Career Trends Explorer and Personalized Job Matcher

Forecasting Future Workforce Trends

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INTRODUCTION

Project Purpose

Analyze and forecast career trends in the workforce. Match personalized job opportunities based on future job market forecasts. Focus on high-demand job sectors, such as remote work and technology.

Project Scope

Utilize historical job data to make predictions. Provide actionable insights for both job seekers and employers.

Job Recommendation System using Python

DATA OVERVIEW

Key Dataset Features

Job title, salary range, country, and job type (remote/full-time/part-time). Historical job postings data by year and month. Metrics such as job count, remote job count, and budget data.

Data Sources

Collected from multiple job boards and career websites.

	title	link	published_date	is_hourly	hourly_low	hourly_high	budget	country
0	Experienced Media Buyer For Solar Pannel and R...	https://www.upwork.com/jobs/Experienced-Media-...	2024-02-17 09:09:54+00:00	False	NaN	NaN	500.0	NaN
1	Full Stack Developer	https://www.upwork.com/jobs/Full-Stack-Develop...	2024-02-17 09:09:17+00:00	False	NaN	NaN	1100.0	United States
2	SMMA Bubble App	https://www.upwork.com/jobs/SMMA-Bubble-App_%7...	2024-02-17 09:08:46+00:00	True	10.0	30.0	NaN	United States
3	Talent Hunter Specialized in Marketing	https://www.upwork.com/jobs/Talent-Hunter-Spec...	2024-02-17 09:08:08+00:00	True	NaN	NaN	NaN	United States
4	Data Engineer	https://www.upwork.com/jobs/Data-Engineer_%7E0...	2024-02-17 09:07:42+00:00	False	NaN	NaN	650.0	India

DATA PREPROCESSING

Cleaning and Preparing Data

Handling missing values and inconsistencies.

Creating New Columns

Creating new columns, such as 'YearMonth' for time-series analysis.

Grouping and Aggregating

Grouping and aggregating data by year and job type for better forecasting.

	title	Cleaned Job Title
1	Full Stack Developer	full stack developer
2	SMMA Bubble App	smma bubble app
3	Talent Hunter Specialized in Marketing	talent hunter specialized marketing
4	Data Engineer	data engineer
5	SEO for Portuguese Psychologist site	seo portuguese psychologist site

Top 20 Keywords by TF-IDF Scores
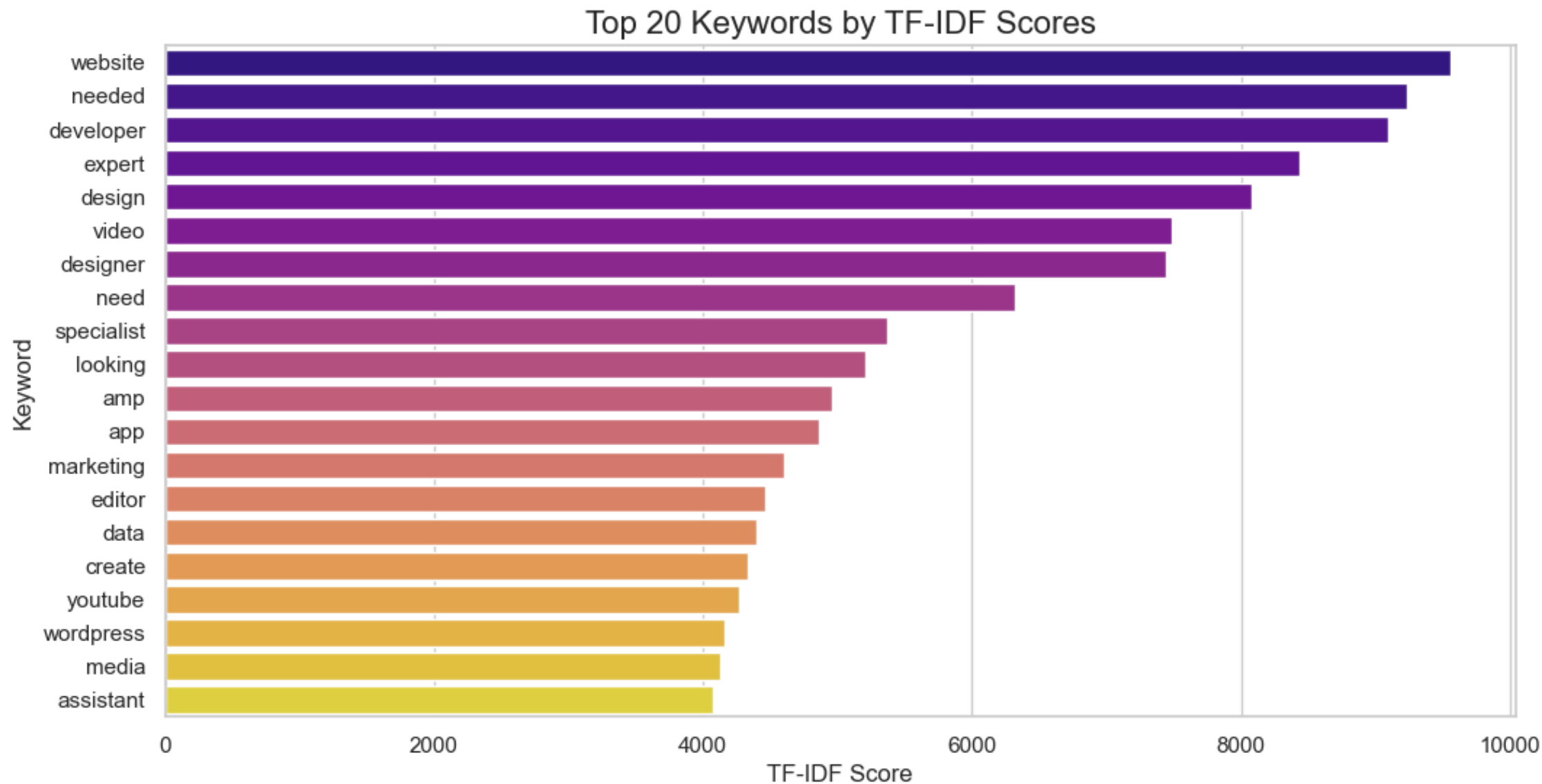
- • - High TF-IDF Scores: "Website" and "needed" rank highest, reflecting their specificity in job titles.
- • - Technical Skills: Keywords like "developer," "design," and "video" emphasize demand for tech and creative roles. Specialized Expertise: Terms such as "specialist" and "expert" highlight a need for niche professionals.
- • - Content and Marketing: Words like "marketing," "YouTube," and "WordPress" show focus on digital content creation.
- •

Task 1: Analyzing Keywords and Salaries

Top Keywords by Average Salary
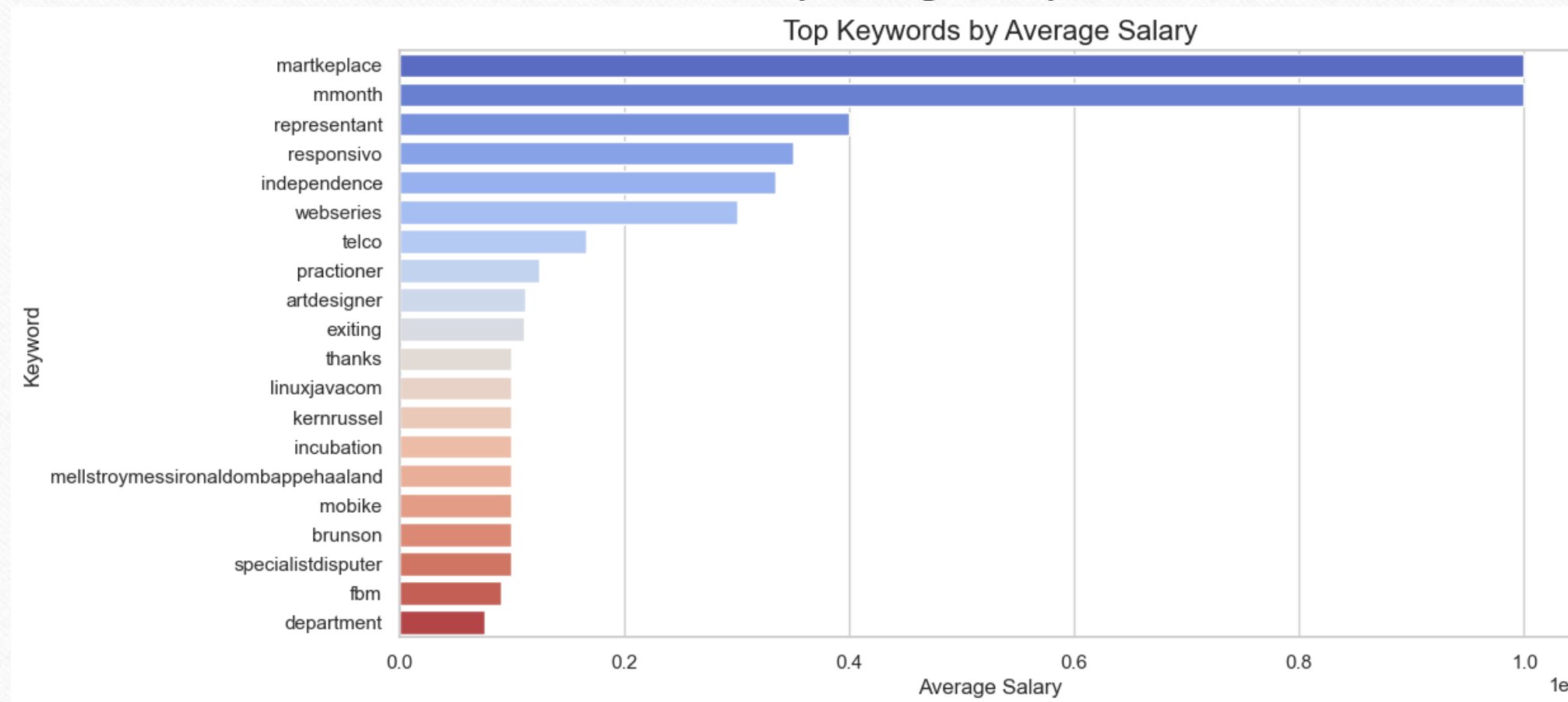
•**High-Salary Keywords**: Niche roles like marketplace and month offer high earnings.
•**Earning Potential**: Keywords such as representative signal lucrative opportunities.
•**Emerging Roles**: Unconventional terms like webseries suggest growing job markets.
•**Generalized Roles**: Keywords like department reflect less lucrative, broader roles.

Correlation Analysis

Keyword-Salary Correlations
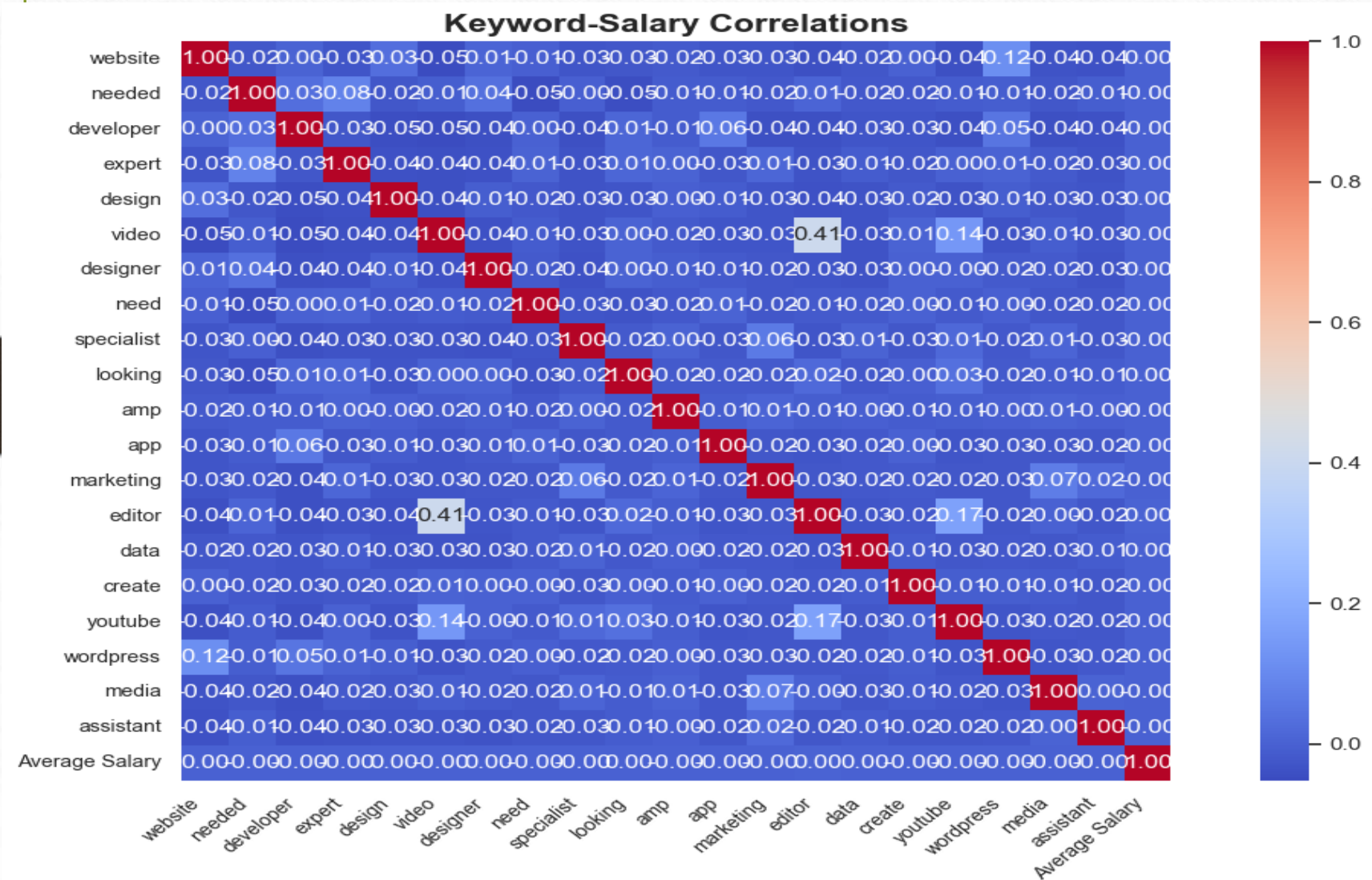
- **Low Salary Correlation**: Most keywords show weak links to salary, implying broader factors at play.
- **Positive Correlation**: Terms like "Editor" and "Design" show moderate correlation (~0.41), linking them to higher salaries.
- **Negligible Impact**: Keywords like "Website," "Developer," and "Marketing" have minimal or no salary correlation.
- **Key Insight**: Specialized skills, such as editing and design, may have a stronger influence on salary.
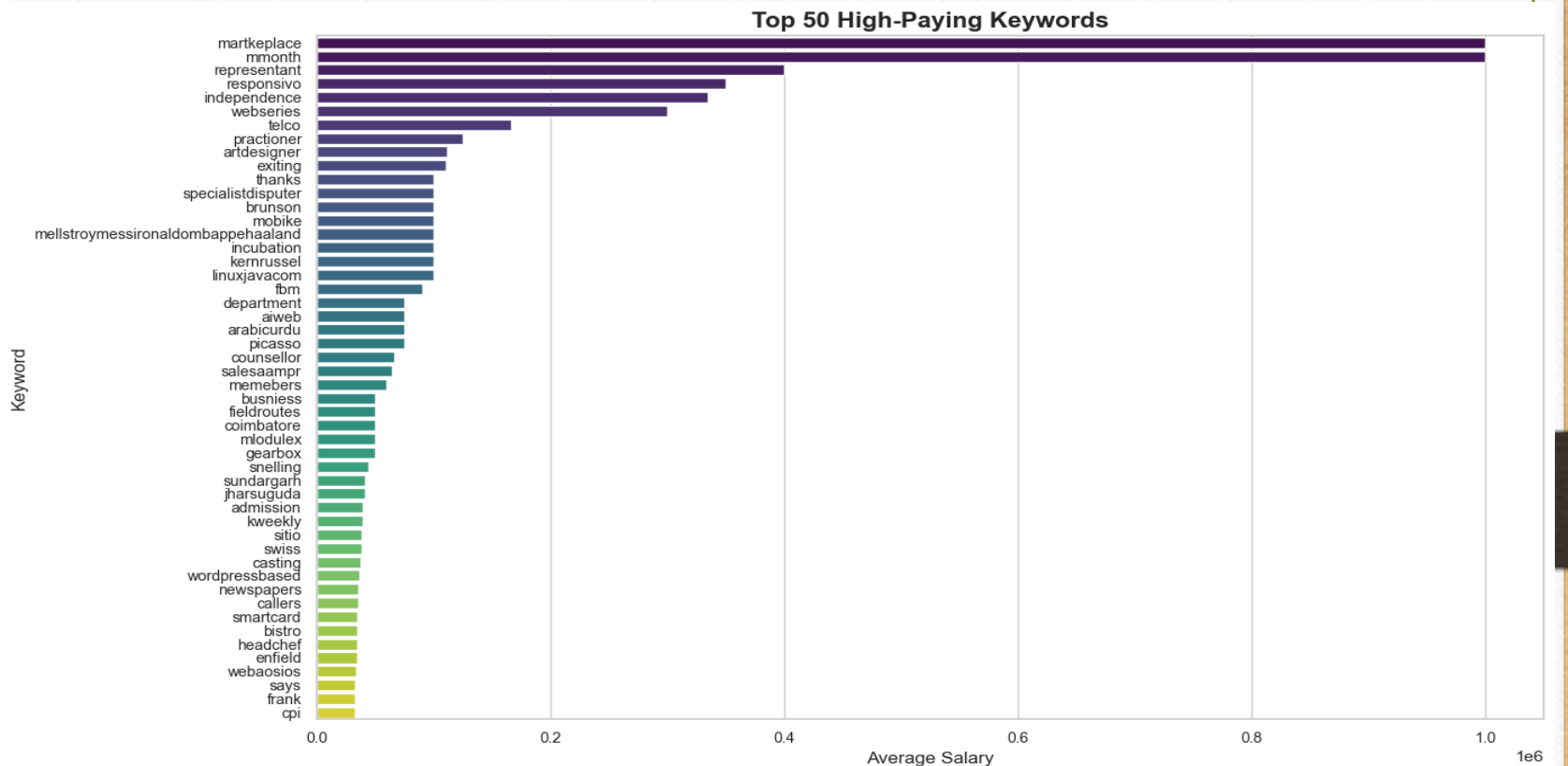
Word Cloud For The Most Frequent Keywords

Top 50 High-Paying Keywords

This word cloud highlights frequently used terms in project or task postings, emphasizing "website," "developer," "needed," "expert," and "design," suggesting high demand for web-related expertise and creative roles.
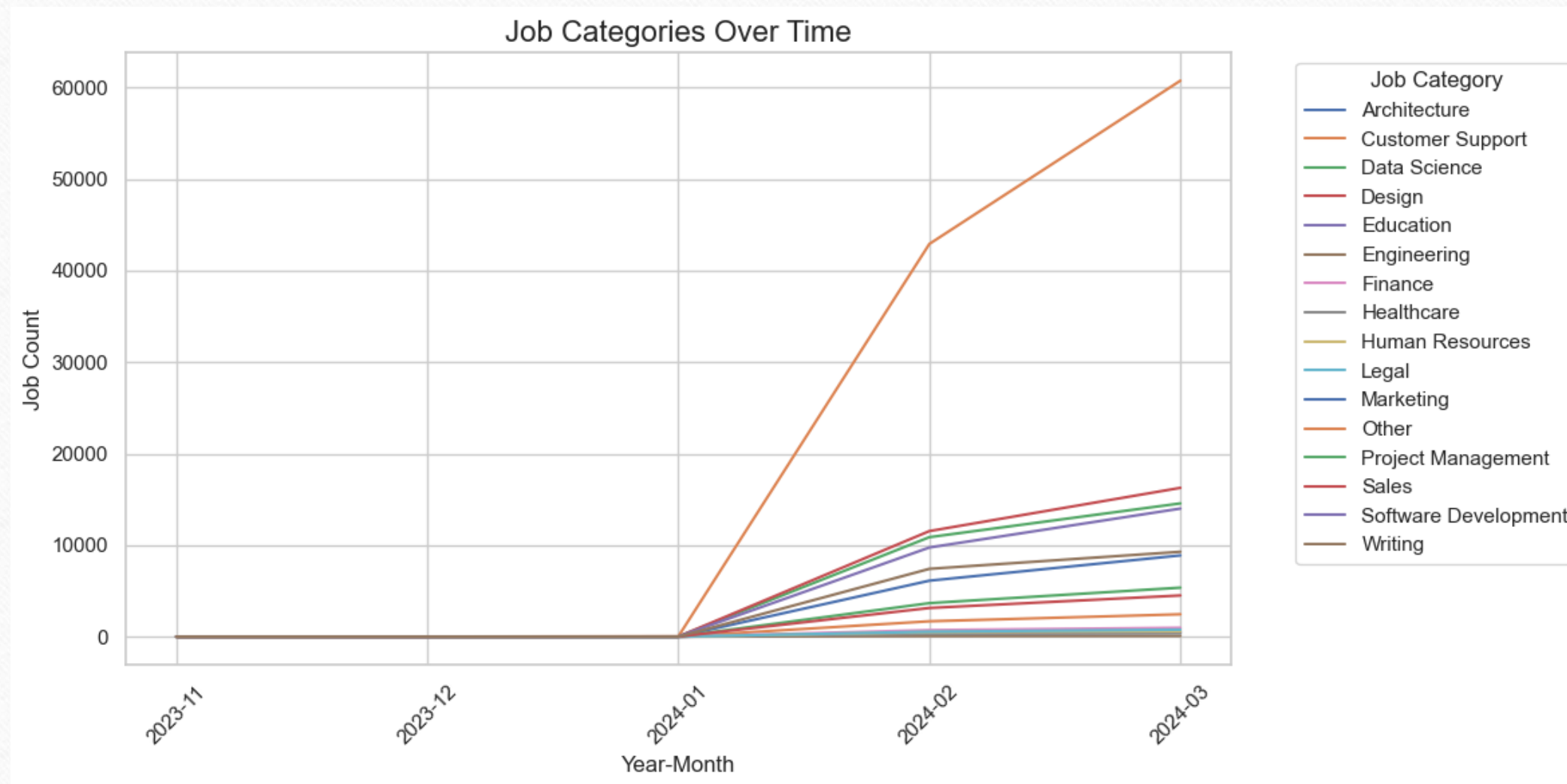
- **Top-Paying Keywords**: Terms like "marketplace" and "representant" signal high salaries, with niche roles and tech-focused keywords like "linuxjavacom" also emerging.
- **Geographic Insights**: Place-based keywords like "sundargarh" highlight high-salary roles tied to specific locations.
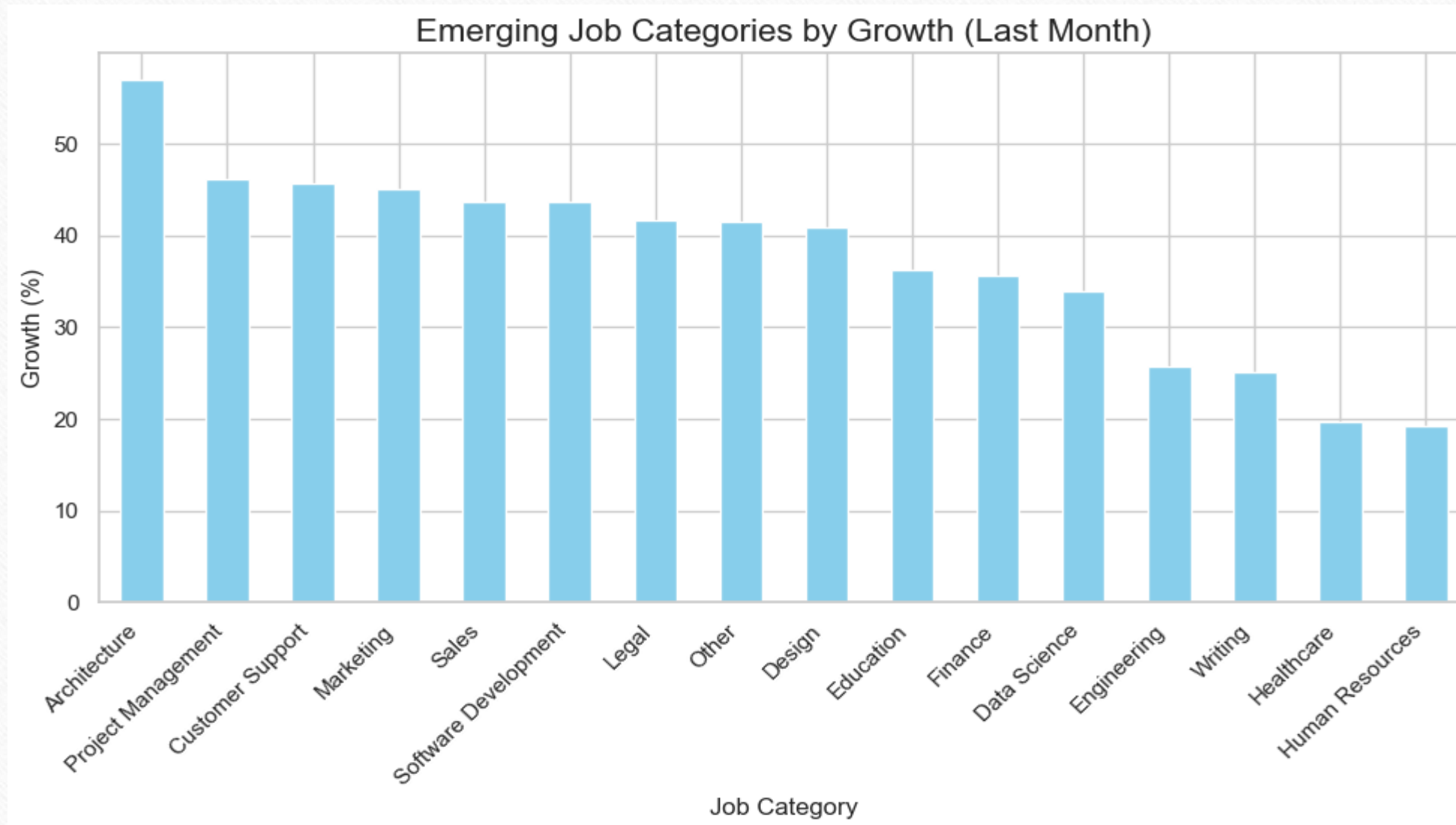
Task 2: Identifying Emerging Job Categories

The chart shows the growth in job postings across various categories over time, with Software Development experiencing a significant surge from January to March 2024. Other categories show steady but smaller increases, reflecting broader demand trends.

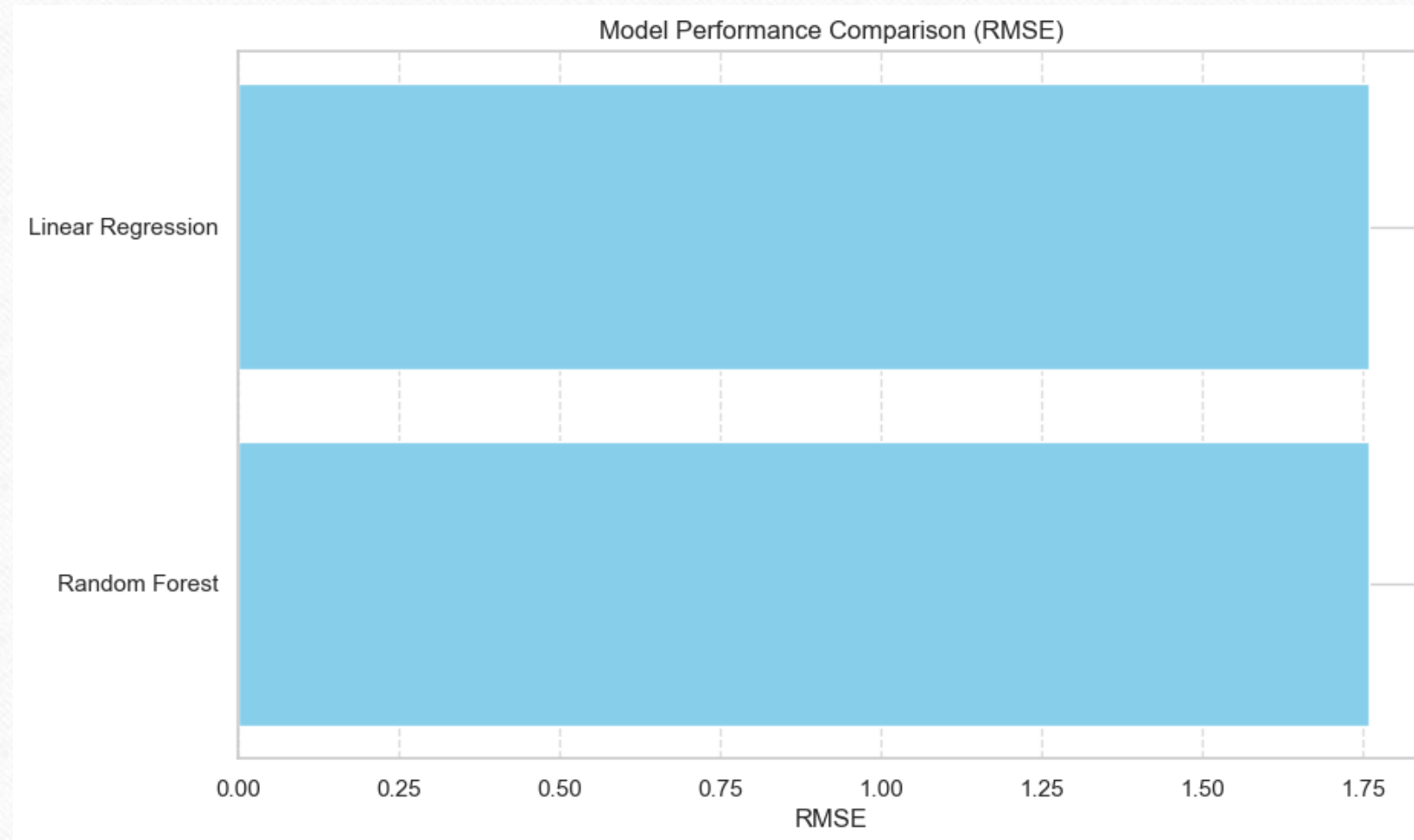Emerging Job Categories by Growth (Last Month)

The bar chart highlights **Architecture** and **Project Management** as the fastest-growing job categories in the last month, with over 50% growth. Other fields like **Customer Support**, **Marketing**, and **Software Development** also show significant upward trends.
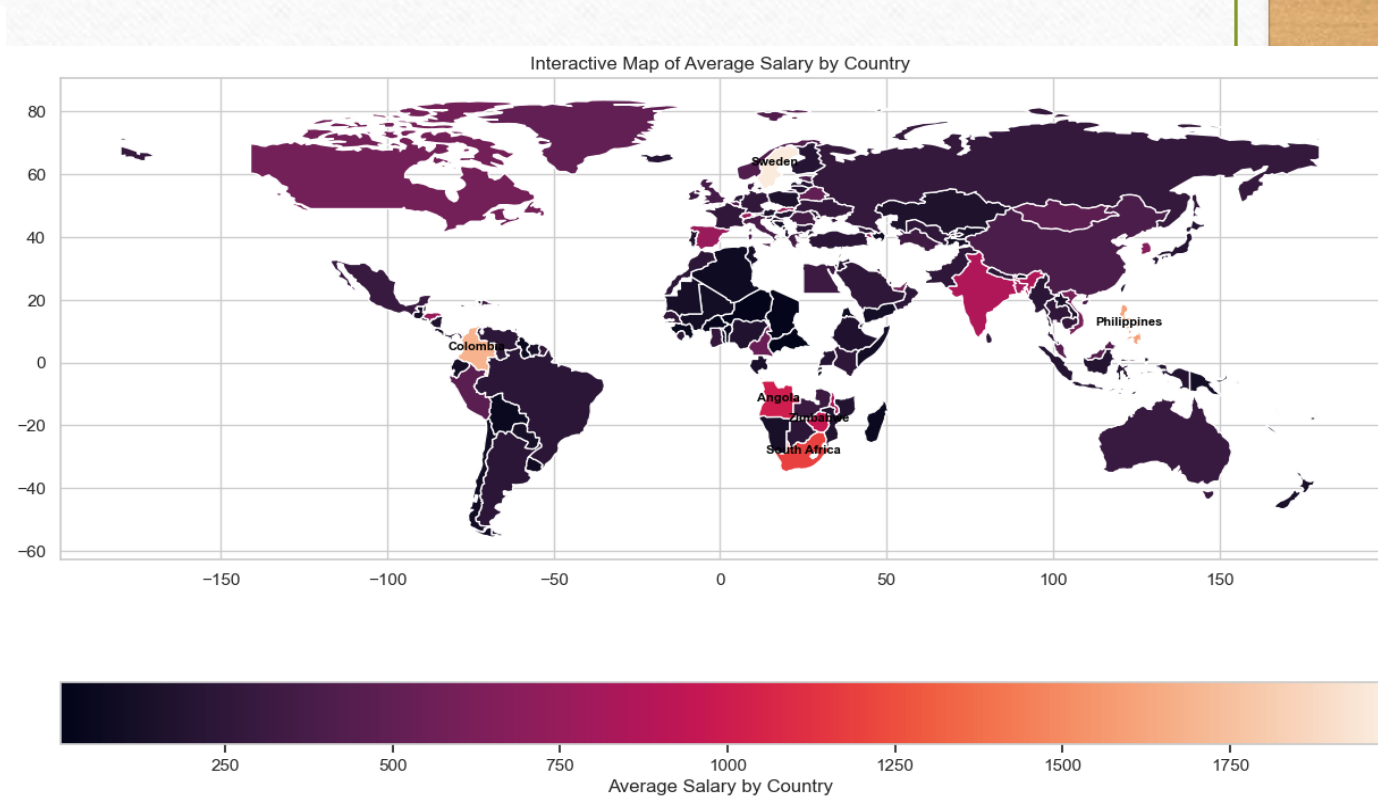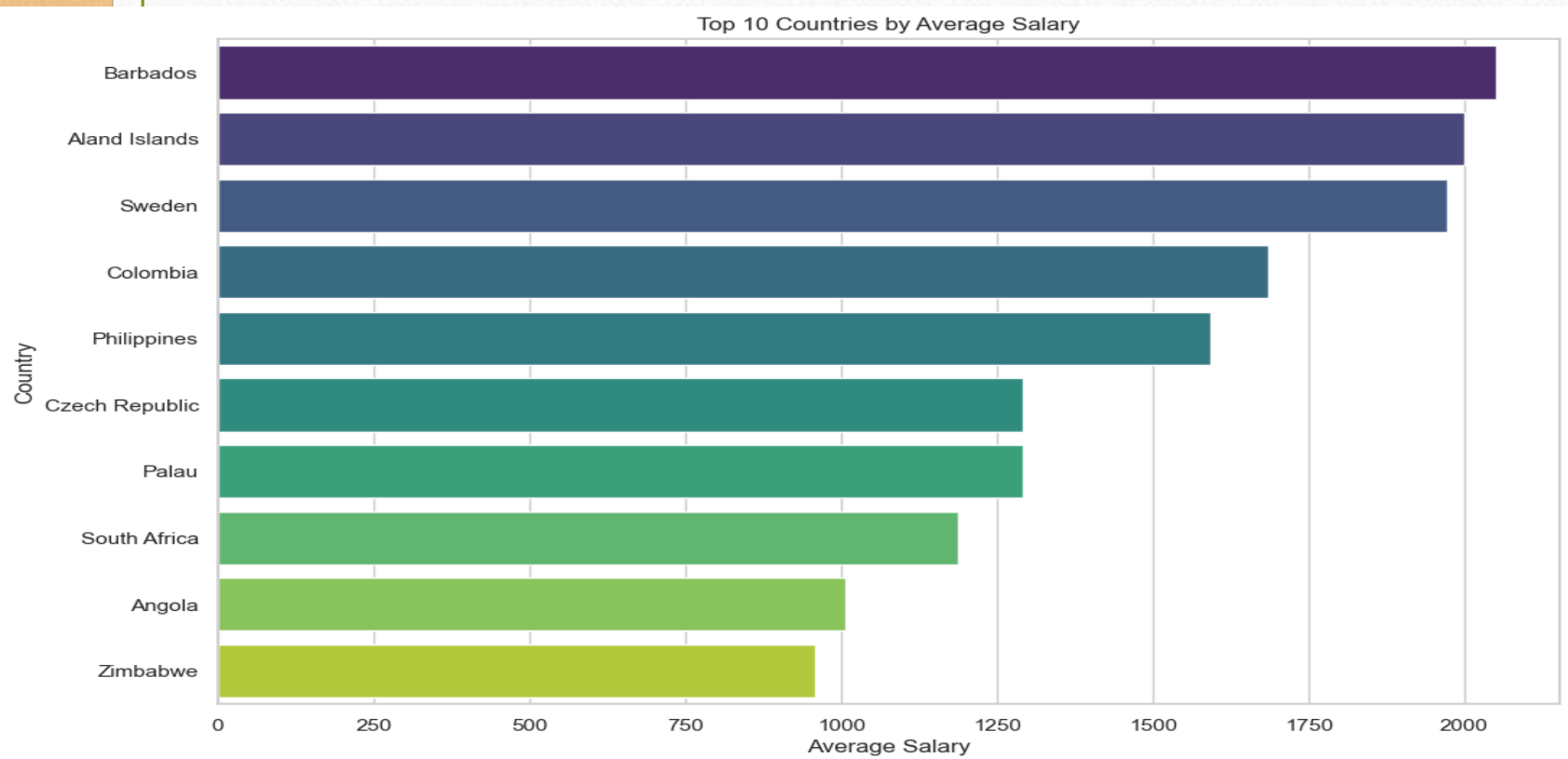
Task 3: Forecasting High-Demand Roles

Both **Random Forest** and **Linear Regression** models exhibit identical performance with an RMSE of **1.7586**, indicating no significant difference in predictive accuracy for the given dataset.

# Task 4: Comparative Salary Analysis by Region

This chart depicts the top 10 countries ranked by average salary, showcasing that Barbados leads, followed by Åland Islands and Sweden. The graph highlights variations in income levels across these countries, emphasizing economic disparities globally.

Remote Work Trends Analysis

Remote Work Trends Over Time

Forecasted Remote Work Trends
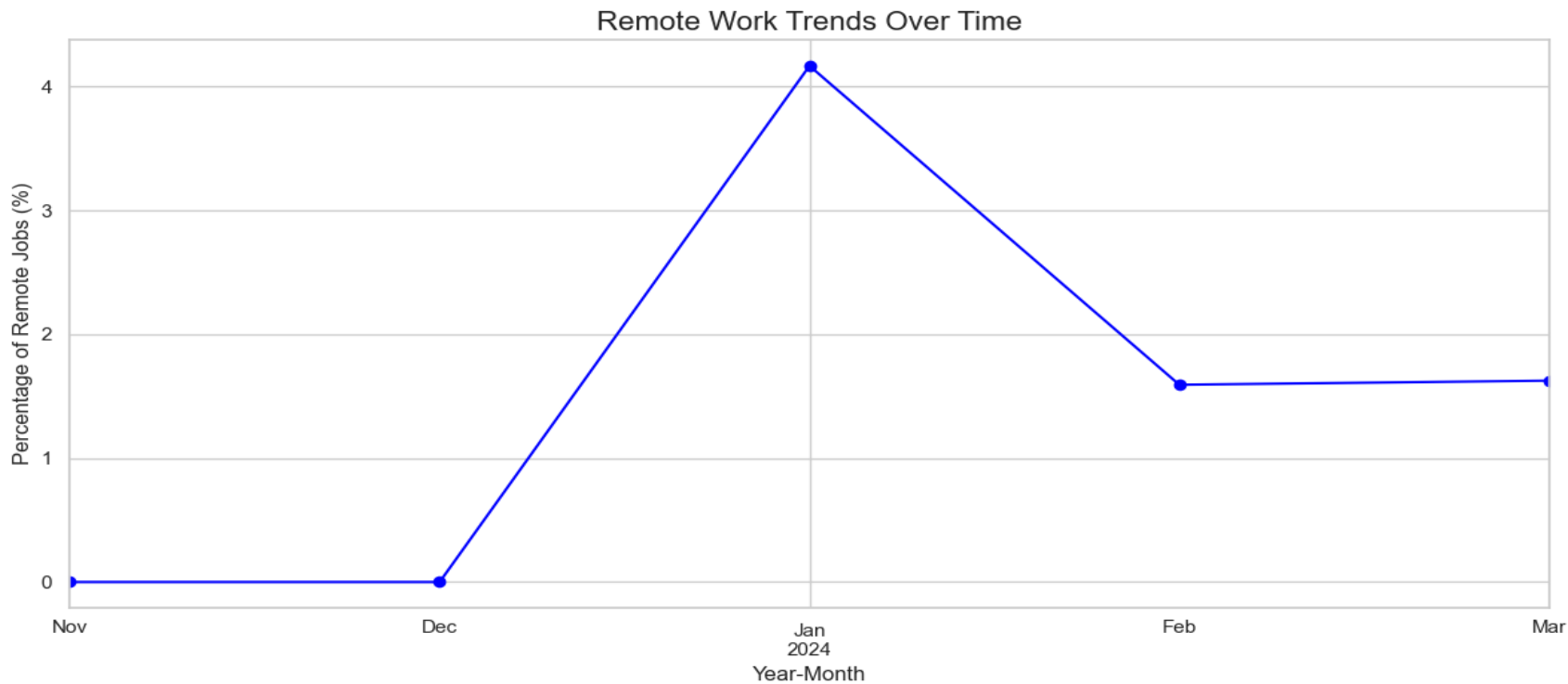
The graph illustrates the trends in remote job percentages over time, with a significant peak in January 2024, followed by a decline and stabilization in February and March. This indicates a temporary surge in remote work opportunities at the start of the year.
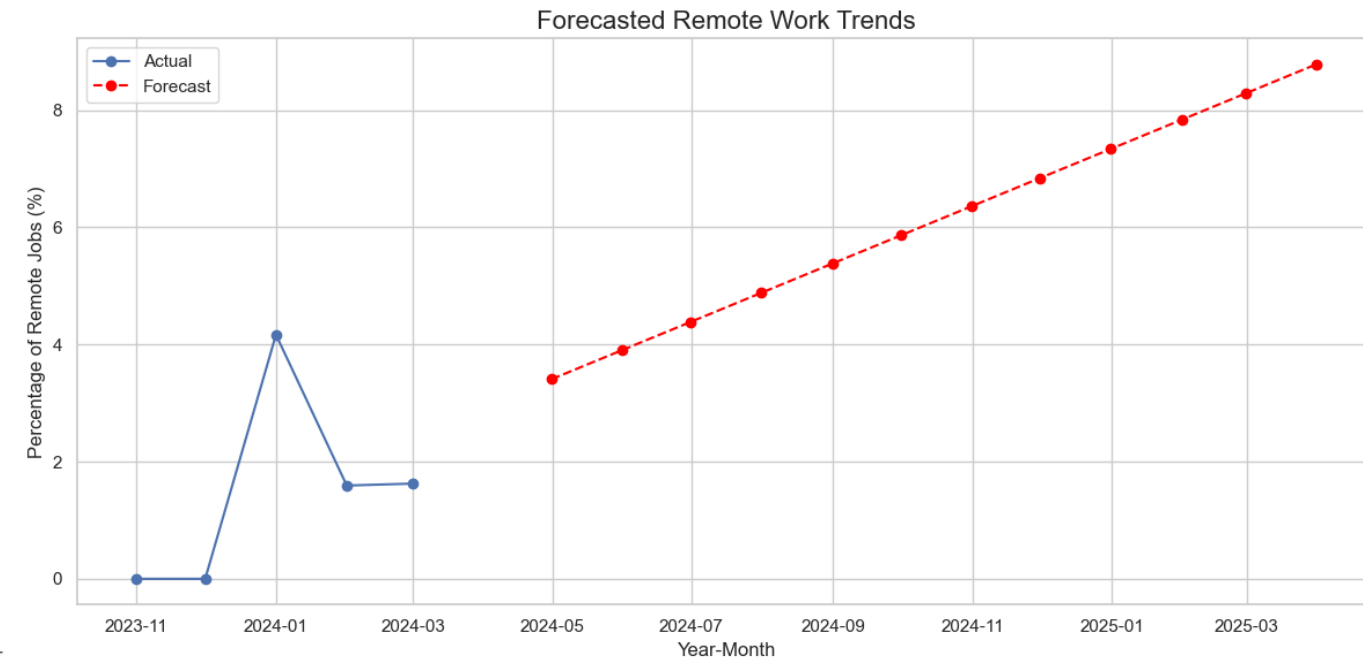
The chart shows actual remote work trends until early 2024, with a peak in January, followed by a stabilization. The forecast suggests a steady increase in remote job percentages from mid-2024 to early 2025, highlighting a growing adoption of remote work.
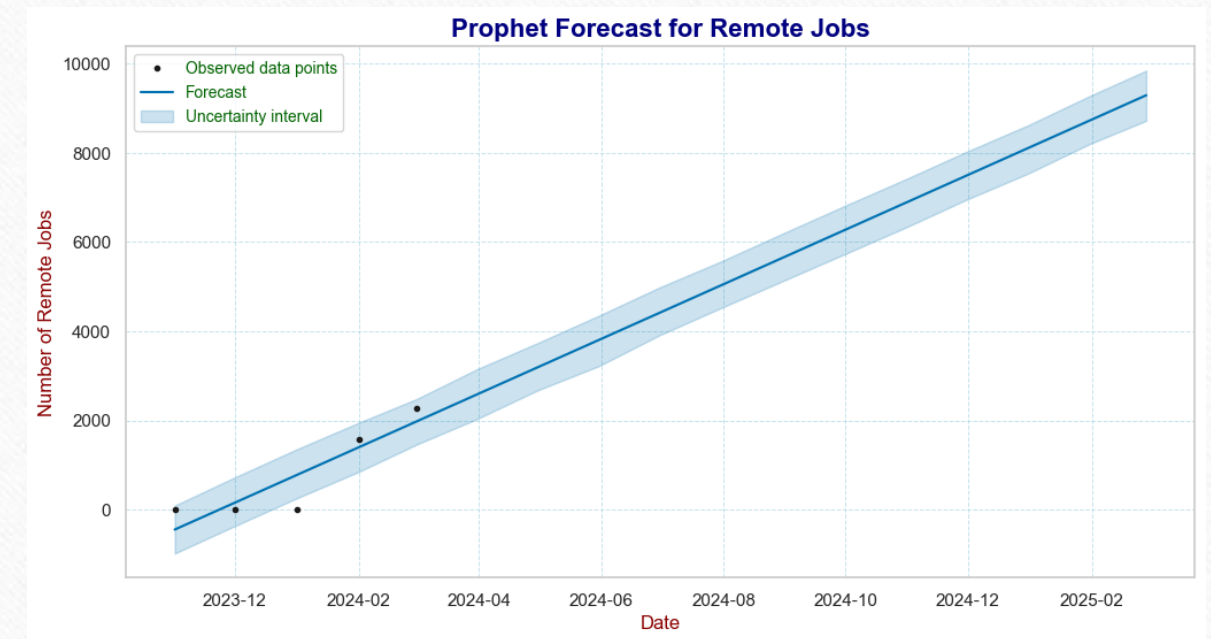
Models Used for Forecasting

ARIMA (Autoregressive Integrated Moving Average)

Time series forecasting model. Suitable for predicting trends in job openings and remote work.
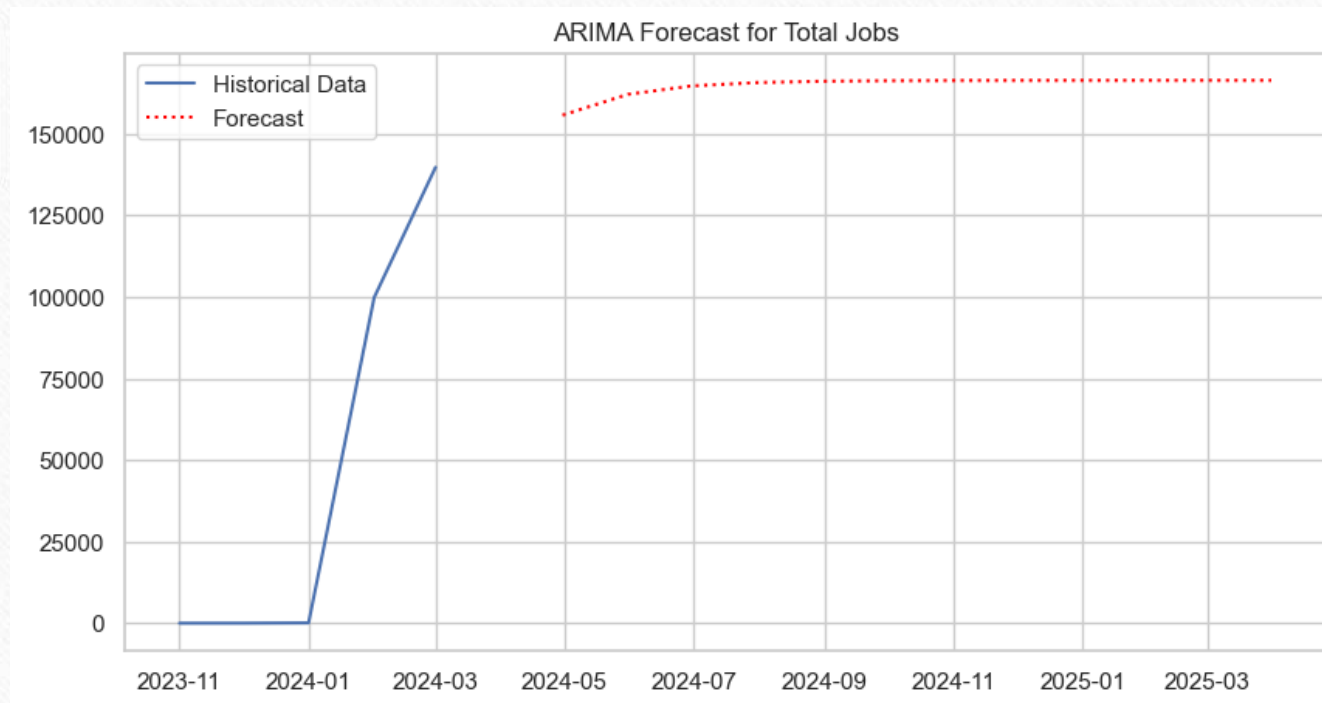
Prophet

Developed by Facebook for forecasting time-series data. Robust to missing data and outliers. Ideal for seasonal trends in the job market.

OUTPUTS IN STREAMLIT

Input Your Preferences

☑ Update Model with Current Data

Enter your skills (comma-separated):

Python, Data Science

Preferred Location:

United States

Minimum Hourly Rate:

30   −   +

Maximum Hourly Rate:

100   −   +

Minimum Budget:

0   −   +

Personalized Job Recommendation Engine

Input Your Preferences

☑ Update Model with Current Data

Enter your skills (comma-separated):

Python, Data Science

Preferred Location:

United States

Minimum Hourly Rate:

30   —   +

Maximum Hourly Rate:

100   —   +

Minimum Budget:

0   —   +

Recommended Jobs for You

	title	country	hourly_low	hourly_high
40,915	Python Developer for AI Data Science Project	United States	30	80
70,356	Marketing Modeling A/B Testing and Data Science	United States	40	75
110,423	Science Writer & Editor	United States	43	65
14,878	AI Applications & Data Science Engineer	United States	40	60
171,126	Python Developer	United States	30	50
78,462	Python Developer	United States	30	50
96,599	Python Developer (US only)	United States	50	80
34,904	Comp Data	United States	45	75
204,356	Full-Stack Developer, Data Science, Machine Learning & AI	United States	60	80
149,220	Data engineering with Python	Canada	40	60

Preferences saved successfully!

Key Insights from Forecasting

Remote Jobs

Remote work is projected to continue growing, becoming a larger share of total job openings.

Salary Trends

Salaries in tech and healthcare are expected to rise due to increasing demand. Remote job salaries show slight growth due to the competitive job market.

Job Categories

High-demand sectors, such as technology, healthcare, and data science, are expected to lead in job creation.
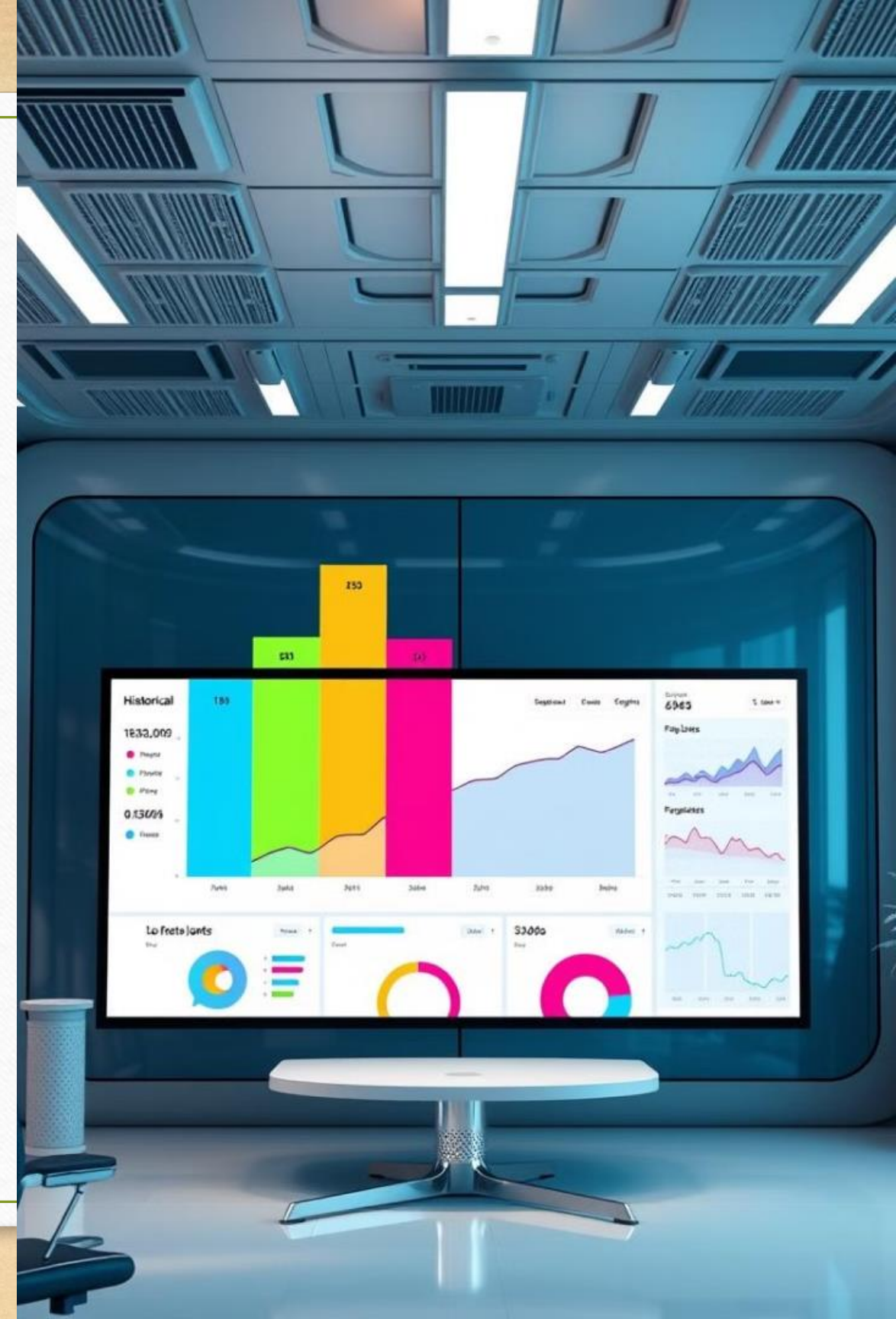
Recommendations

For Job Seekers

Target roles in high-growth sectors, such as technology, data science, and healthcare. Focus on improving skills related to remote work and digital transformation.

For Employers

Invest in remote work infrastructure. Upskill your workforce to meet future demands.

For Policymakers

Support upskilling initiatives and provide resources for career transitions. Invest in remote work-friendly policies and digital skill training.