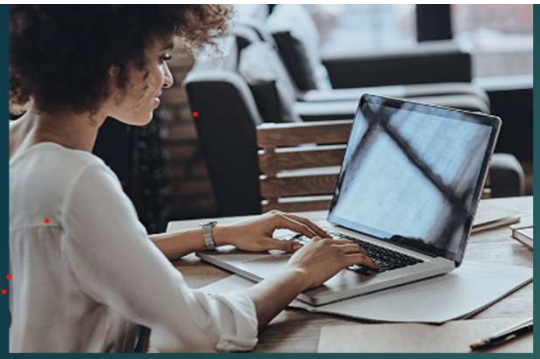

JOB RECOMMENDATION SYSTEM

SmartMatch: Enhancing Job Search Efficiency through Intelligent Job Recommendation Systems

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PROJECT OVERVIEW

- Problem statement
- data understanding
- objectives
- Project flow
- Data understanding
- Exploratory analysis
- Modelling

INTRODUCTION

- We aim to simplify job searching with a system that efficiently matches job seekers with relevant postings based on their qualifications and preferences, benefiting both job seekers and recruiters.

- Our project builds on existing research to create a solution that enhances the job search and recruitment experience across all industries

STAKEHOLDERS

Job Seekers

Recruiters

Career Advisors

DATA UNDERSTANDING

- Our project aims to create a job recommendation system to streamline the job search process, benefiting job seekers and recruiters by enabling quicker and more accurate matches between candidates and positions.
- This system, relevant across all industries, leverages natural language processing (NLP) and machine learning techniques to enhance job recommendations, building on research such as Narula et al. (2023).
- By addressing a real-world problem, we hope to improve the job search experience for individuals and the recruitment process for organizations.

Problem Statement

Challenge

Cumbersome &Inefficient Job Search Process

Issue

- **Job seekers:** Irrelevant postings overload.
- **Recruiters:** Data volume hinders.

Impact

Frustration, inefficiencies, delays

Data Source

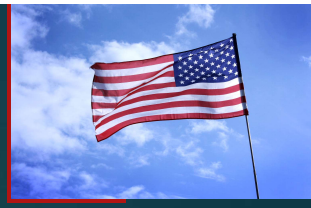
Provider

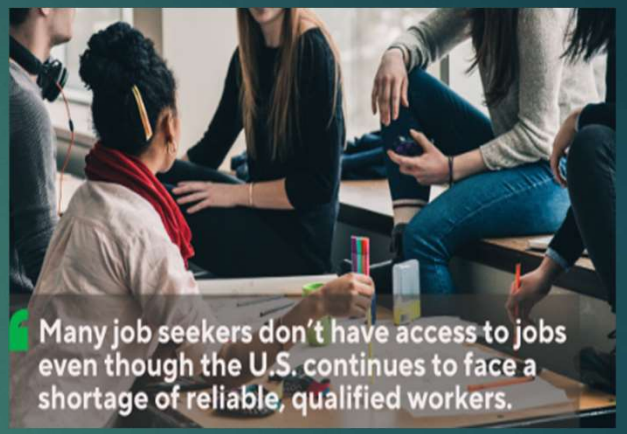
- The datasets have been downloaded straight from kaggle

Datasets

- Combined_Jobs_Final.csv: Details about job openings
- Experience.csv: Information on job seekers' previous roles.
- Job_views.csv: Data on the time spent by job seekers viewing job openings.
- Positions_Of_Interest.csv: Records of positions job seekers are interested in.
- job_data.csv: Additional descriptions of job openings.

American Labor Market





Economic conditions: America faces like persistent inflation, geopolitical tensions, and financial instability which could temper their GDP growth and potentially limit job creation in the longer term

Technological Advancement: Driven by breakthroughs in AI & renewable energy, there has been a demand for new skills fostering innovation and growth across all industries

Labor Market Policies: Current U.S. labor market policies focus on addressing labor shortages, improving worker protections, and promoting wage growth and job training

Research Objectives:

Develop an intelligent matching algorithm.

Enhance recruiter experience.

Develop a user friendly web application.

Deployment and maintenance

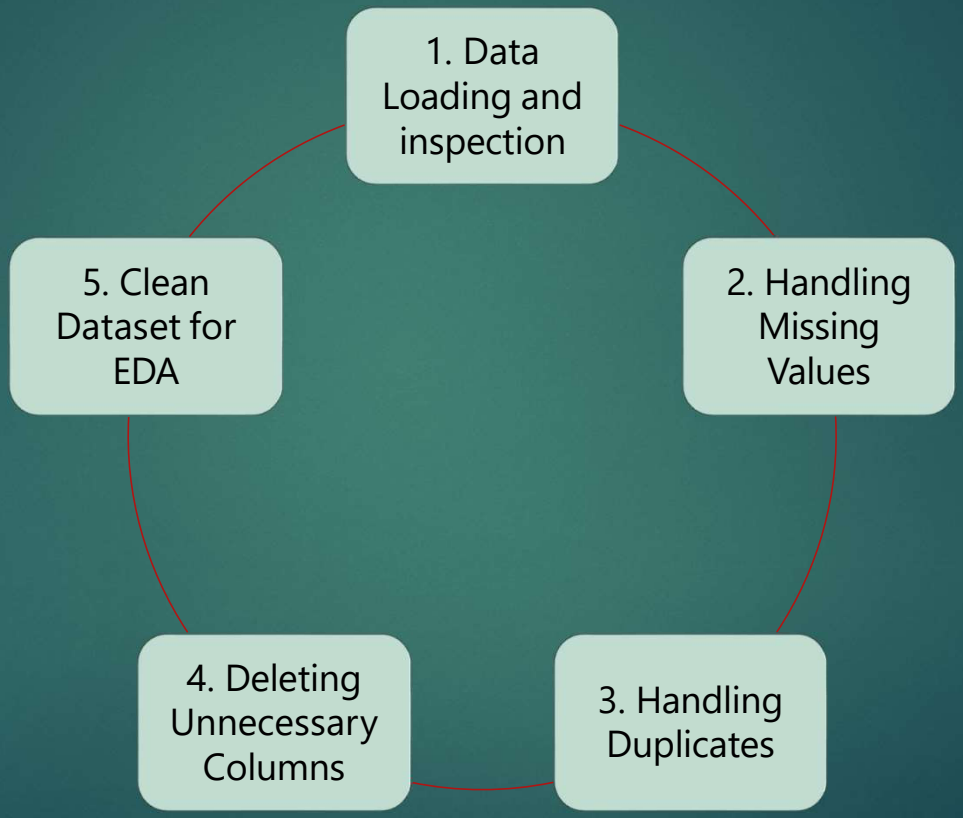
Research Questions:

How can an intelligent matching algorithm be developed to effectively match job seekers with job postings based on their skills?

What machine learning techniques are most effective for improving job recommendation?

How can user experience for both recruiters and job seekers be optimized?

Data Cleaning Process

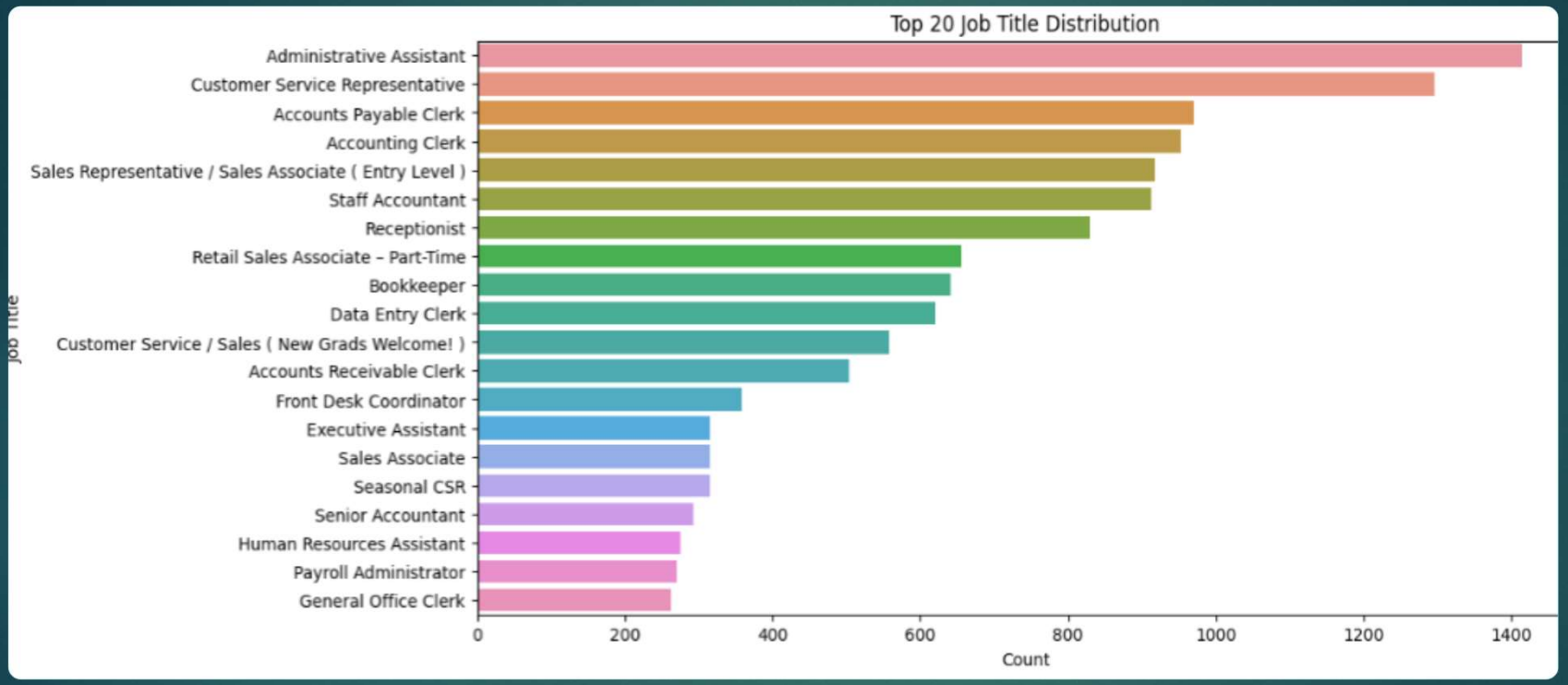


EXPLORATORY DATA ANALYSIS

DATA POINT

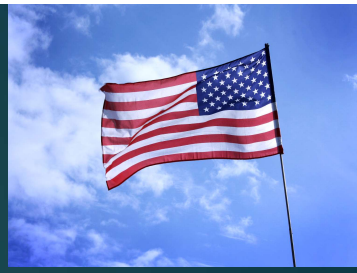

United States of America
CANADA
Washington
Oregon
Montana
Idaho
Wyoming
Nevada
California
Utah
Colorado
Arizona
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wisconsin
Illinois
Michigan
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Maine
Vermont
New Hampshire
Massachusetts
Rhode Island
Connecticut
New Jersey
Delaware
Maryland
Washington, D.C.
MEXICO
Alaska
Hawaii
American Geographics
BAHAMAS
CUBA

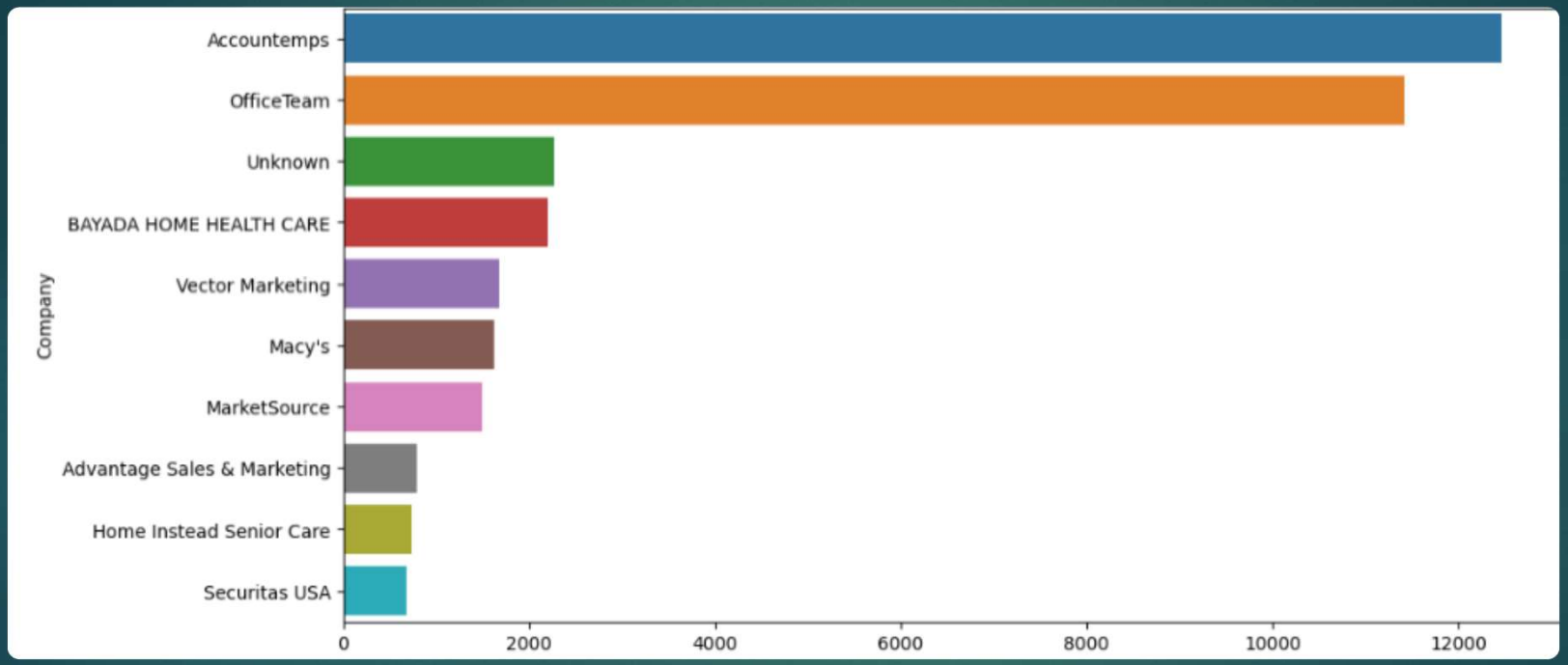
UNIVARIATE ANALYSIS: MOST SOUGHT AFTER JOB POSITIONS



High counts for specific titles like Administrative assistants show high demand in these roles.

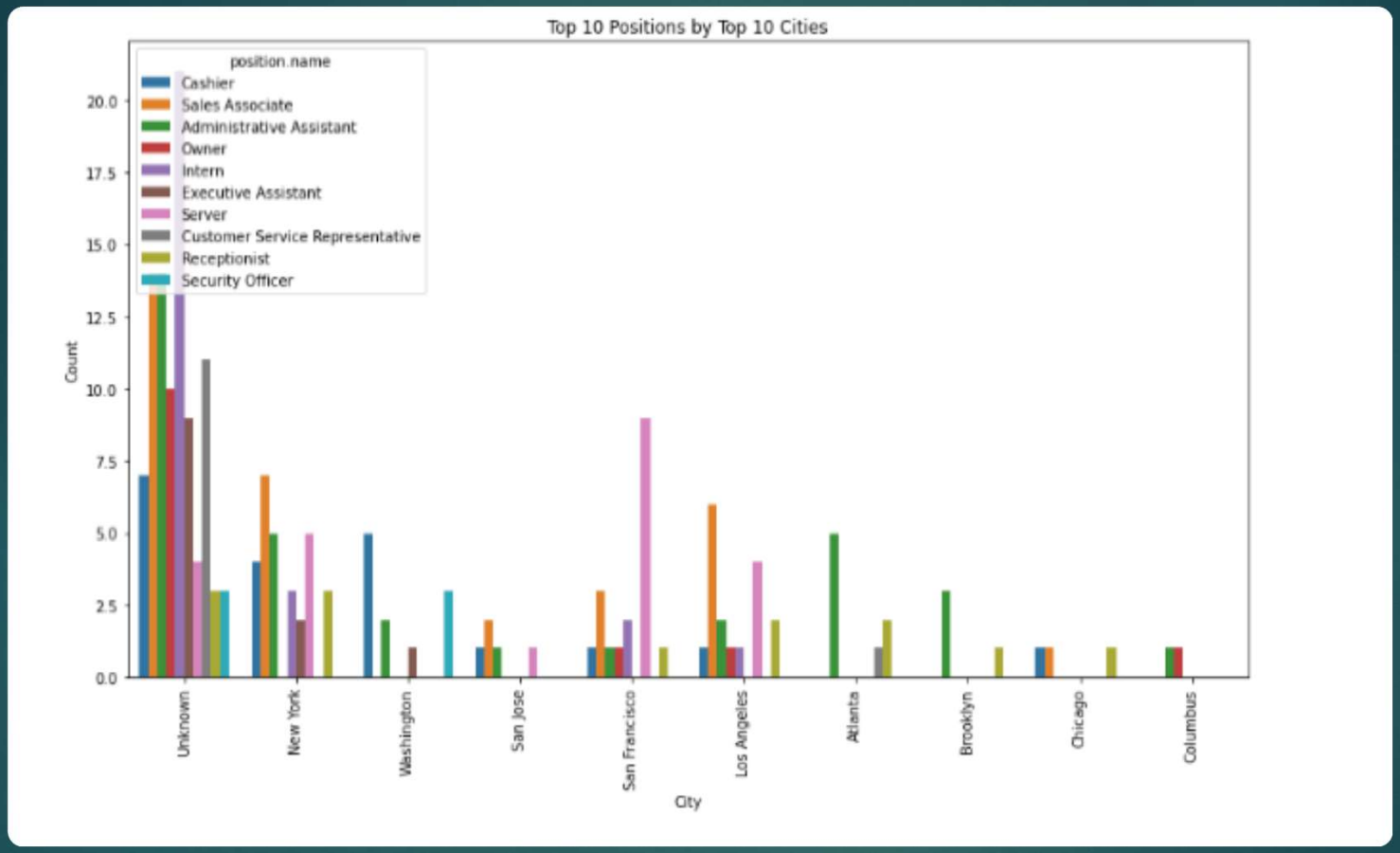
BIVARIATE ANALYSIS: TOP 10 COMPANIES BY JOB POSTINGS





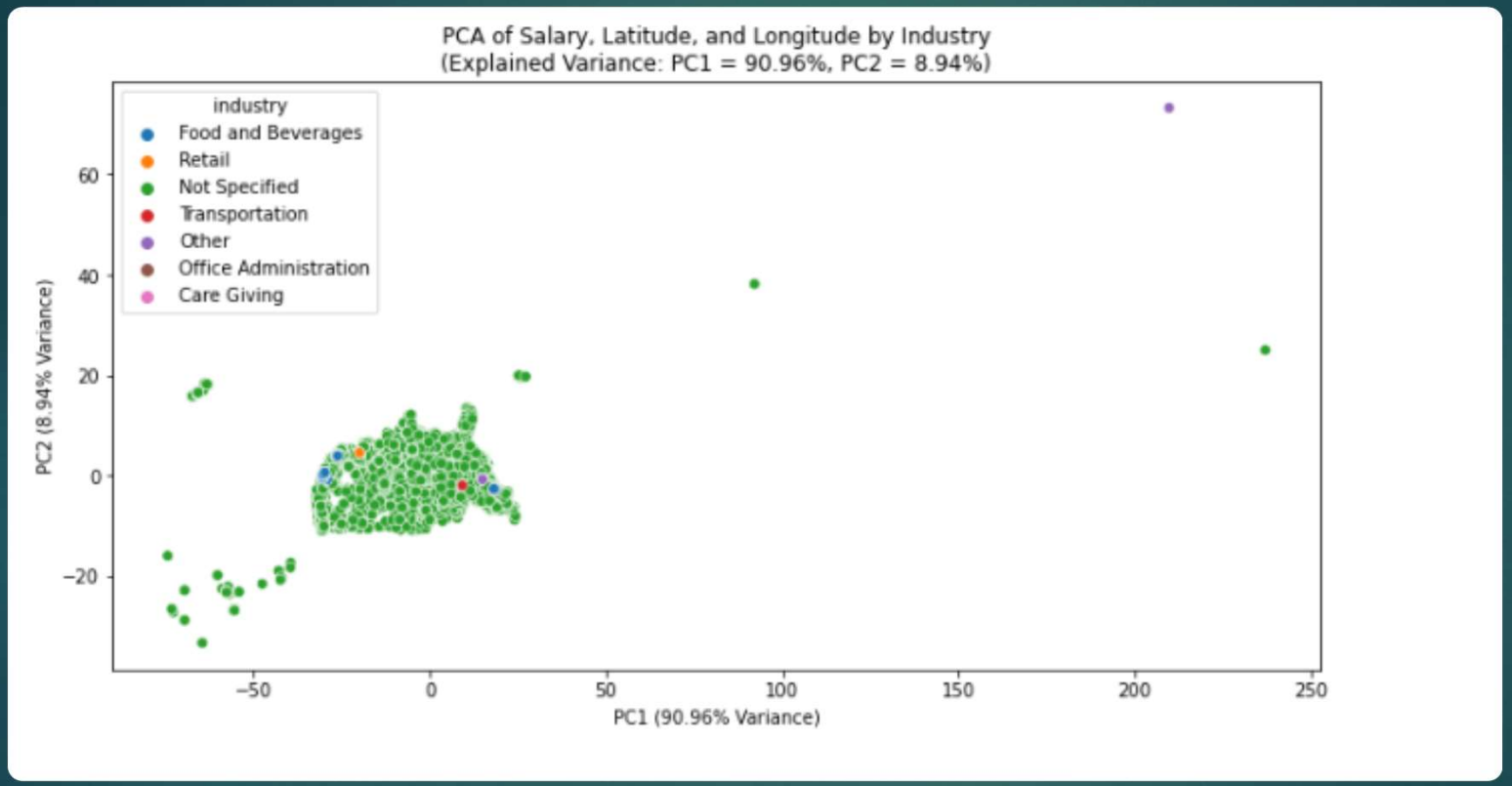
Some markets are the most active in job hiring potentially indicating market leaders

SALARY DISTRIBUTION BY INDUSTRY



This visualization shows which positions are most common in the top 10 cities, revealing geographical preferences for certain job roles. It can assist job seekers in identifying where their desired positions are most likely to be available.

MULTIVARIATE ANALYSIS: PCA FOR NUMERICAL COLUMNS



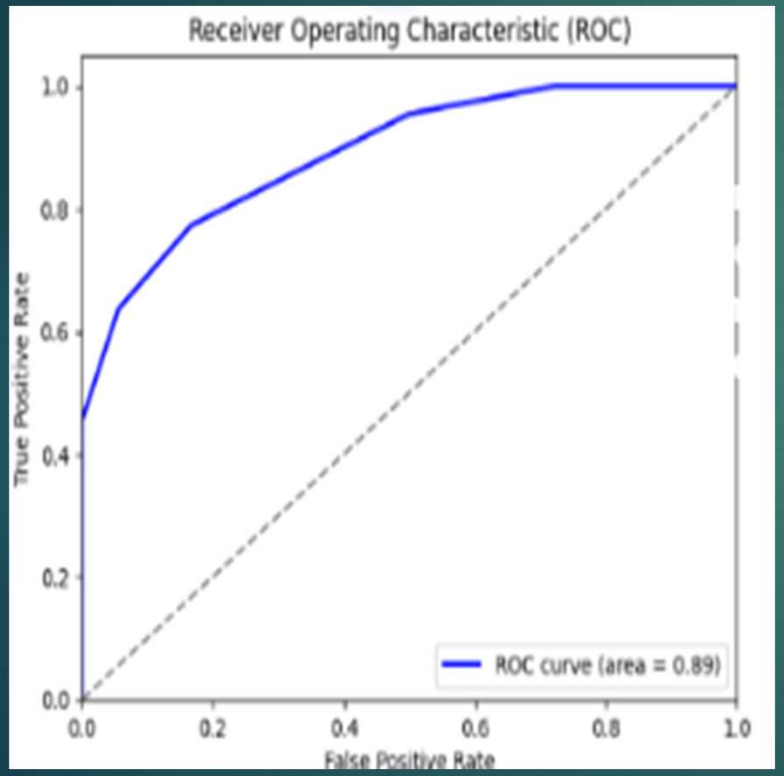
PC1 explains 90.96% of the variance, highlighting its dominant role in capturing key features like salary, latitude, and longitude. PC2 contributes only 8.945% of the variance, indicating a minor role in the data's variability.

MODELLING

MODEL SUCCESS METRICS

- Precision: High relevance in job recommendations.
- Recall: Comprehensive coverage of relevant opportunities.
- Normalized Discounted Cumulative Gain (NDCG
- Comprehensive coverage of relevant opportunities.
- F1 Score: Balance between precision and recall.
- Mean Reciprocal Rank (MRR): 1.0

MODEL EVALUATION

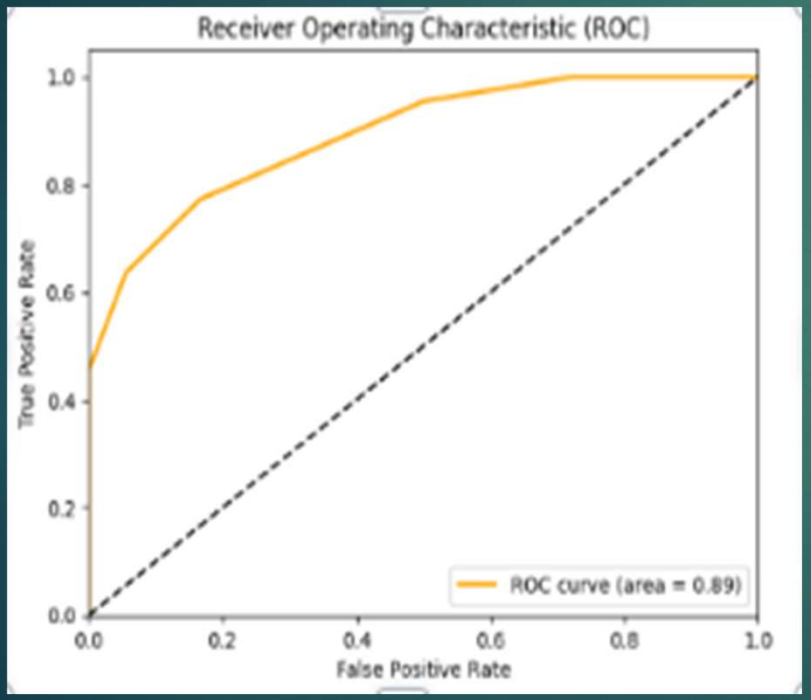


- **Precision: 0.9333333333333332**
- **Recall: 0.35**
- **mrr_value: 1.0**
- **ndcg: 0.5137088609996164**

- **The model excels at making highly accurate top recommendations (high precision and perfect MRR)**

Model Evaluation

K-Nearest Neighbors (KNN) and Singular Value Decomposition (SVD)



- **Both had a similar score below.**
- **Precision: 0.6**
- **Recall: 1.0**
- **mrr_value: 1.0**
- **ndcg: 1.0**

Conclusion on modelling

- Model 1:
- Conclusion:
- Highly precise with perfect top ranking, but low recall limits the range of relevant jobs shown.
- Insight:
- Ideal for focused, top-quality recommendations; needs better recall and ranking beyond top jobs.
- Model 2:
- Conclusion:
- Perfect coverage and ranking, but moderate precision includes some less relevant jobs.
- Insight:
- Best for comprehensive job listings with perfect ranking; can improve by increasing precision.

DEPLOYMENT

Web Application:

Link-https://appappmnfqtl6q4zqgfkwf6zth7n.streamlit.ap/

- Deployed on Streamlit, offering a user-friendly interface for job seekers and recruiters.

- Continuous Integration: Regular updates and monitoring to maintain accuracy and performance.

CONCLUSION

- The SmartMatch project successfully addressed the inefficiencies of traditional job search processes by applying machine learning techniques to create an intelligent job recommendation system.

- By enhancing the experiences of both job seekers and recruiters, SmartMatch provides a more personalized, efficient, and user-friendly approach to job matching, paving the way for a more streamlined and equitable hiring process.

RECOMMENDATIONS

- Enhance algorithm accuracy- refine matching criteria to increase relevant job suggestions
- Improve user experience- simplify interface and ensure intuitive navigation.
- Incorporate personalized suggestions- use user data to tailor job recommendations uniquely.

Thank you

- ANY QUESTIONS?