AI-Powered Job Market Insights

Labor Market Classification Analysis.

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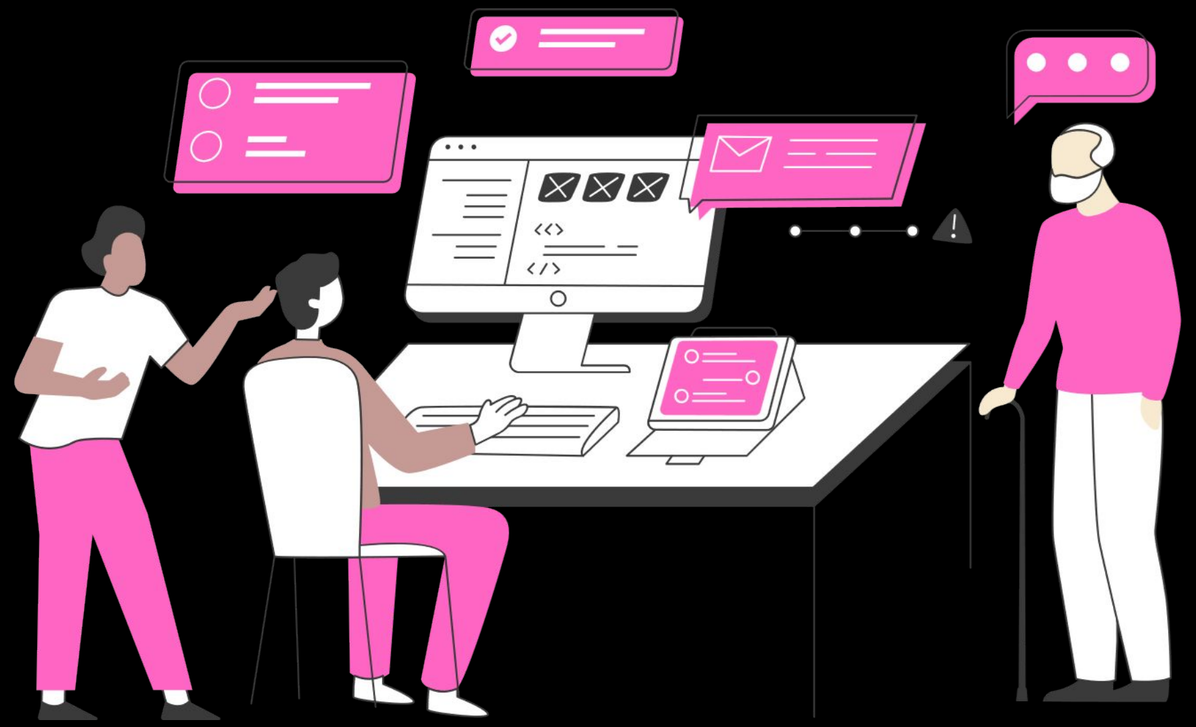
WELCOME TO PRESENTATION



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INTRODUCTION

One of the biggest problems that has emerged due to new technologies, such as AI, is their impact on many sectors, including economic and labor markets. These sectors are either being replaced by this technology or creating more job opportunities because of it. Through this research, we identify trends and patterns to make predictions about possible key trends in AI-driven employment.

This can be supported by evidence such as: "In 2024, 77% of companies are already using or exploring the implementation of AI in their processes, contributing $15.7 billion to the projected global GDP by 2030".

This research highlights how AI is shaping industries and the labor market, with clear signals showing patterns that reveal how employment opportunities and challenges are likely to evolve as AI technology continues to advance.

Methodology

Classification Analysis:
- Supervised learning models predict employment trends based on job type, AI adoption, and salary data.
- Example methods: Decision Trees, Random Forests.

Clustering Analysis:
- Group industries by AI adoption, salary levels, and risk of automation using K-Means Clustering.

Information Retrieval:
- Extract, clean, and preprocess data for meaningful analysis using R libraries like dplyr, tidyr, and caret.

Why These Methods?

- Clustering identifies groups of industries or roles with similar employment patterns.
- Classification predicts trends like which jobs are at risk or likely to experience growth.

Dataset

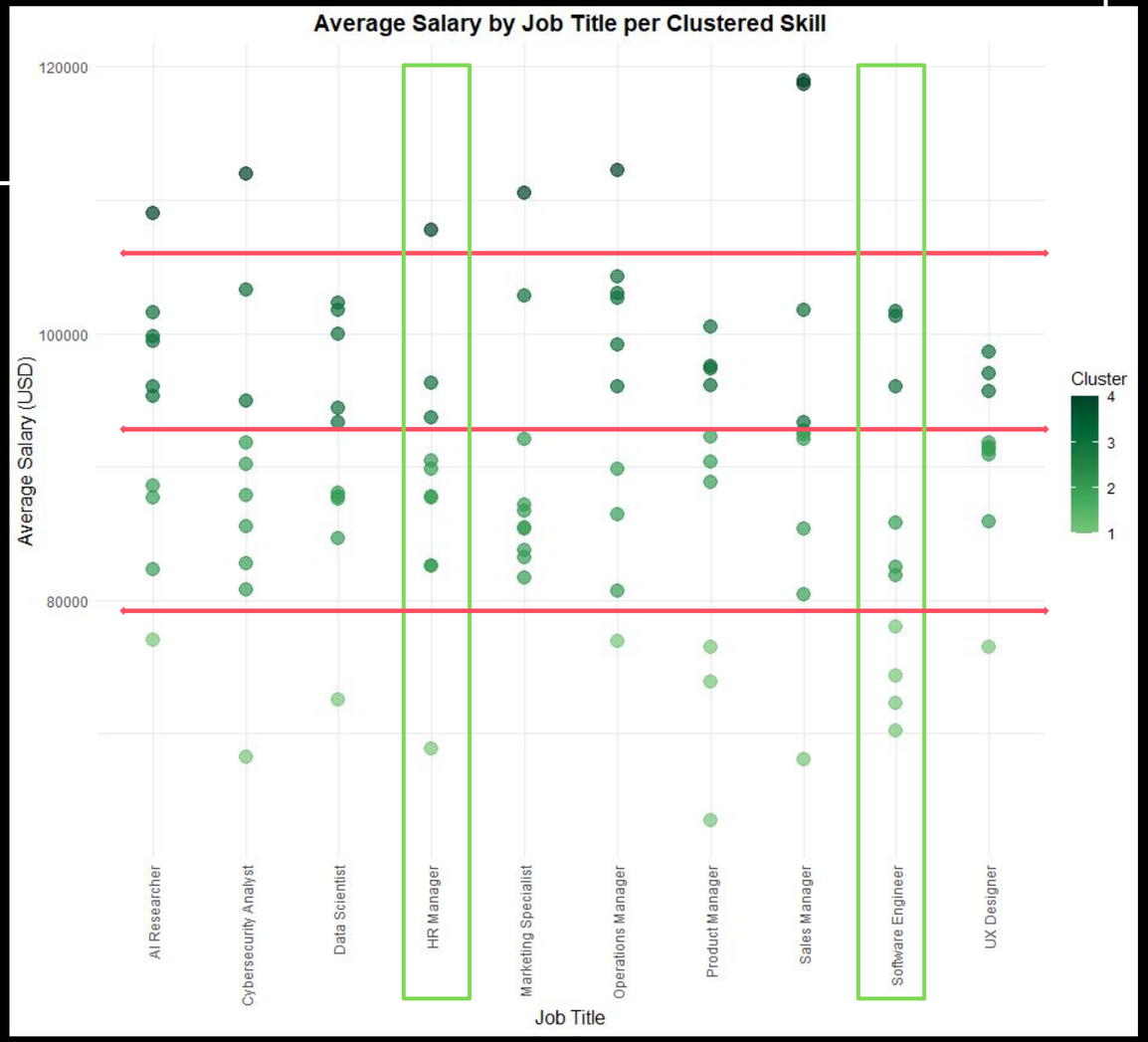
- **Dataset Summary:**
  - **Source:** Kaggle – "AI-Powered Job Market Insights"
  - **Data Details:**
    - 500 job listings across diverse industries.
    - Key Variables: Job Title, Industry, AI Adoption Level, Automation Risk, Salary, Skills, and more.
- **Purpose:** To provide a comprehensive and realistic view of the modern job market.

	A	B	C	D	E	F	G	H	I	J	K
1	Job_Title	Industry	Company_Si	Location	AI_Adoption_	Automation_	Required_Ski	Salary_USD	Remote_Frie	Job_Growth_Projection	
2	Cybersecurit	Entertainmer	Small	Dubai	Medium	High	UX/UI Design	111392.1652	Yes	Growth	
3	Marketing Sp	Technology	Large	Singapore	Medium	High	Marketing	93792.56246	No	Decline	
4	AI Researche	Technology	Large	Singapore	Medium	High	UX/UI Design	107170.2630	Yes	Growth	
5	Sales Manag	Retail	Small	Berlin	Low	High	Project Mana	93027.95375	No	Growth	
6	Cybersecurit	Entertainmer	Small	Tokyo	Low	Low	JavaScript	87752.92217	Yes	Decline	
7	UX Designer	Education	Large	San Francisc	Medium	Medium	Cybersecurit	102825.0078	No	Growth	
8	HR Manager	Finance	Medium	Singapore	Low	High	Sales	102065.7206	Yes	Growth	
9	Cybersecurit	Technology	Small	Dubai	Medium	Low	Machine Lea	86607.3176	Yes	Decline	
10	AI Researche	Retail	Large	London	High	Low	JavaScript	75015.86084	No	Stable	
11	Sales Manag	Entertainmer	Medium	Singapore	High	Low	Cybersecurit	96834.57829	Yes	Decline	
12	Marketing Sp	Finance	Small	London	High	High	Python	91566.97337	Yes	Growth	
13	AI Researche	Entertainmer	Medium	Singapore	Medium	High	UX/UI Design	78902.56574	No	Growth	
14	AI Researche	Transportatic	Large	San Francisc	High	Medium	Python	73151.99034	Yes	Growth	
15	HR Manager	Retail	Small	Paris	Low	High	Cybersecurit	98209.51687	Yes	Decline	
16	Product Man	Finance	Medium	Singapore	High	High	JavaScript	101001.9011	Yes	Growth	
17	Sales Manag	Telecommun	Small	Dubai	High	Low	UX/UI Design	82799.35770	No	Growth	
18	Software Eng	Manufacturir	Medium	Singapore	High	Medium	Machine Lea	78401.25928	No	Decline	

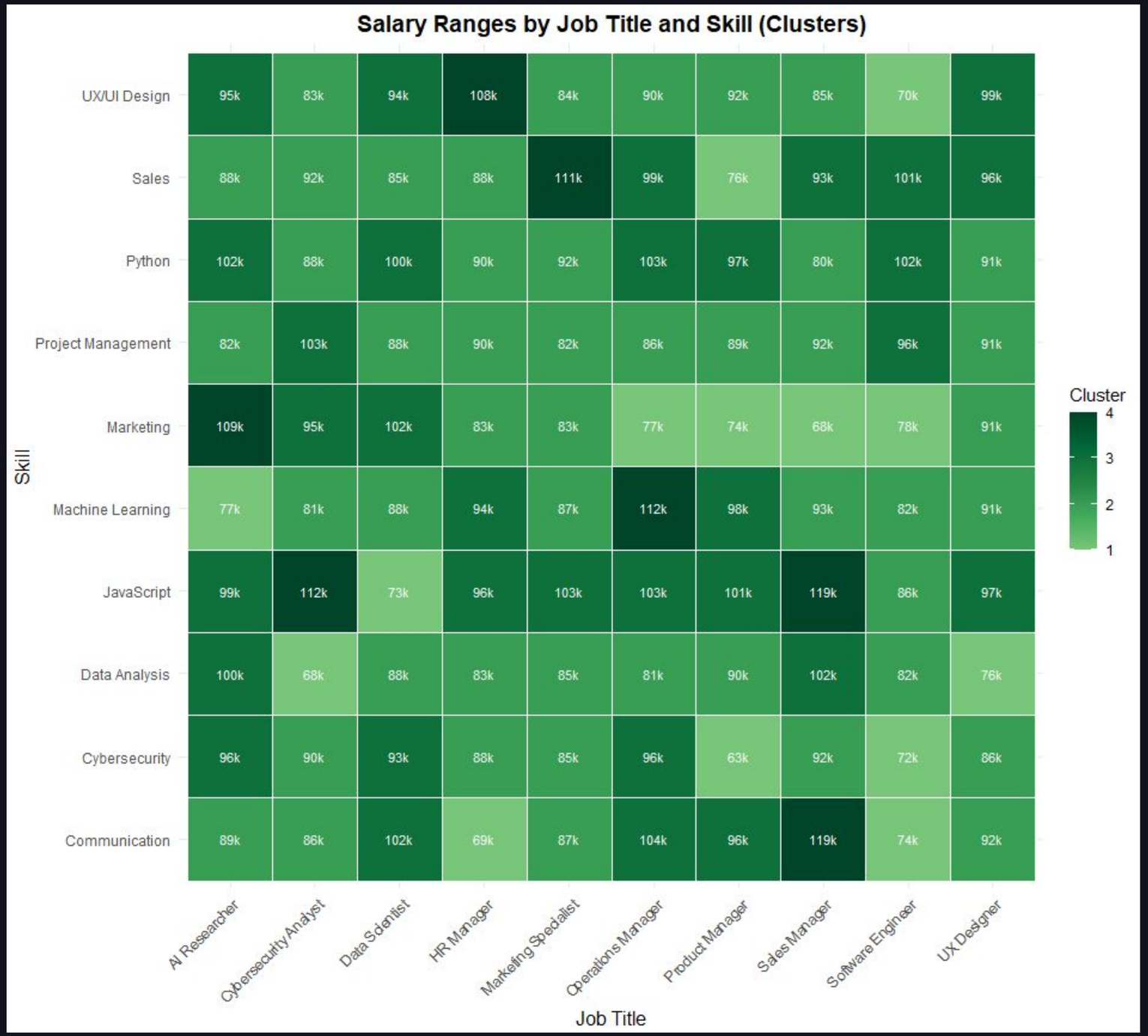
Modeling

- **Methods:**
  - **Clustering:** Identified patterns among industries and roles.
  - **Classification:** Grouped jobs by skills, automation risk, etc.

- **Goals:** Predict salary ranges, job growth potential, and automation risk.



Output

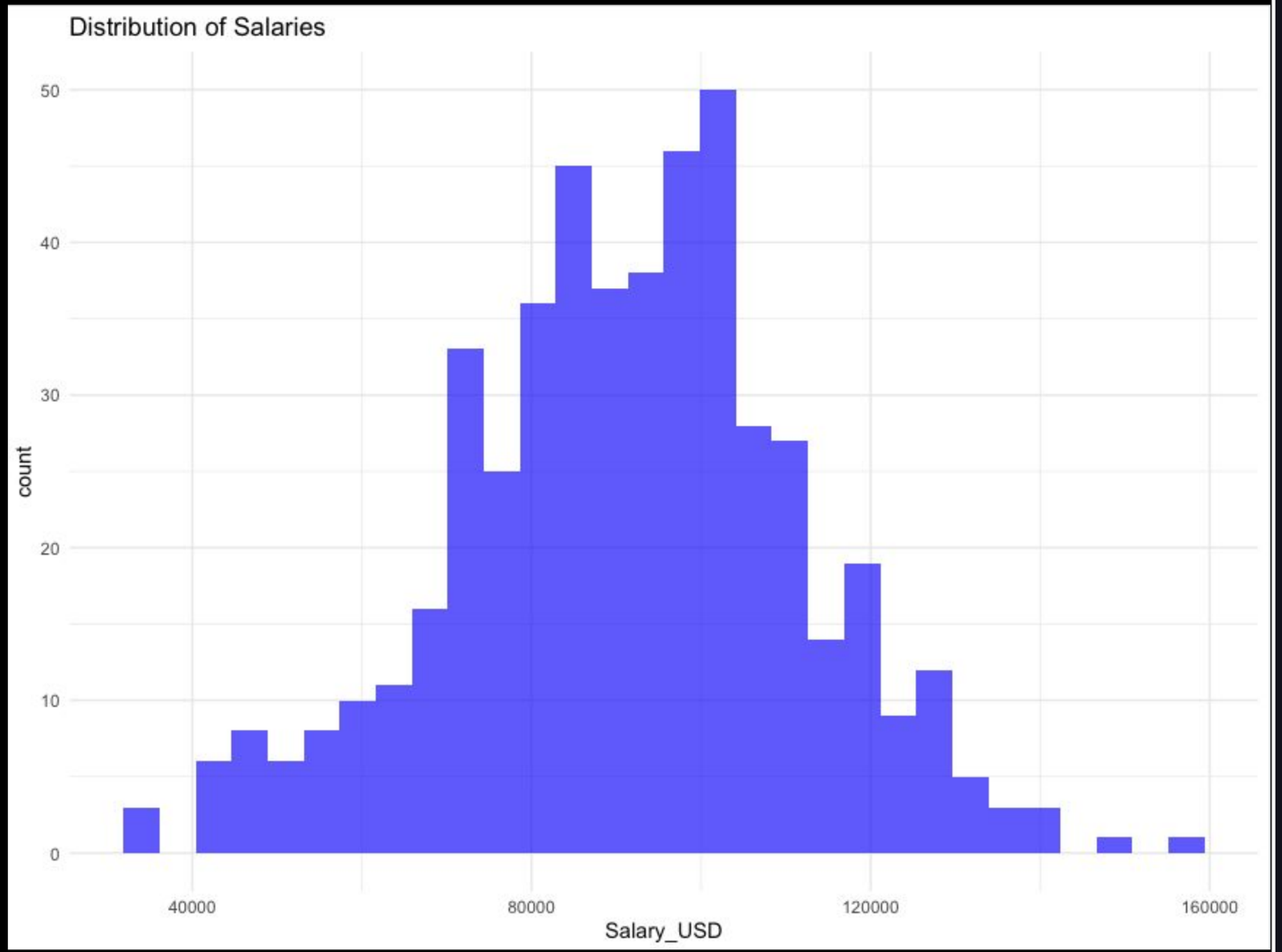

Salary Ranges by Job Title and Skill (Clusters)
Skill
UX/UI Design 95k 83k 94k 108k 84k 90k 92k 85k 70k 99k
Sales 88k 92k 85k 88k 111k 99k 76k 93k 101k 96k
Python 102k 88k 100k 90k 92k 103k 97k 80k 102k 91k
Project Management 82k 103k 88k 90k 82k 86k 89k 92k 96k 91k
Marketing 109k 95k 102k 83k 83k 77k 74k 68k 78k 91k
Machine Learning 77k 81k 88k 94k 87k 112k 98k 93k 82k 91k
JavaScript 99k 112k 73k 96k 103k 103k 101k 119k 86k 97k
Data Analysis 100k 68k 88k 83k 85k 81k 90k 102k 82k 76k
Cybersecurity 96k 90k 93k 88k 85k 96k 63k 92k 72k 86k
Communication 89k 86k 102k 69k 87k 104k 96k 119k 74k 92k
AI Researcher
Cybersecurity Analyst
Data Scientist
HR Manager
Marketing Specialist
Operations Manager
Product Manager
Sales Manager
Software Engineer
UX Designer
Job Title
Cluster
4
3
2
1

Salary Distribution Overview

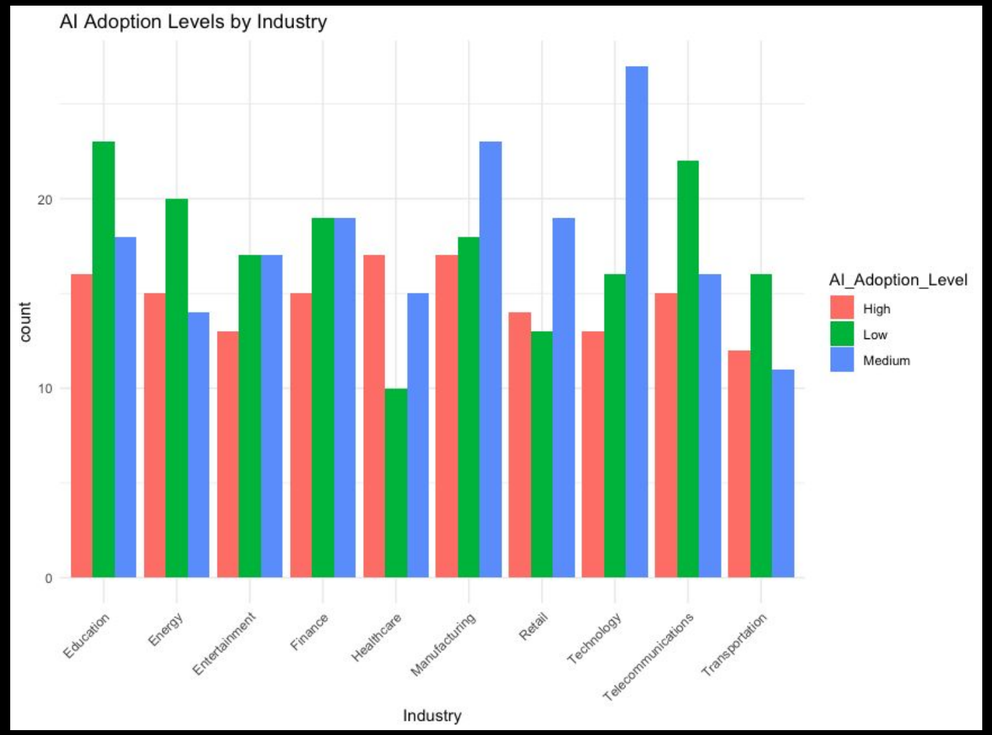
An initial analysis of the dataset reveals that the majority of salaries fall within the range of $70,000 to $100,000 USD.

- This cluster suggests a mid-range concentration in most industries.
- Understanding salary distribution is crucial to identifying how AI adoption and other variables influence pay scales.

Additional exploration is needed to uncover outliers and trends among industries with varying levels of AI adoption.



AI Adoption Across Industries



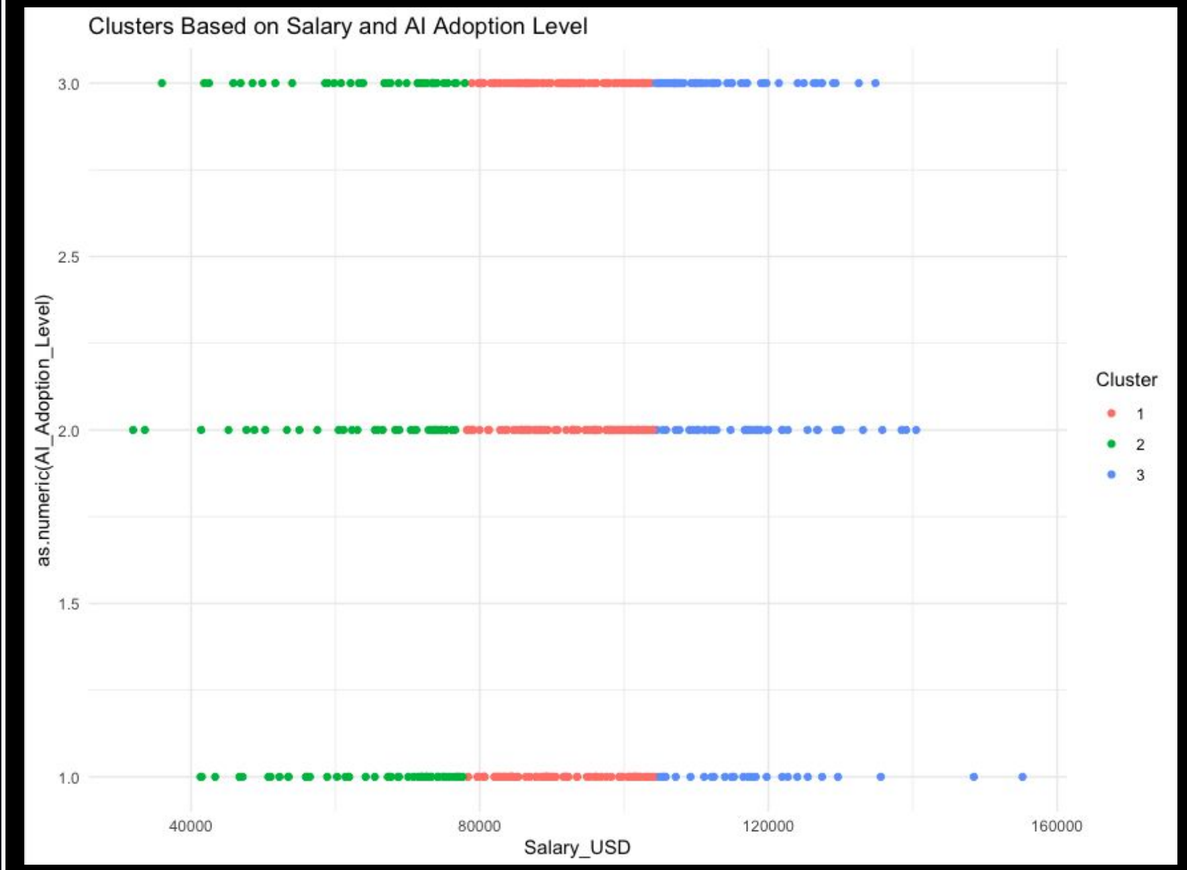
Industries are adopting AI at different rates, highlighting disparities in technological integration:

- High adoption: Technology, Healthcare, and Finance.
- Medium adoption: Retail and Manufacturing.
- Low adoption: Education and other sectors resistant to automation.

These differences provide insights into how industries are reshaping their workforce strategies.

- For instance, industries with high adoption rates often offer roles requiring advanced technical skills.

AI Adoption Levels and Salaries



Examining the relationship between AI adoption and salaries reveals:

- Higher levels of AI adoption slightly correlate with increased salaries.
- Salaries remain relatively stable across adoption levels, with small variations.

This suggests that AI adoption is not the sole factor influencing salaries; other variables like location and required skills also play a role.

Key Insights from Preliminary Analysis

The initial analysis provides several critical takeaways:

- Salaries are predominantly clustered in the $70,000–$100,000 range, reflecting a balanced mid-tier distribution.
- Industries like Technology and Finance lead in AI adoption, while Education shows slower integration.
- Salaries correlate with AI adoption levels, but the relationship is not strongly linear."

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Statistics by Class:

                     Class: Decline Class: Growth Class: Stable
Sensitivity                  0.3333        0.3939       0.25000
Specificity                  0.6923        0.6154       0.68182
Pos Pred Value               0.3548        0.3421       0.27586
Neg Pred Value               0.6716        0.6667       0.65217
Prevalence                   0.3367        0.3367       0.32653
Detection Rate               0.1122        0.1327       0.08163
Detection Prevalence         0.3163        0.3878       0.29592
Balanced Accuracy            0.5128        0.5047       0.46591
```

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Confusion Matrix and Statistics

          Reference
Prediction Decline Growth Stable
   Decline      11     11      9
   Growth       10     13     15
   Stable       12      9      8

Overall Statistics

               Accuracy : 0.3265
                 95% CI : (0.2352, 0.4287)
    No Information Rate : 0.3367
    P-Value [Acc > NIR] : 0.6217

                  Kappa : -0.0108

 Mcnemar's Test P-Value : 0.5774

Statistics by Class:
```
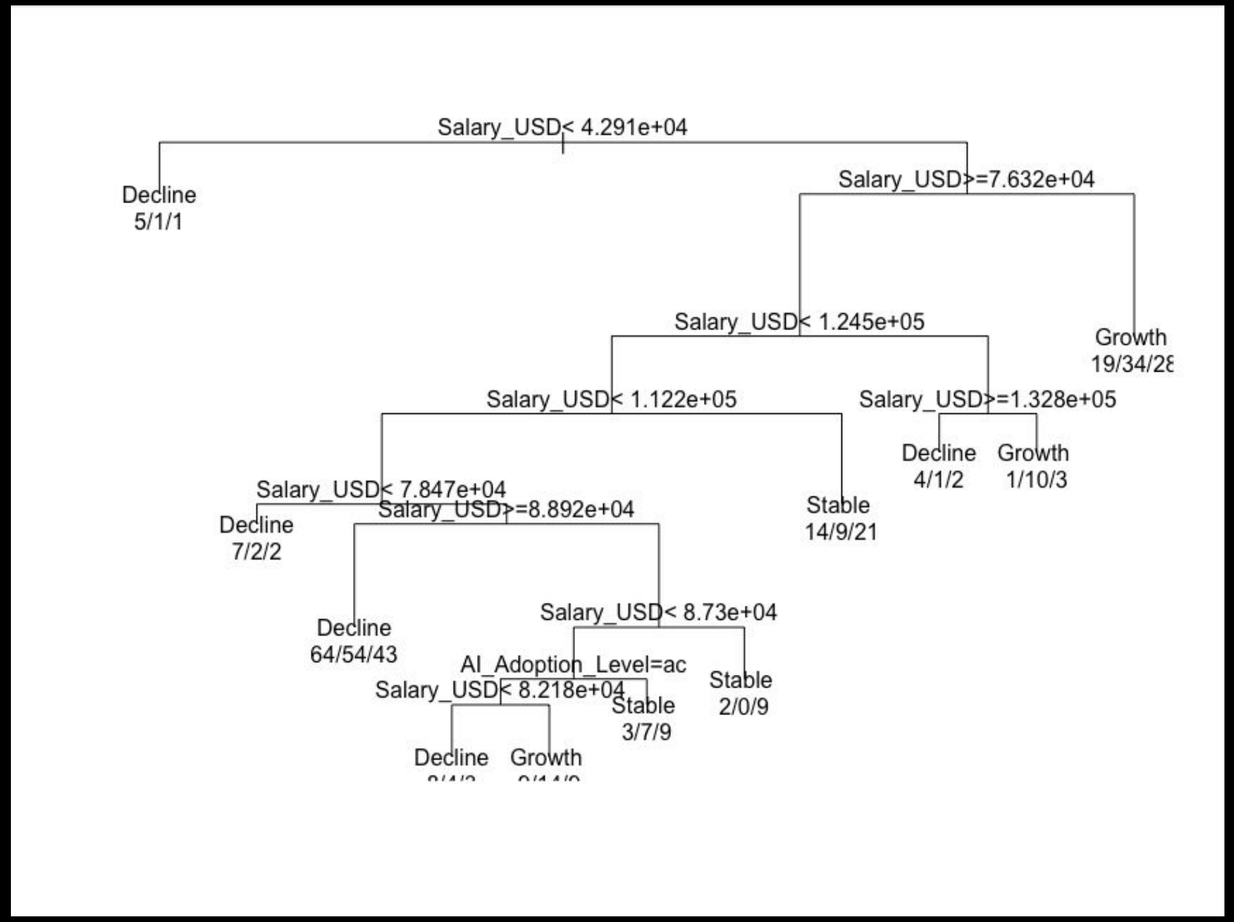

Next steps in the analysis will focus on:

- Exploring automation risk and its correlation with job displacement.
- Investigating skill demand across industries with high AI adoption.

Refining predictive models to enhance accuracy in identifying job growth trends.

Model Evaluation and Decision Tree Insights



The model shows low accuracy, suggesting its predictions are unreliable.

This is likely due to overfitting, which occurs when the model fits too closely to the small dataset, reducing its ability to generalize.

Decision Tree Insights:The decision tree evaluates whether a job's salary is higher or lower than a specific threshold. Based on this, it predicts:

- Jobs with low salaries and low AI adoption are likely to decline.
- Jobs with higher salaries may show more stability or growth.

Results

- **Skills Analysis**
  - Detecting emerging technical and soft skills required for high-paying roles.
  - Ranking skills in demand by industry or sector.
  - Highlighting opportunities for upskilling.

- **Highest Paying Job & Skills Combinations:**
  - HR Manager & UI/UX Design
  - Marketing Specialist & Sales
  - AI Researcher & Marketing
  - Operations Manager & Machine Learning
  - Cybersecurity Analyst & JavaScript
  - Sales Manager & JavaScript
  - Sales Manager & Communication

Conclusion

- **Key Takeaways:**
  - AI is seriously changing the game in industries like tech, healthcare, and finance, creating new opportunities and risks at the same time.
  - Skills like Python, Data Analysis, and Machine Learning are becoming non-negotiable, along with soft skills like adaptability and project management.
  - Jobs in manufacturing and retail are at a higher risk of being automated, so people in these sectors need to prepare for changes.
- **What We Think Should Happen:**
  - **For Job Seekers:** Focus on learning skills that are in demand and can’t be easily replaced by AI.
  - **For Policymakers:** Step up with programs to reskill and upskill workers in vulnerable industries.
  - **For Employers:** Stay ahead of the curve by aligning hiring strategies with where AI is heading.

RESOURCE PAGE

1- AI-Powered Job Market Insights Dataset - https://www.kaggle.com/datasets/uom190346a/ai-powered-job-market-insights

2-AI Index Report 2024 - Stanford AI Index - https://aiindex.stanford.edu/

THANK YOU!