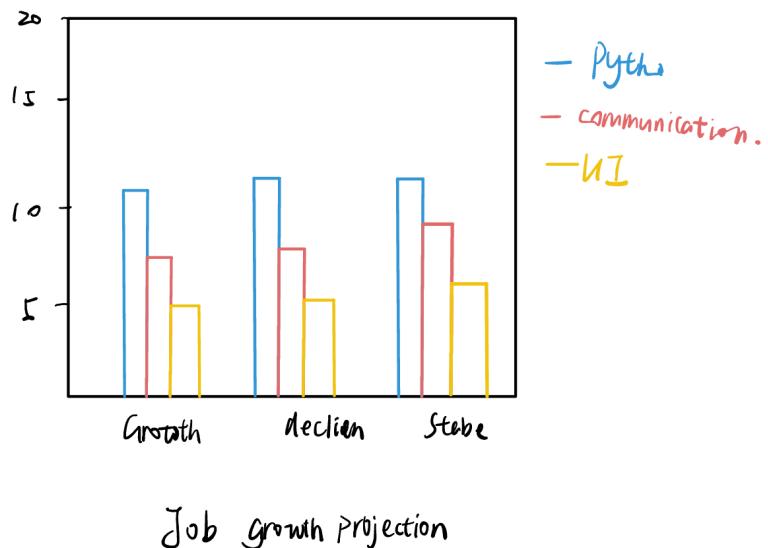


- Skills Demand Word Cloud:
 - Display the most demanded skills, with word size representing frequency.
 - Provide filters to allow users to generate word clouds based on industry, AI adoption level, automation risk, etc.

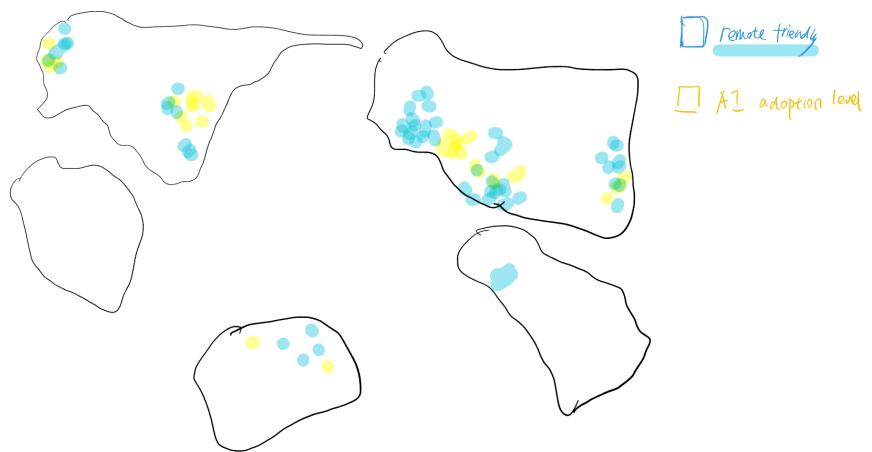


Word cloud. of skill sets

- Job Growth Projections:
 - Bar chart visualizes the **impact of job growth projection on required skills**, comparing how different skills are demanded in jobs that are either growing, declining, or remaining stable.



- Map Visualization:
 - Integrated map highlighting job locations, remote-friendly options, and AI adoption levels.



Must-have Features:

1. Interactive dashboard with responsive design.
2. Visualizations for all primary objectives (AI adoption, automation risk, salary trends, skills demand, job growth).
3. Data filtering options (by industry, company size, location, etc.).
4. User-friendly interface with clear legends and labels.

Optional Features:

1. Sentiment Analysis:

- Utilize natural language processing (NLP) techniques to analyze the sentiment of job descriptions, reviews, or employee feedback in the dataset. This will help categorize the sentiment as positive, negative, or neutral, which can be visualized to show trends in job satisfaction or market sentiment toward different industries or companies.

2. Predictive Models:

- Implement machine learning models to predict the likelihood of a job opening being filled based on factors such as job type, location, salary, and company reputation. The model's outcomes can be visualized in an interactive dashboard, showing which jobs are most in demand.

3. Time Series Animation:

- Create an animated time series to visualize changes in the job market over time. This can highlight trends such as rising job demand in certain industries, salary changes, or shifts in geographical job availability, providing a dynamic view of the market over specific periods.

4. Advanced Interactivity:

- Add advanced interactive features such as tooltips displaying detailed job information, draggable sliders to filter data by time range (e.g., job openings over the past 6 months), or hover effects to reveal additional insights like salary ranges, demand trends, or job category breakdowns.

Project Schedule:

Week 1 (Sept 16 – Sept 22)	Initial Visualization & Prototyping	<input type="checkbox"/> Gather feedback from peers and the instructor on initial prototypes. <input type="checkbox"/> Start initial data cleaning (remove duplicates, handle missing values, etc.).

Week 2 (Sept 23 – Sept 29)	Implement Visualizations and Basic Interactions	<ul style="list-style-type: none"> <input type="checkbox"/> Implement core visualizations (e.g., Grouped Bar Chart, Stacked Bar Chart) for Automation Risk Analysis and Salary Impact. <input type="checkbox"/> Add basic interactivity such as hover tooltips and filters. <input type="checkbox"/> Test visualization rendering on different screen sizes.
Week 3 (Sept 30 – Oct 6)	Add Filters and Finalize Visual Design	<ul style="list-style-type: none"> <input type="checkbox"/> Add industry and company size filters to enable dynamic updates of visualizations. <input type="checkbox"/> Finalize color schemes and styling for all charts. <input type="checkbox"/> Ensure the dashboard is user-friendly and well-structured.
Week 4 (Oct 7 – Oct 13)	Finalize Visualizations & Integrate Interactivity	<ul style="list-style-type: none"> <input type="checkbox"/> Finalize all visualizations and add interactive elements <input type="checkbox"/> Build the project website and integrate the visualizations. <input type="checkbox"/> Ensure all visual elements are responsive and functional on multiple devices. <input type="checkbox"/> Draft a screencast video showcasing the key findings and interactive elements.
Week 5 (Oct 14 – Oct 20)	Refinements & Testing	<ul style="list-style-type: none"> <input type="checkbox"/> Review the visualization for any errors, refine them, and make necessary adjustments. <input type="checkbox"/> Ensure visualizations effectively communicate your key findings.
	Final Submission	<ul style="list-style-type: none"> <input type="checkbox"/> All website files and libraries (code). <input type="checkbox"/> Data (or cloud storage links if necessary). <input type="checkbox"/> Process Book (PDF). <input type="checkbox"/> README file (including links to the project site and screencast).

