Global Software Industry Insights: Developer Survey Analysis

A Comprehensive Study on Trends Related to Wages, Satisfaction, Remote Work, Technology, etc. n

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Executive Summary

(Objective):

This report analyzes the Stack Overflow Developer Survey data to identify key trends in the software industry. The study focuses on salary distributions, the correlation between experience and income, and the impact of education on employment.

(Key Findings):

Our analysis reveals a strong positive correlation (0.41) between professional experience and annual compensation. Furthermore, we identified that remote work preferences vary significantly across different developer roles, with Data Analysts and Back-end developers showing the highest flexibility.

(Conclusion):

The findings suggest that while formal education remains a strong pillar for full-time employment, continuous skill development in emerging technologies and adaptation to hybrid work models are essential for long-term career growth.

Table of Contents

Technical Infrastructure & Data Acquisition

API Development: Built a custom Flask REST API to filter and serve job dataset (JSON) based on dynamic parameters (Location, Skills).

Web Scraping: Automated data collection using BeautifulSoup to extract real-time programming language popularity and salary benchmarks.

Database Management: Leveraged SQLite to manage over 80,000+ survey responses, ensuring efficient querying for large-scale analysis.

Tools Used: Python (Numpy,Pandas, Requests), Regex for pattern matching, and Excel/CSV for automated reporting.

Data Cleaning & Preprocessing

Outlier Detection: Identified extreme salary values (e.g., $16M+) using Box Plots to prevent statistical bias.

Data Filtering: Focused on the 95th percentile ($10k - $300k range) to represent the actual professional market.

Normalizations: Applied Z-Score and Min-Max Scaling to bring disparate compensation metrics into a comparable scale.

Categorical Cleaning: Simplified 50+ job roles and 20+ education levels into 5 core categories for meaningful visualization.

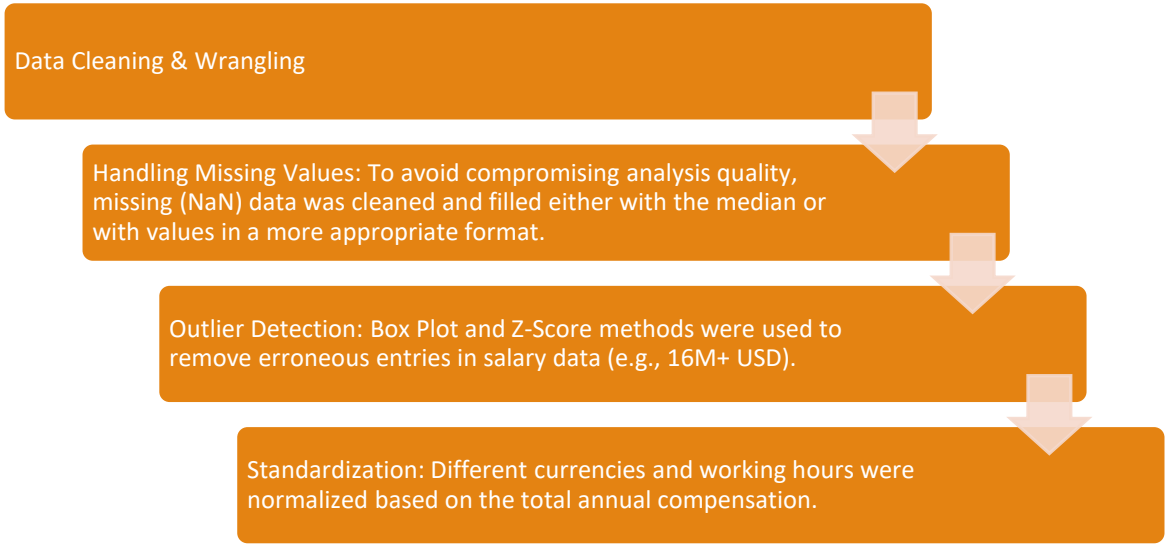
Methodology & Data Engineering

Data Collection (Data Acquisition)

Flask API Integration: Job postings are monitored in JSON format by setting up a local server via Jobs_API.ipynb.

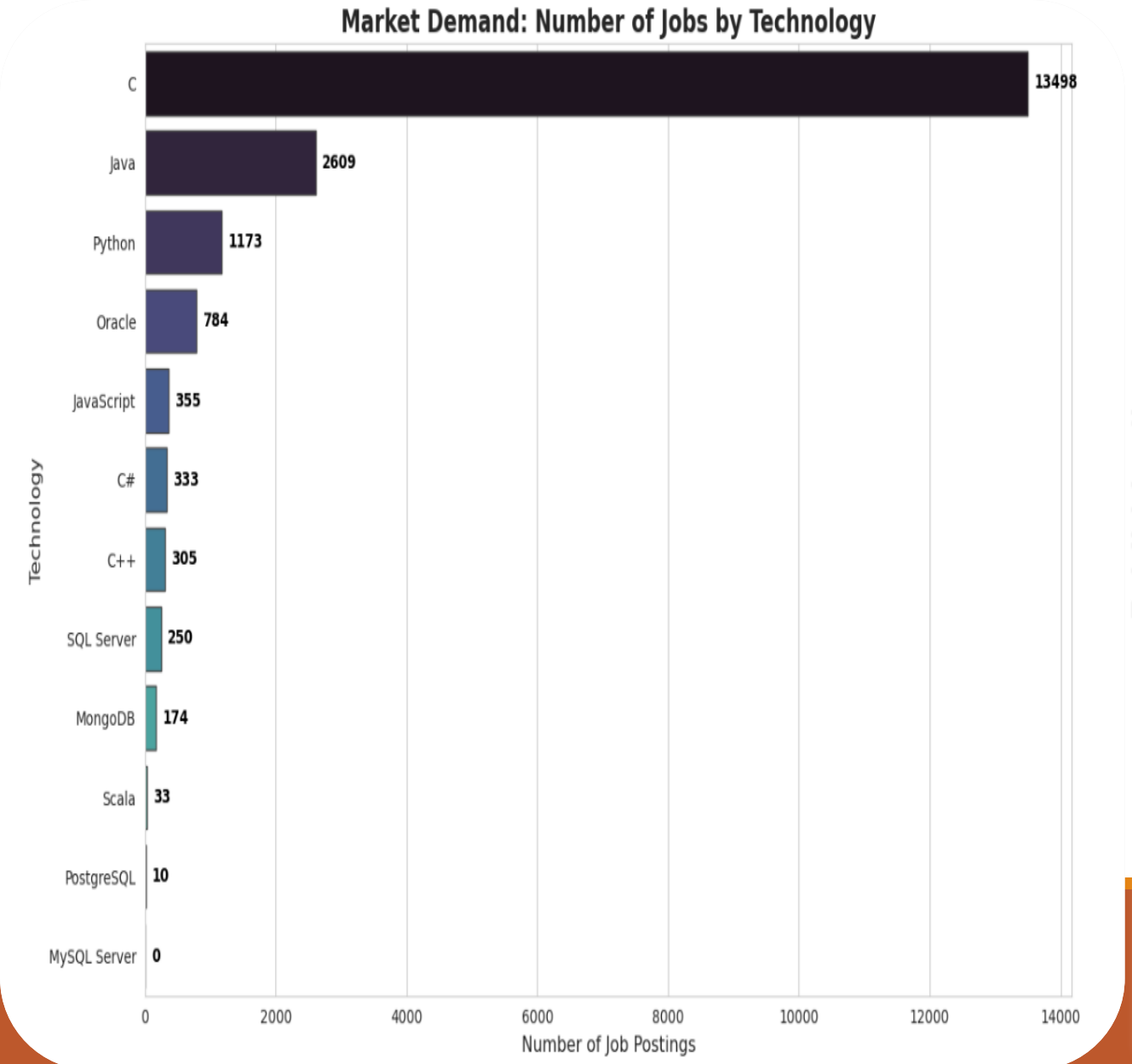
Web Scraping: Popular technology languages and trends are collected from live web resources using BeautifulSoup.

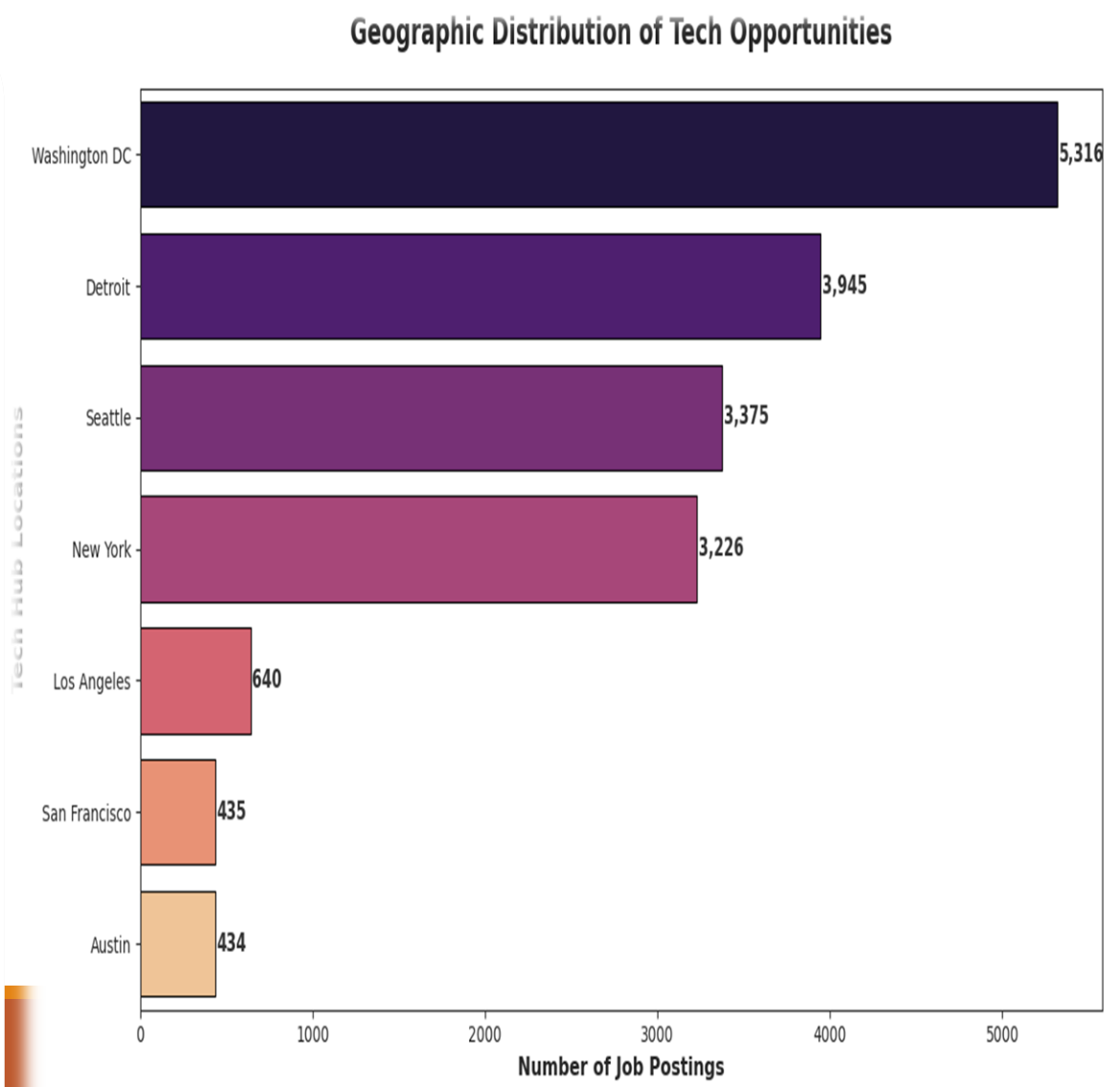
SQL Management: Stack Overflow survey data (80,000+ records) is transferred to an SQLite database for fast querying.



3. Tools & Technologies (Kullanılan Araçlar)

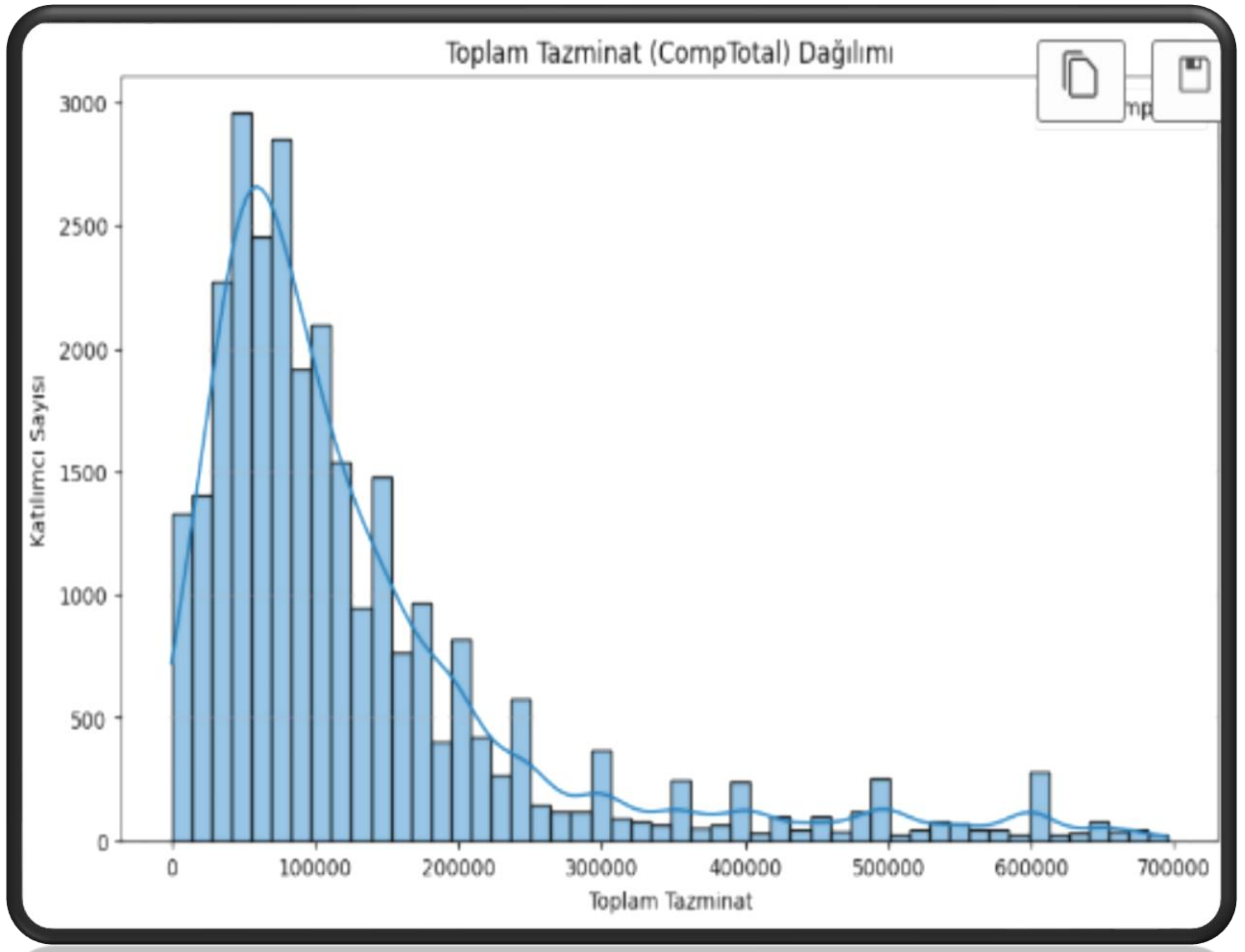
- **Programming:** Python (Pandas, Numpy, Requests).
- **Environment:** Jupyter Notebook & Flask Web Server.
- **Visualization:** Matplotlib, Seaborn ve Looker Studio.

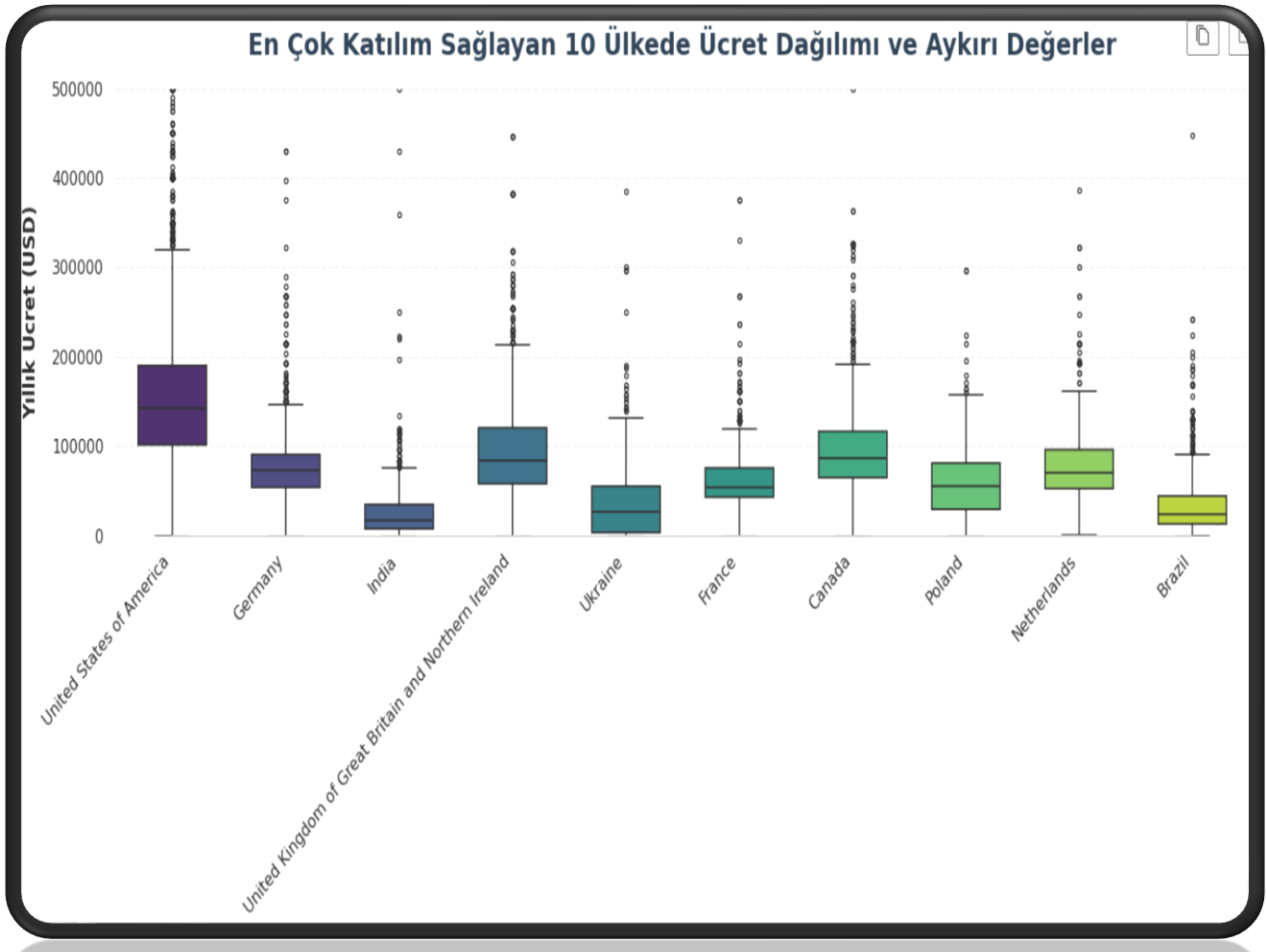




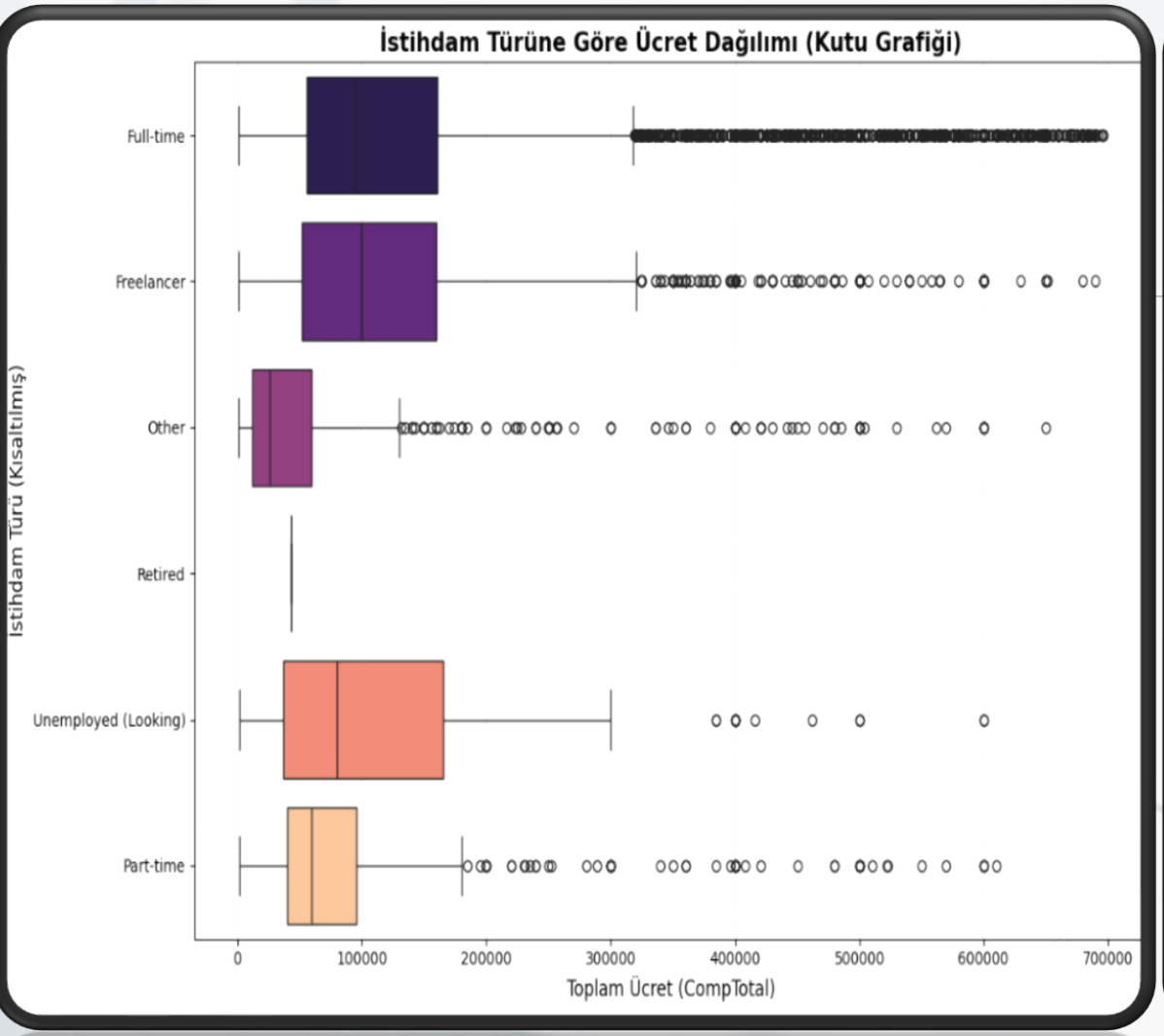
Note: Data programmatically sourced via custom-built Flask API (Jobs_API.ipynb) and exported to job-postings.xlsx.

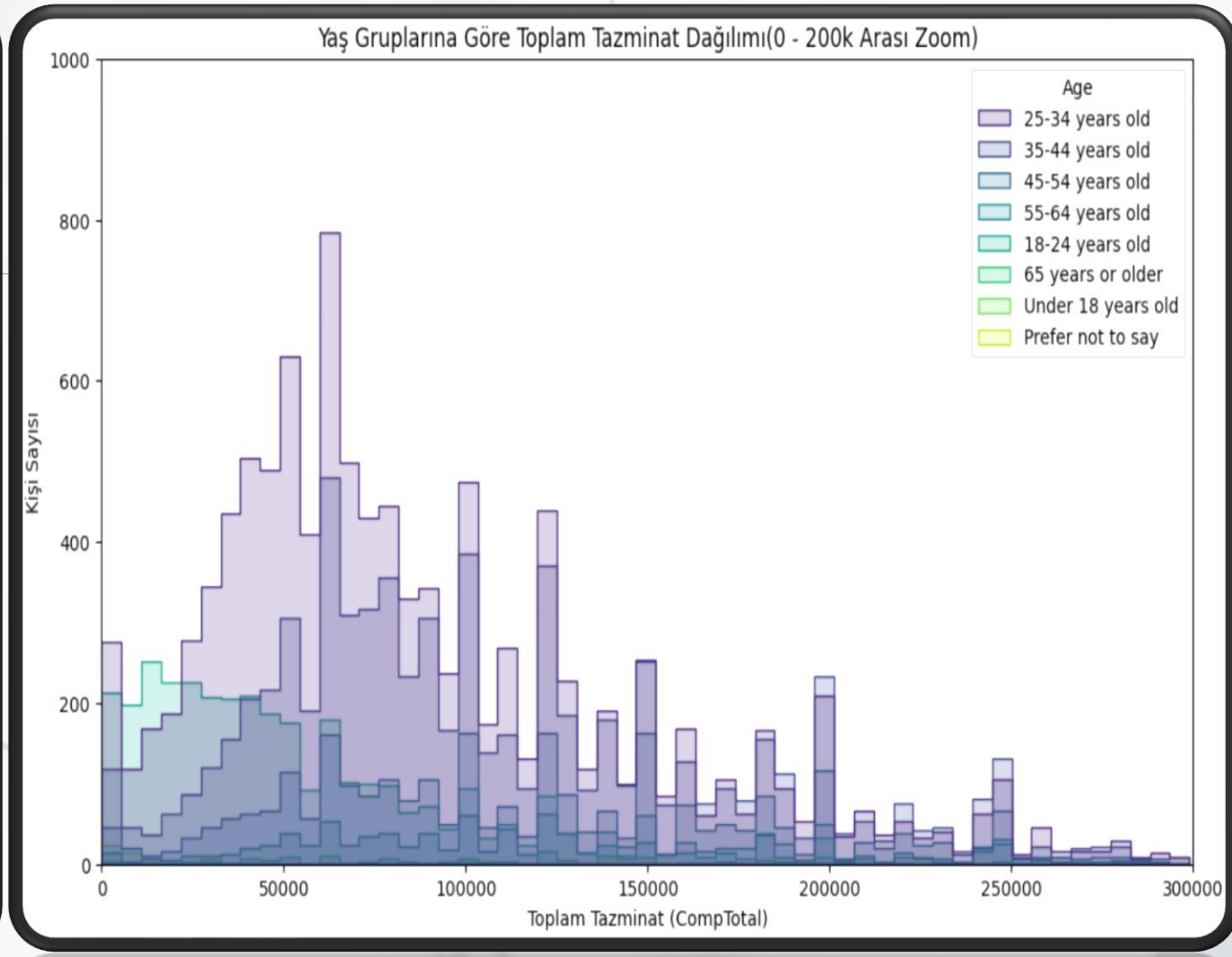
Job posting(Fast Api)

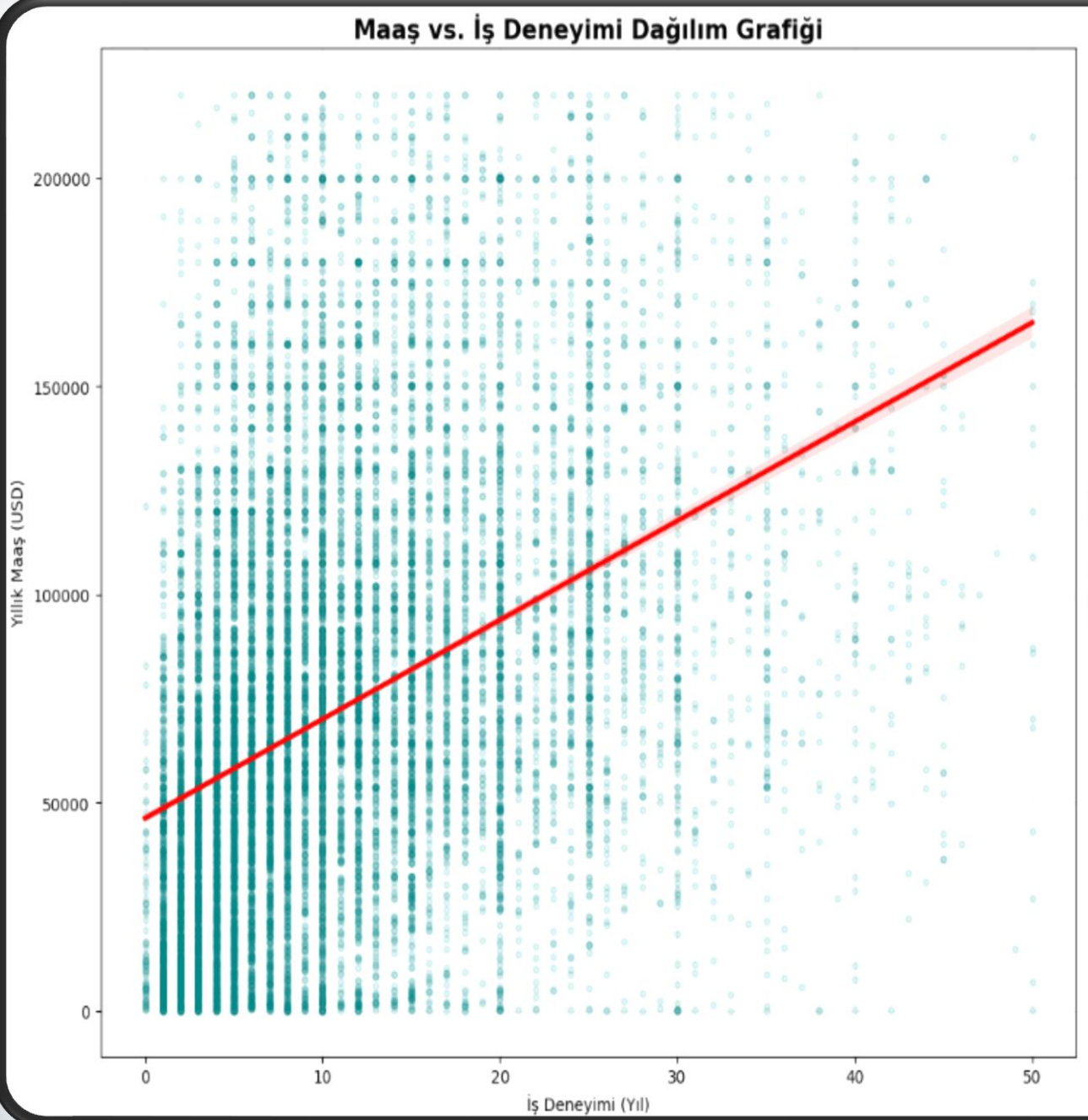


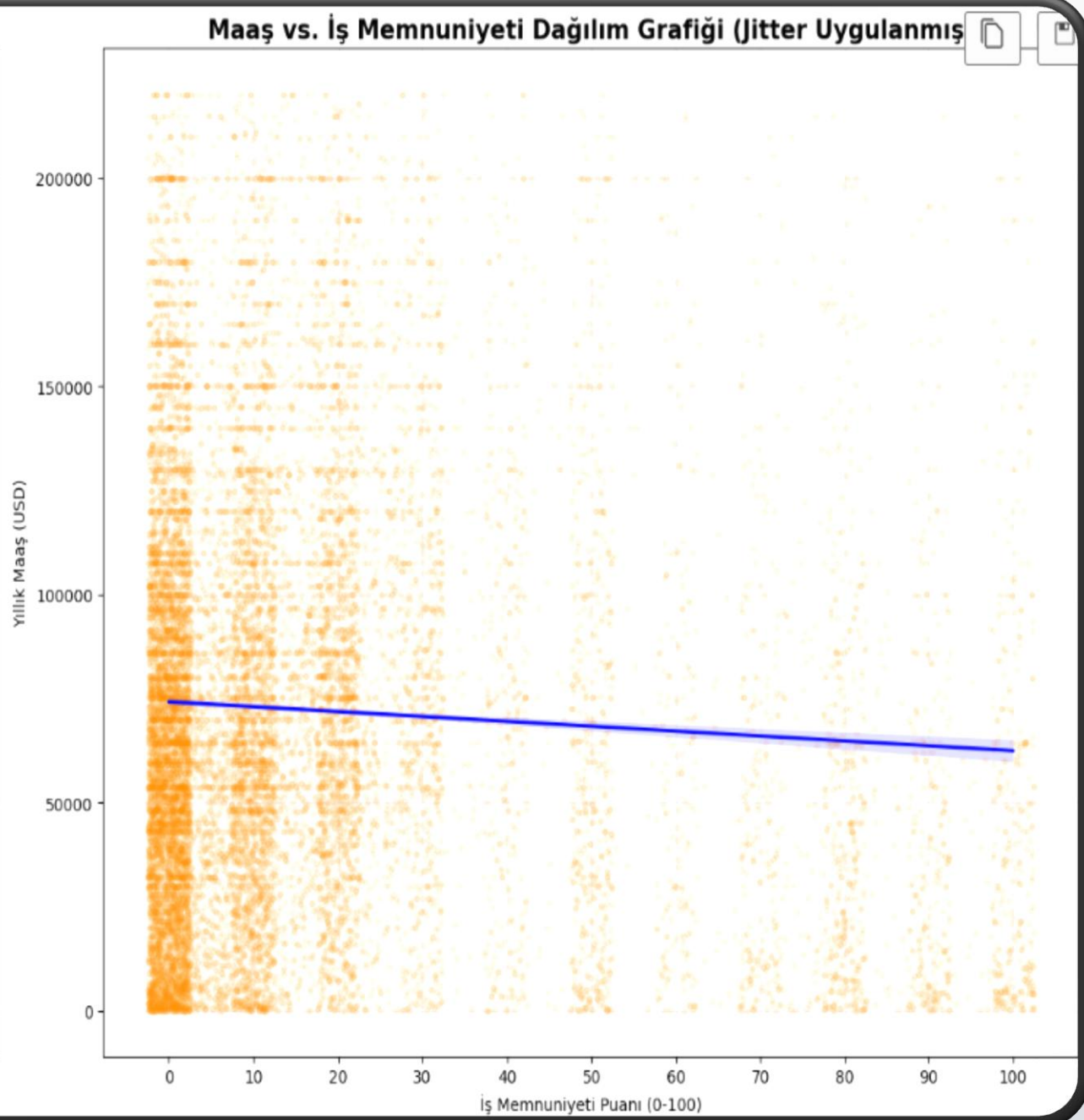


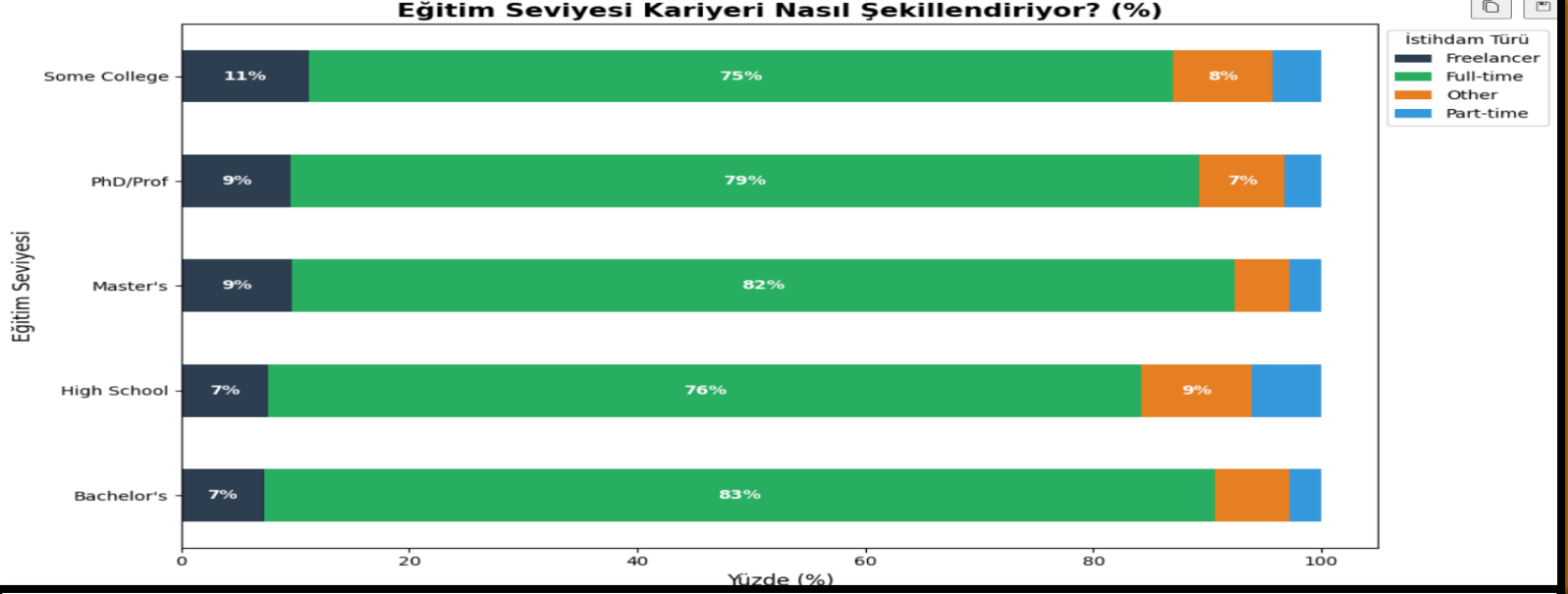
Economic Landscape & Compensation Analysis

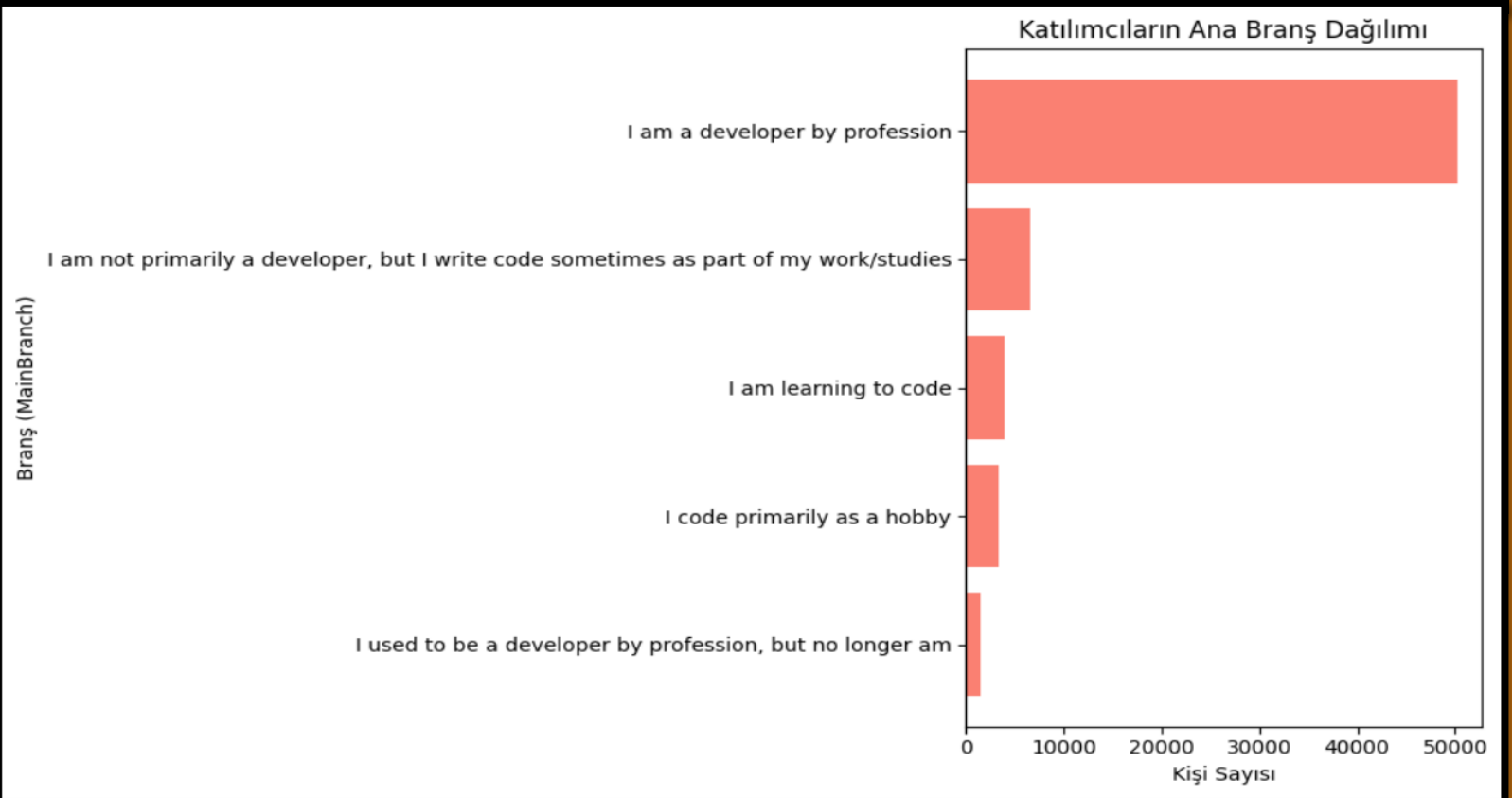

İstihdam Türüne Göre Ücret Dağılımı (Kutu Grafiği)
Full-time
Freelancer
Other
Retired
Unemployed (Looking)
Part-time
İstihdam Türü (Kısaltılmış)
0
100000
200000
300000
400000
500000
600000
700000
Toplam Ücret (CompTotal)


Yaş Gruplarına Göre Toplam Tazminat Dağılımı(0 - 200k Arası Zoom)
Age
25-34 years old
35-44 years old
45-54 years old
55-64 years old
18-24 years old
65 years or older
Under 18 years old
Prefer not to say
Kişi Sayısı
0
200
400
600
800
1000
0
50000
100000
150000
200000
250000
300000
Toplam Tazminat (CompTotal)

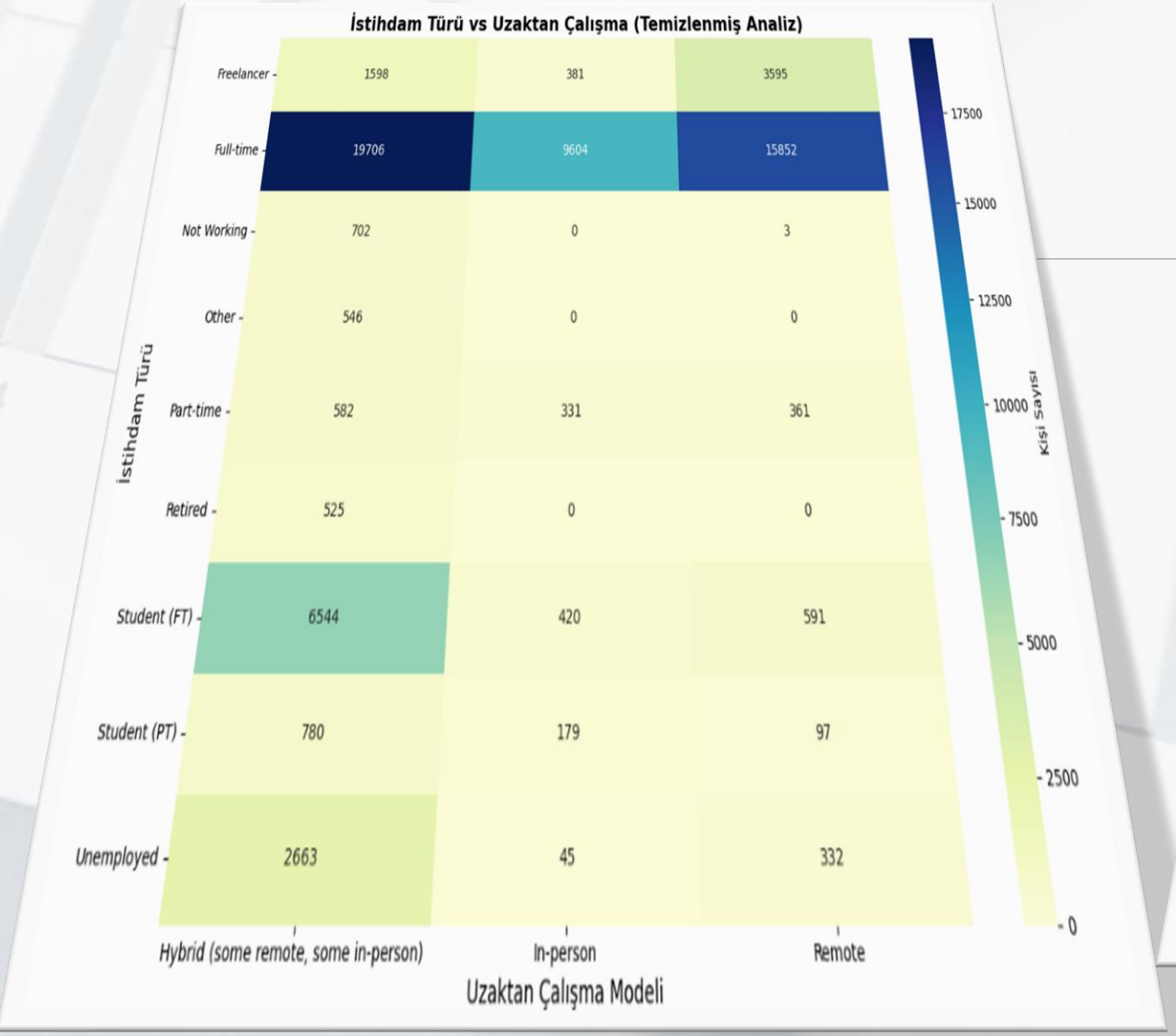

Maaş vs. İş Deneyimi Dağılım Grafiği
Yıllık Maaş (USD)
İş Deneyimi (Yıl)
0
50000
100000
150000
200000
0
10
20
30
40
50

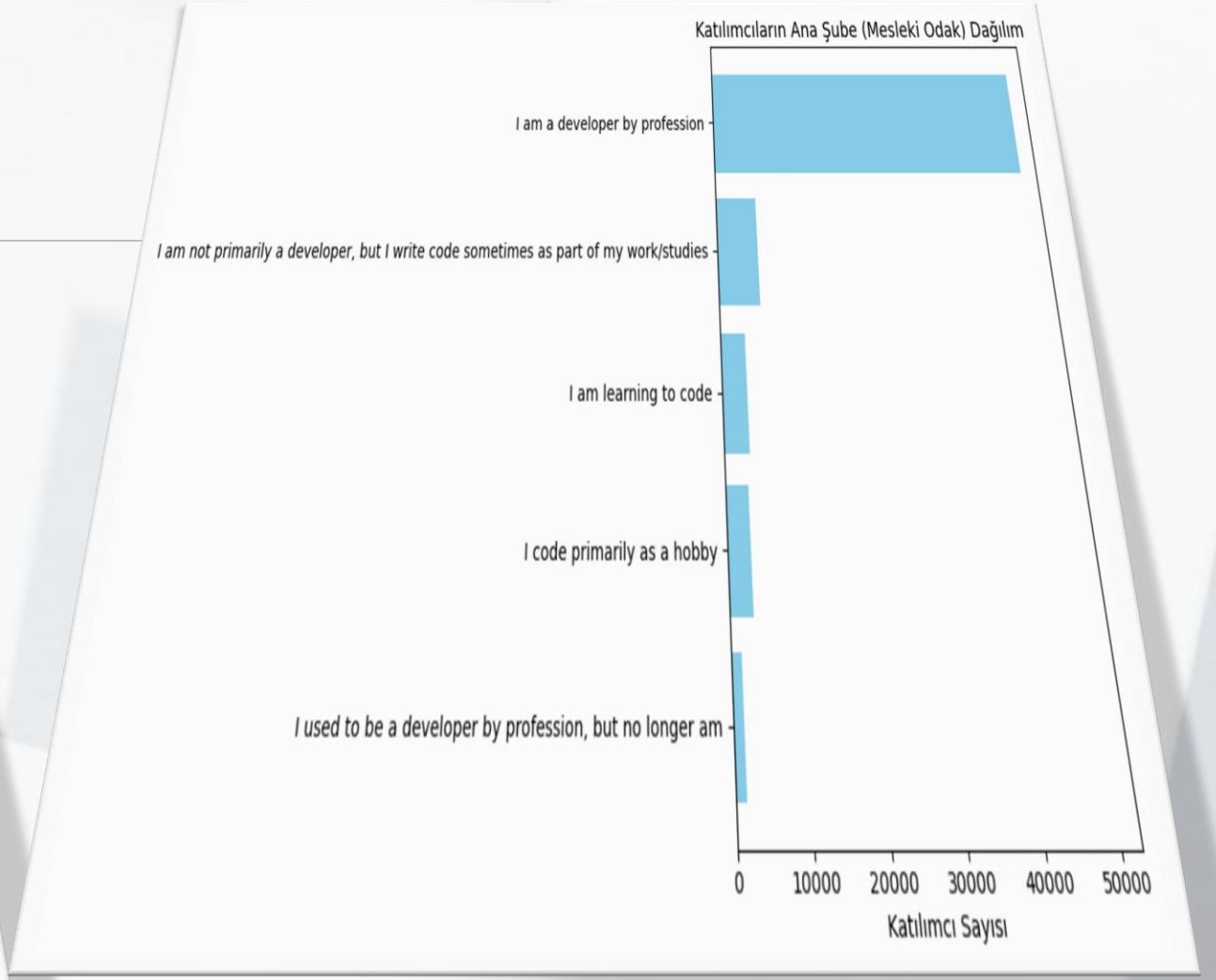

Maaş vs. İş Memnuniyeti Dağılım Grafiği (Jitter Uygulanmış
Yıllık Maaş (USD)
İş Memnuniyeti Puanı (0-100)
0
50000
100000
150000
200000
0
10
20
30
40
50
60
70
80
90
100



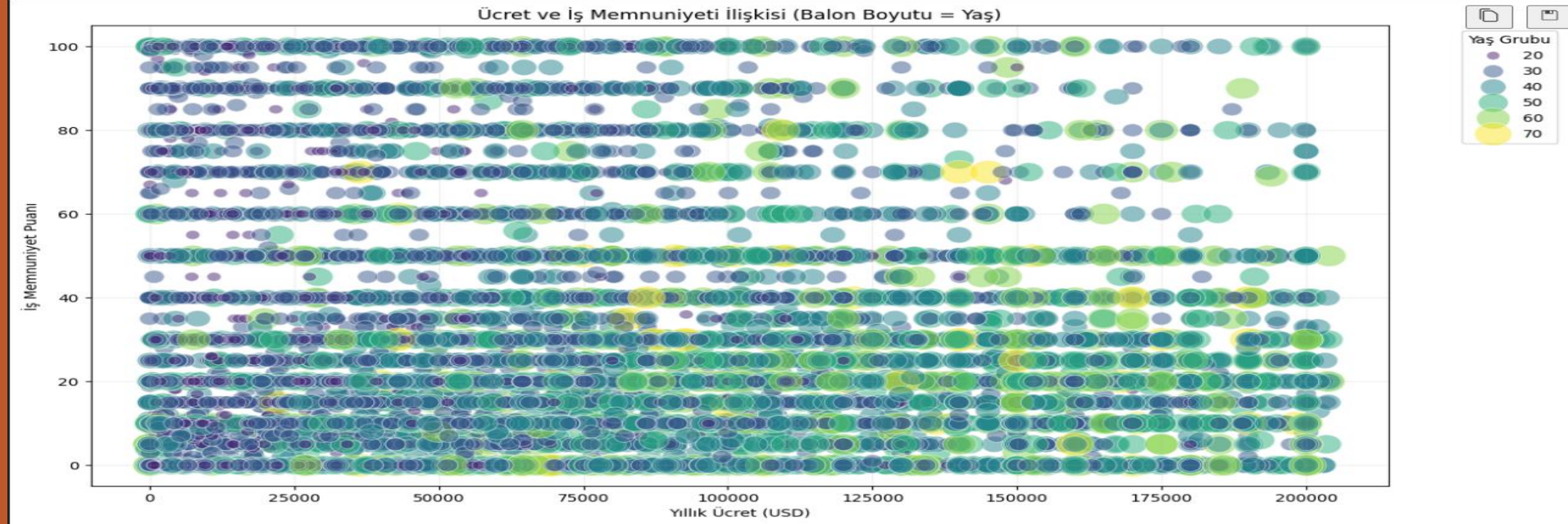


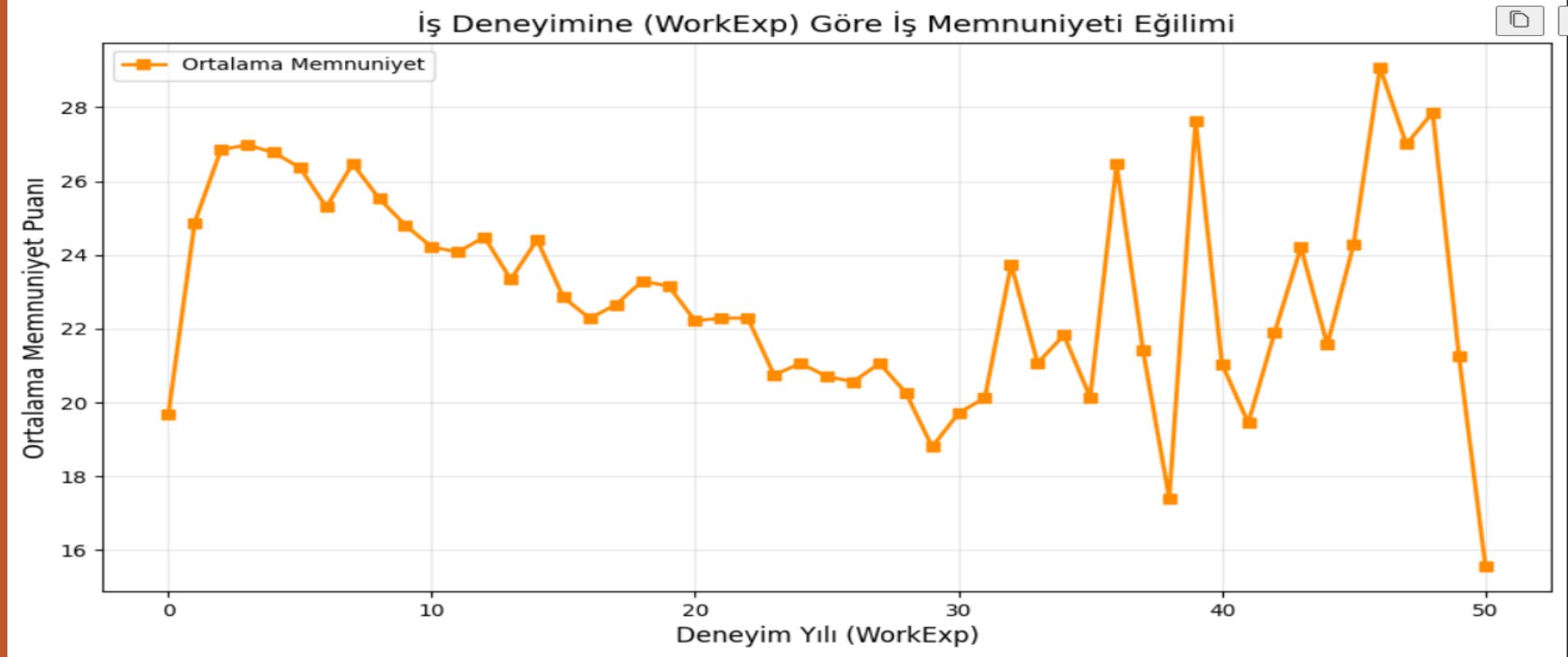
Career Foundations & Academic Background

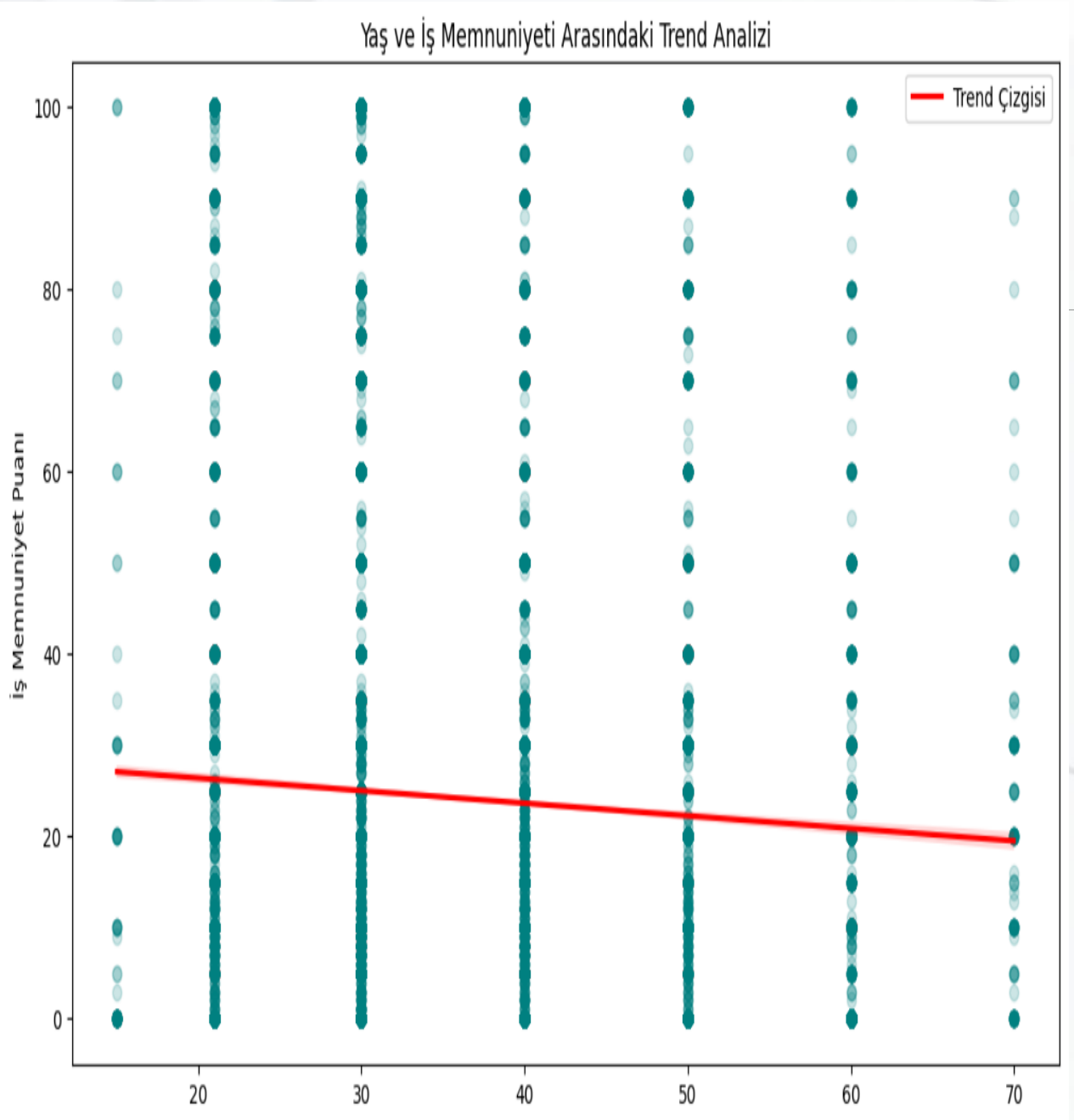

İstihdam Türü vs Uzaktan Çalışma (Temizlenmiş Analiz)
Freelancer
Full-time
Not Working
Other
Part-time
Retired
Student (FT)
Student (PT)
Unemployed
1598
381
3595
19706
9604
15852
702
0
3
546
0
0
582
331
361
525
0
0
6544
420
591
780
179
97
2663
45
332
İstihdam Türü
Hybrid (some remote, some in-person)
In-person
Remote
Uzaktan Çalışma Modeli
Kişi Sayısı
17500
15000
12500
10000
7500
5000
2500
0

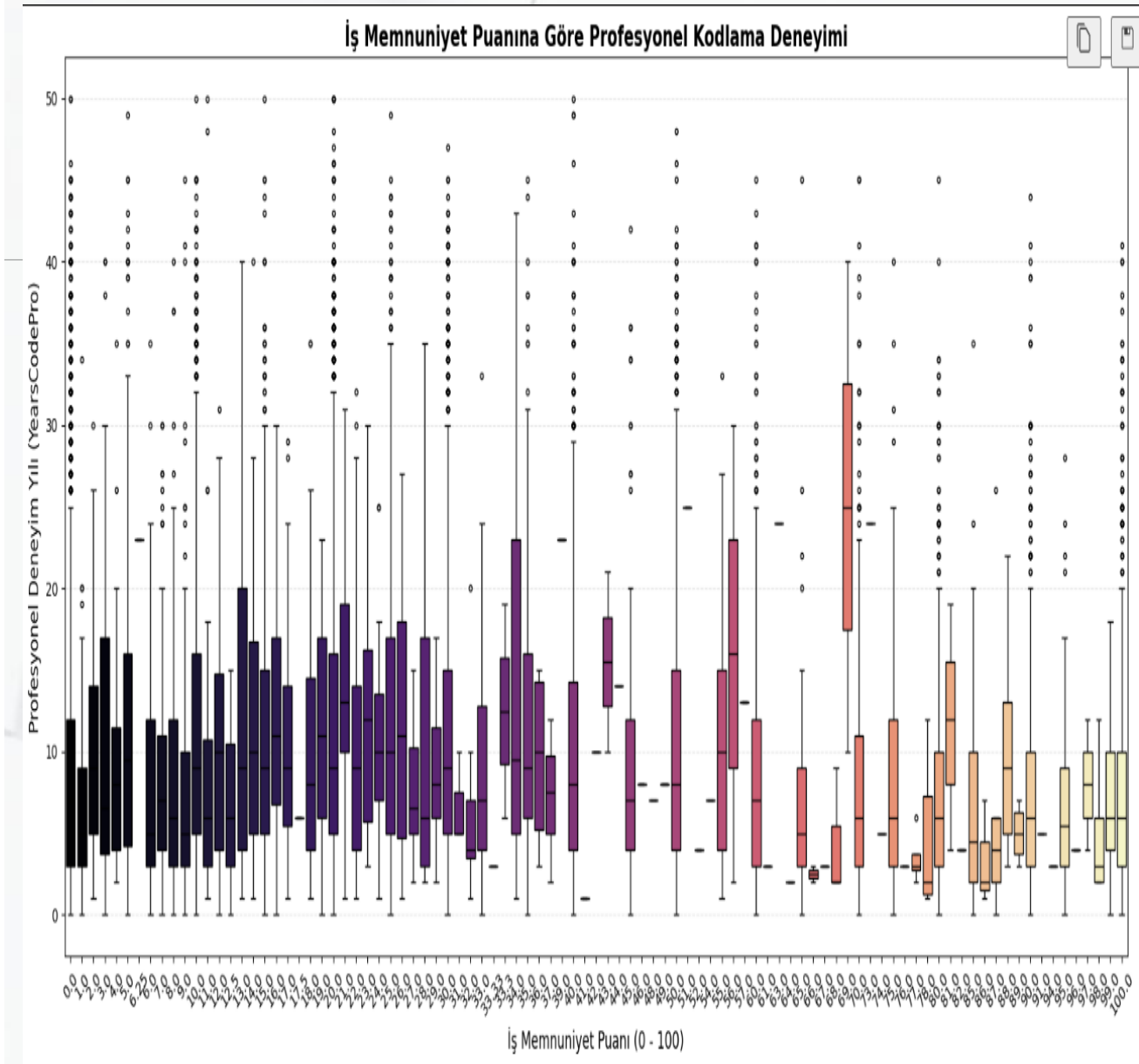

Katılımcıların Ana Şube (Mesleki Odak) Dağılım
I am a developer by profession
I am not primarily a developer, but I write code sometimes as part of my work/studies
I am learning to code
I code primarily as a hobby
I used to be a developer by profession, but no longer am
0
10000
20000
30000
40000
50000
Katılımcı Sayısı

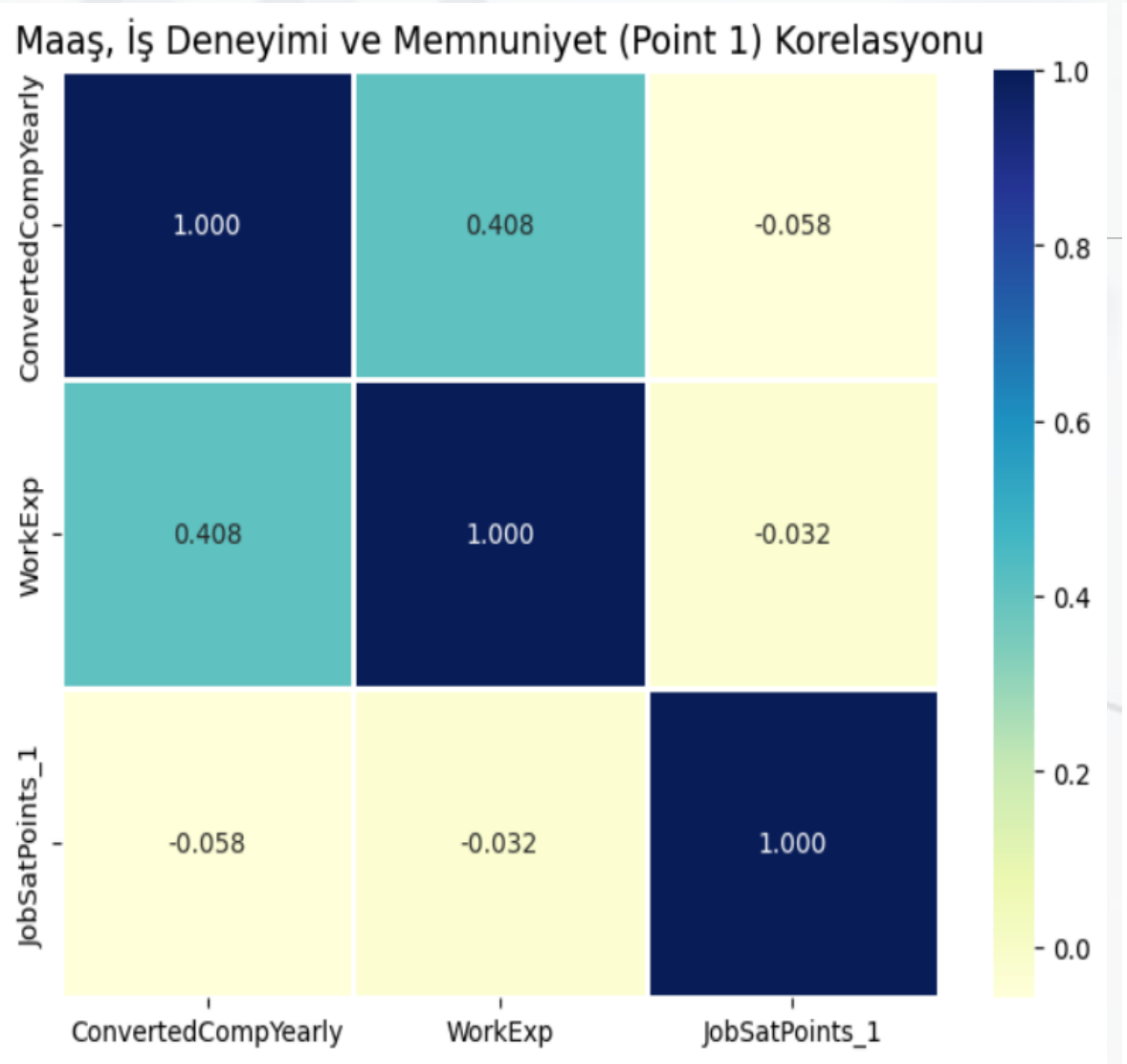
Professional Growth & Satisfaction

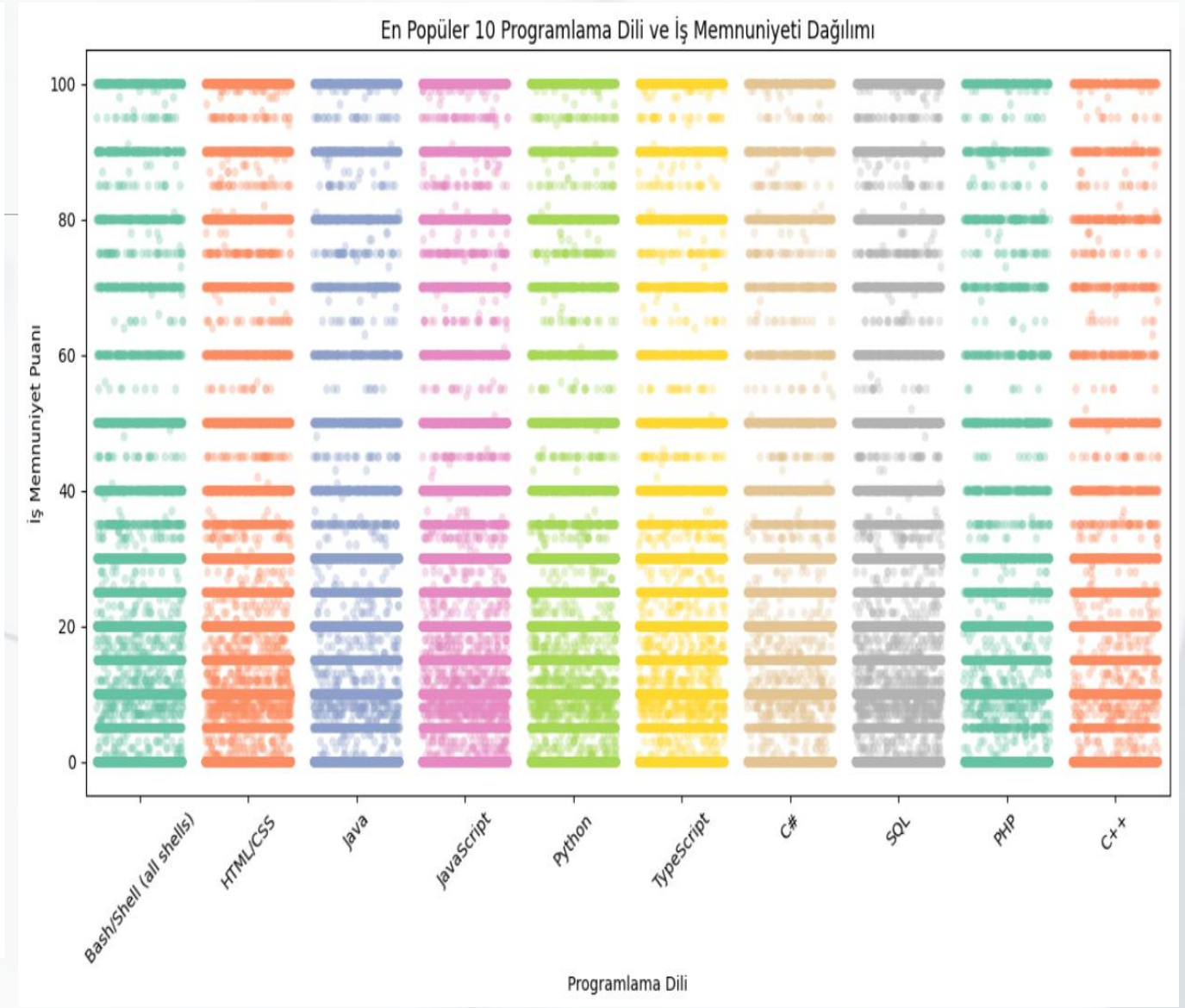




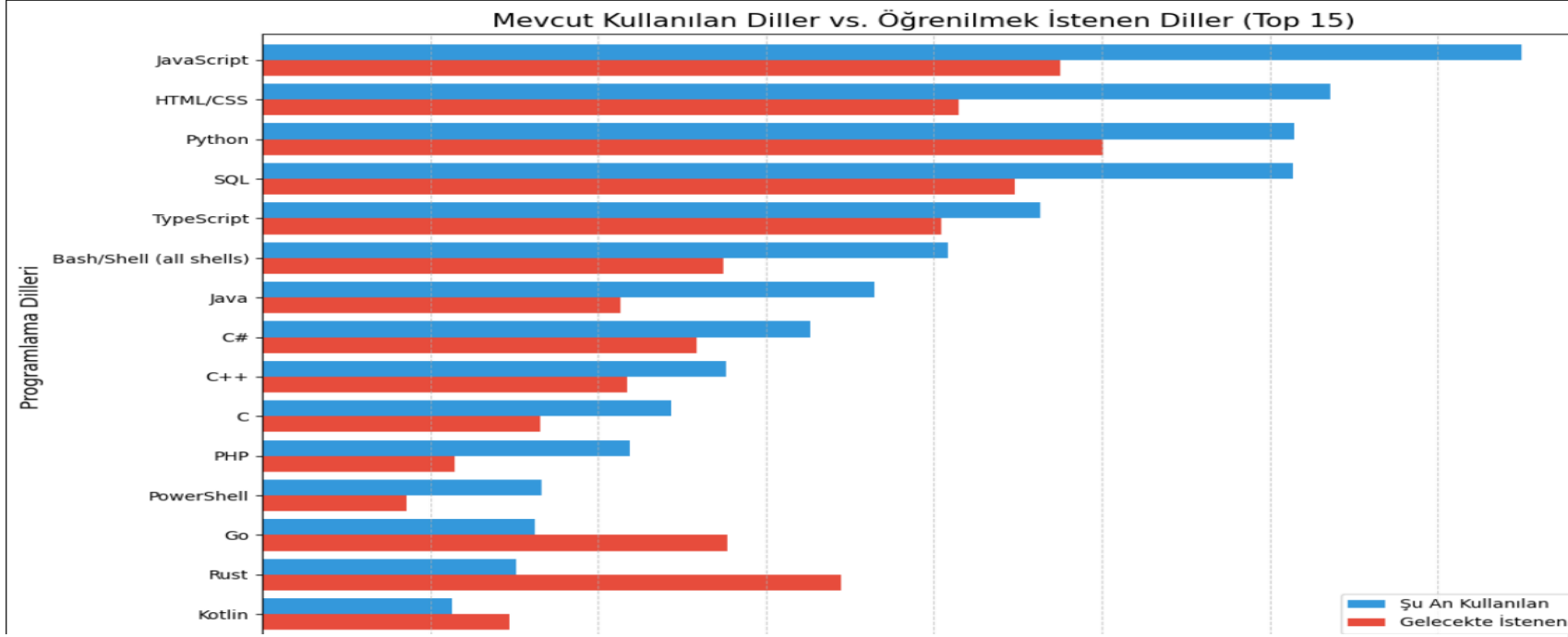

Yaş ve İş Memnuniyeti Arasındaki Trend Analizi
Trend Çizgisi
İş Memnuniyet Puanı
100
80
60
40
20
0
20
30
40
50
60
70

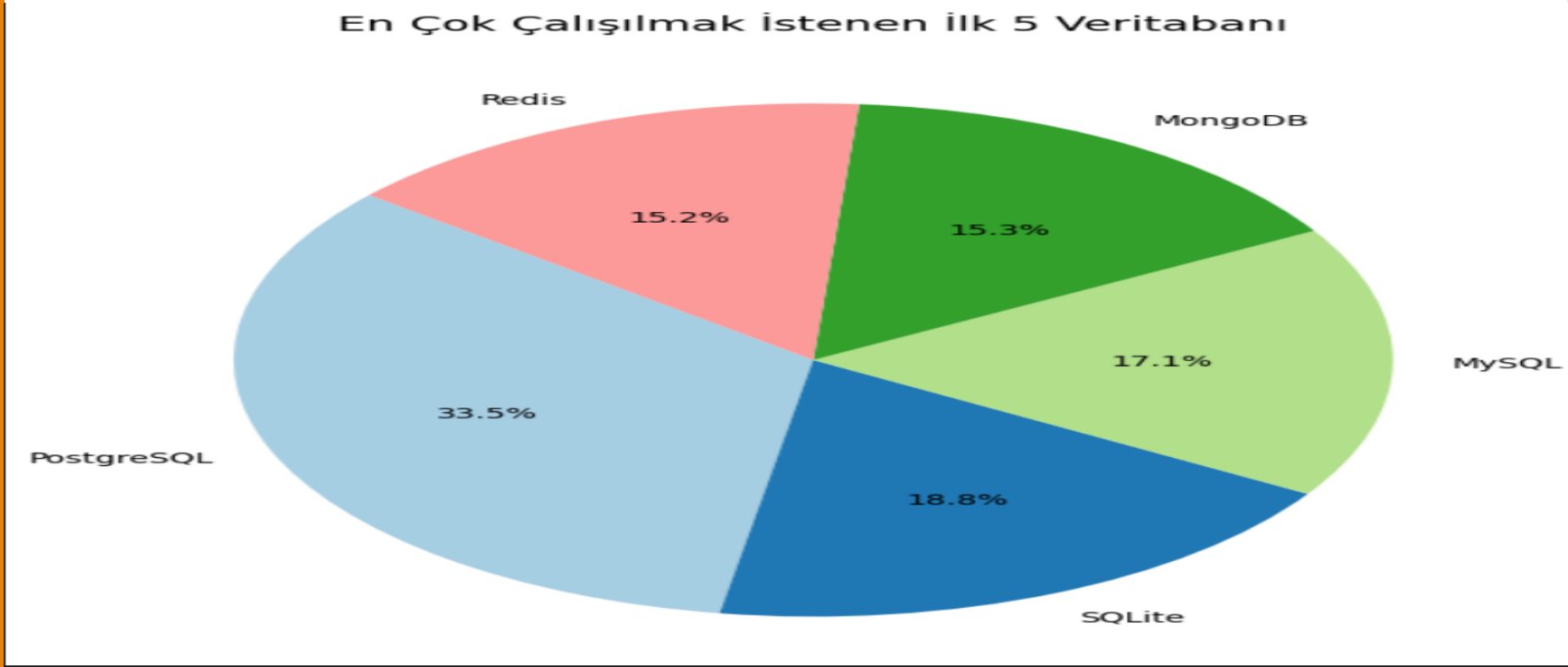

İş Memnuniyet Puanına Göre Profesyonel Kodlama Deneyimi
Profesyonel Deneyim Yılı (YearsCodePro)
İş Memnuniyet Puanı (0 - 100)

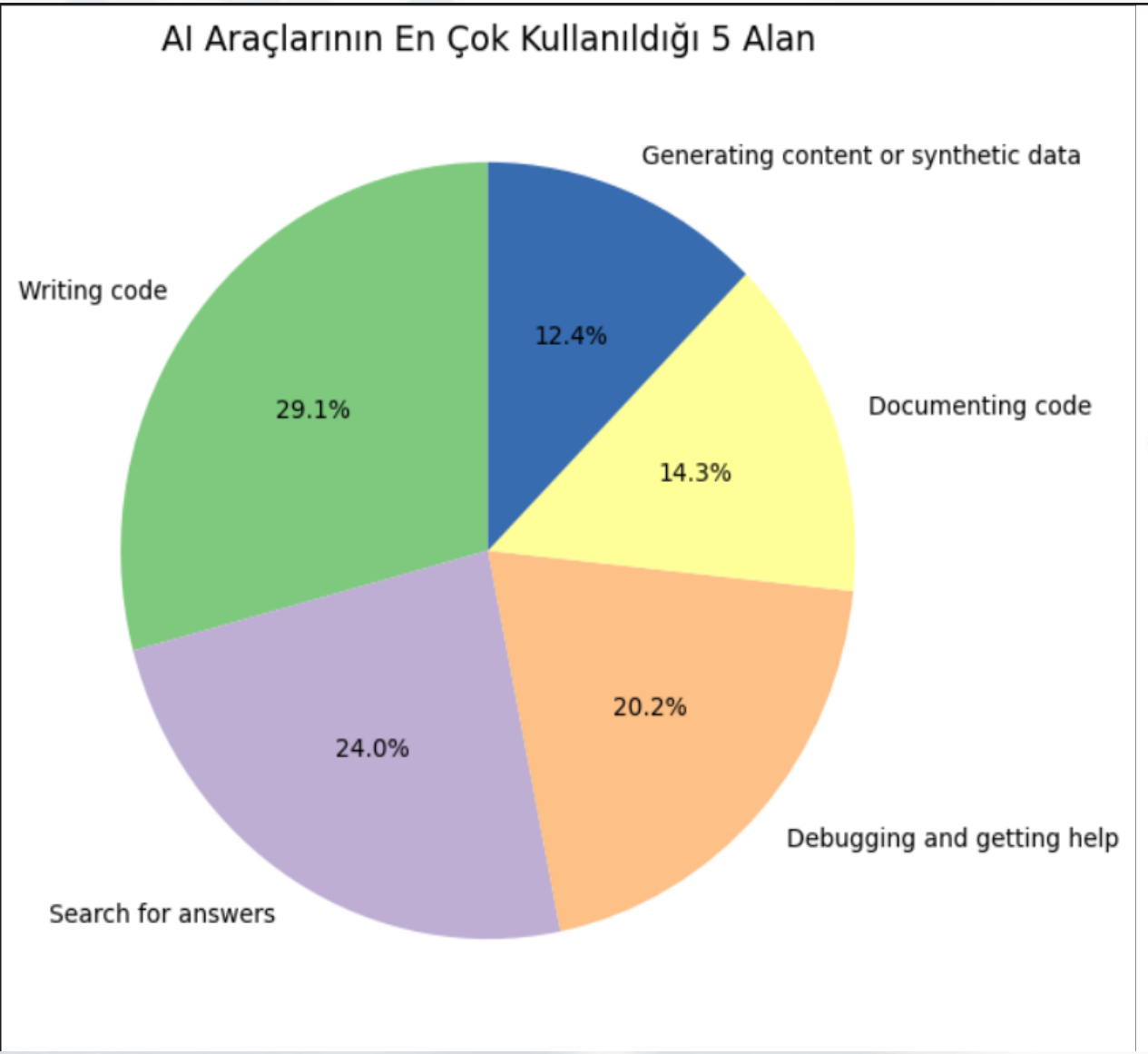

Maaş, İş Deneyimi ve Memnuniyet (Point 1) Korelasyonu
ConvertedCompYearly
WorkExp
JobSatPoints_1
1.000
0.408
-0.058
0.408
1.000
-0.032
-0.058
-0.032
1.000
ConvertedCompYearly
WorkExp
JobSatPoints_1
1.0
0.8
0.6
0.4
0.2
0.0

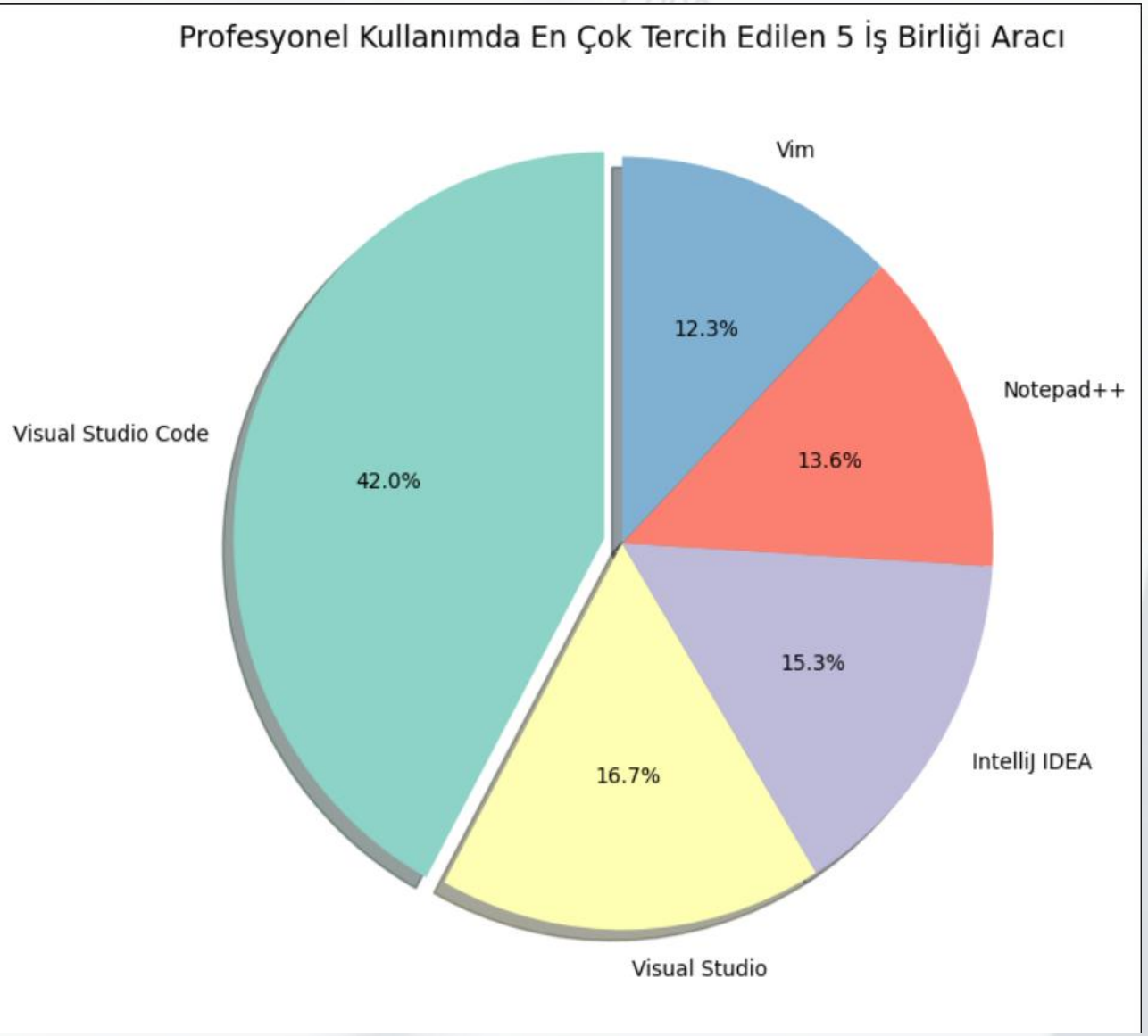

En Popüler 10 Programlama Dili ve İş Memnuniyeti Dağılımı
İş Memnuniyet Puanı
100
80
60
40
20
0
Bash/Shell (all shells)
HTML/CSS
Java
JavaScript
Python
TypeScript
C#
SQL
PHP
C++
Programlama Dili

The Technology Stack of Tomorrow






AI Araçlarının En Çok Kullanıldığı 5 Alan
Generating content or synthetic data
12.4%
Documenting code
14.3%
Debugging and getting help
20.2%
Search for answers
24.0%
Writing code
29.1%


Profesyonel Kullanımda En Çok Tercih Edilen 5 İş Birliği Aracı
Vim
12.3%
Notepad++
13.6%
IntelliJ IDEA
15.3%
Visual Studio
16.7%
Visual Studio Code
42.0%

Strategic Insights:

High concentration of salaries in the [X-Y] range globally.

Full-time roles provide the highest median compensation compared to part-time or student roles.

North America and Europe remain the leaders in top-tier salary outliers.

Degree holders (Masters/PhD) exhibit more stability in long-term full-time employment.

Computer Science and MIS degrees represent over 70% of the professional workforce.

Remote work is most prevalent in software engineering and data analysis roles.

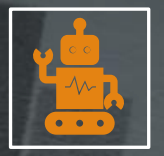
Strategic Insights:

Salary growth accelerates significantly after the first 5 years of professional experience.

Job satisfaction does not always correlate with high salary, suggesting cultural factors play a major role.

Mid-career professionals (30-40 age group) show the highest balance of income and satisfaction.

Traditional languages like SQL/Python maintain dominance, while Rust and Go show high "desire" scores.



Artificial Intelligence tools have reached a 40%+ adoption rate in development workflows.

Cloud-based database solutions are prioritized for next-year learning goals.

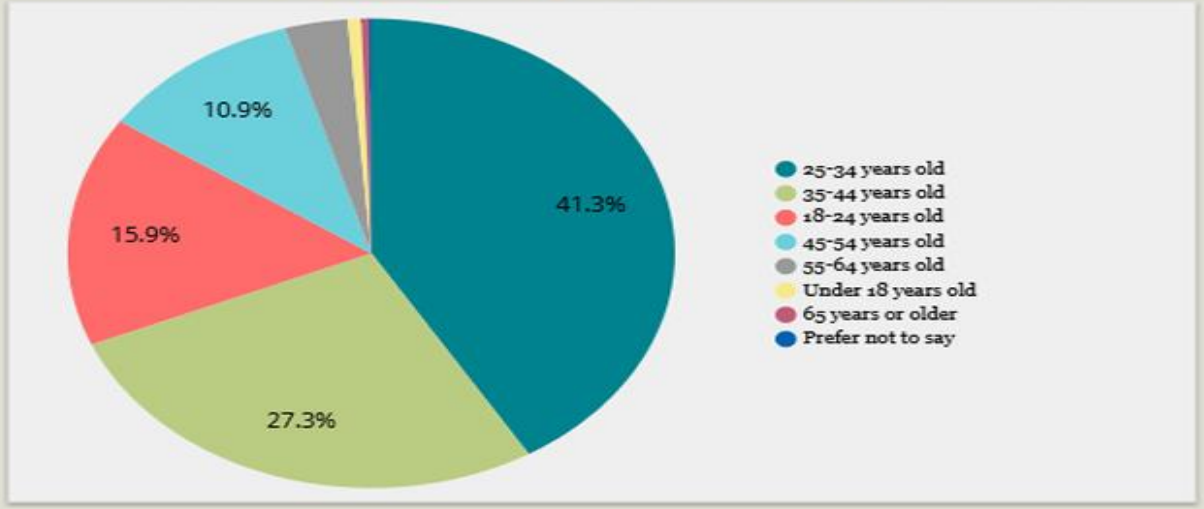
Final Strategic Recommendations

Key Finding: Investment in higher education and niche technologies (AI/Cloud) yields the highest ROI for developers.

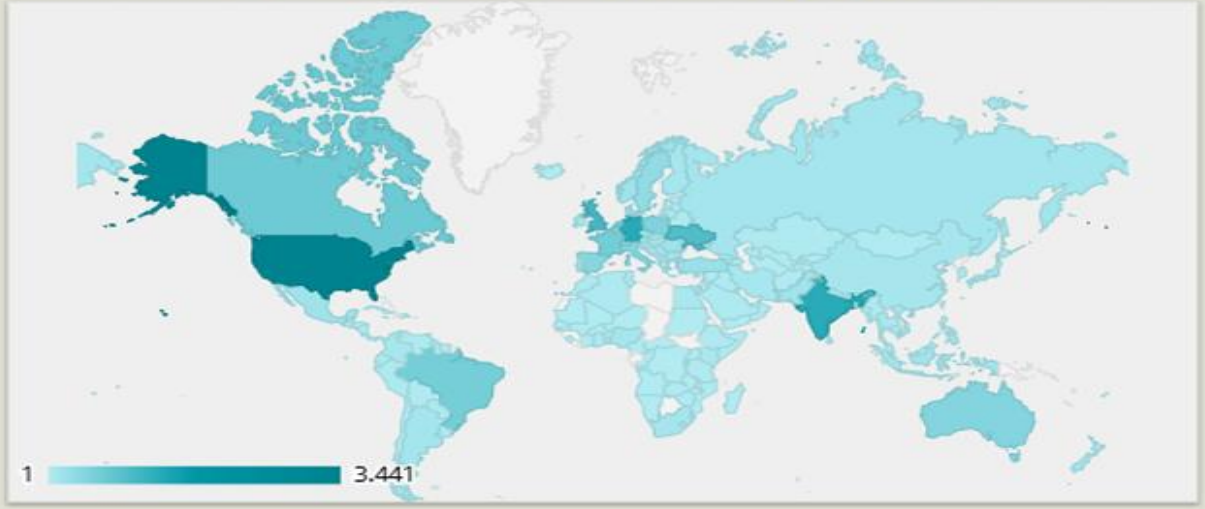
Strategy: Professionals should focus on hybrid work-capable roles to ensure long-term career resilience.

The Bottom Line: Data-driven decision making is the core of modern software career management.

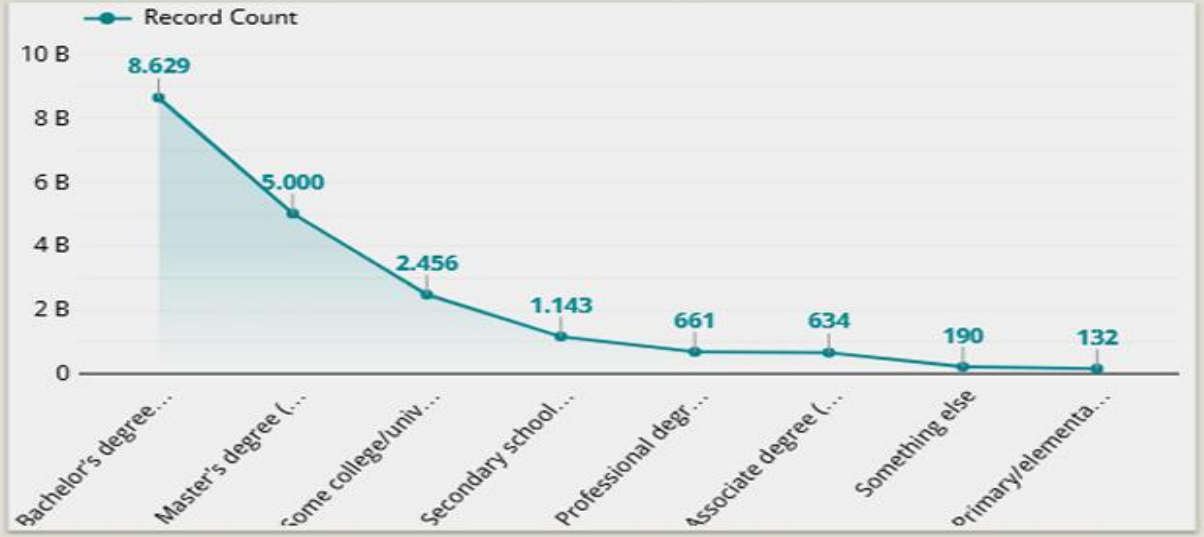
Distribution of Respondents by Age



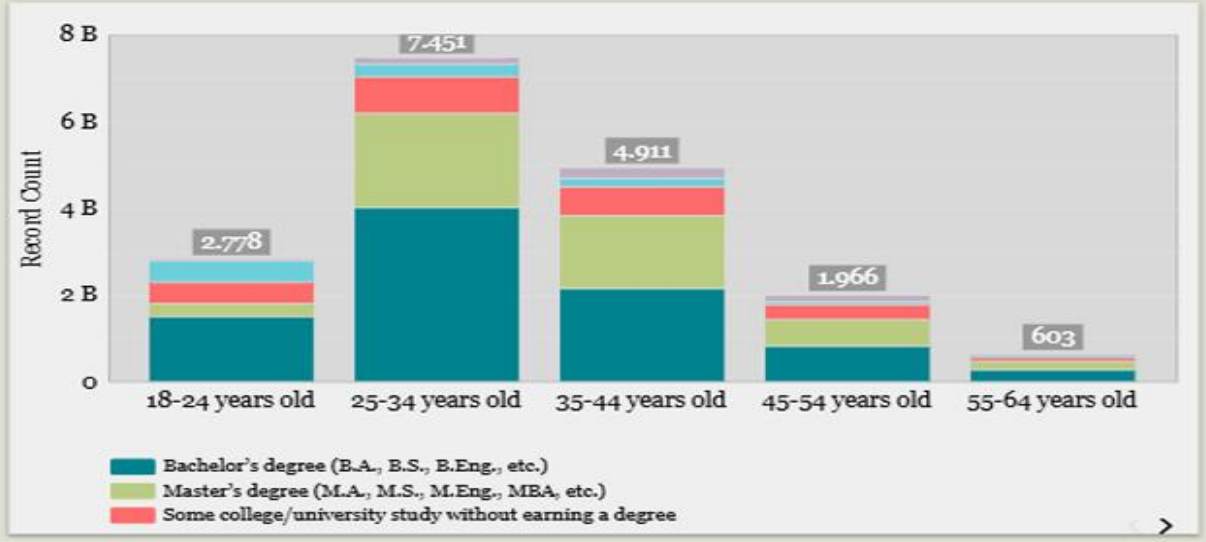
Distribution of Participants by Country



Participant Distribution by Education Level



Number of Participants by Age, Classified by Education Le...



Dashboard Tab 1: Demographics

👥 Demographic Profile: Who Are the Developers?

1. Age Distribution: The Prime Workforce

- **Insight: The majority of participants are aged 25–34 (41.3%) and 35–44 (27.3%).**
- **Observation: This indicates that the data primarily represents the active, tech-savvy workforce in their peak career development years.**

2. Education: Highly Skilled Talent Pool

- **Insight: Most participants hold Bachelor's or Master's degrees.**
- **Observation: The results reflect the opinions of a highly qualified and educated labor force, adding high credibility to the tech trends observed.**

3. Geographical & Participation Trends

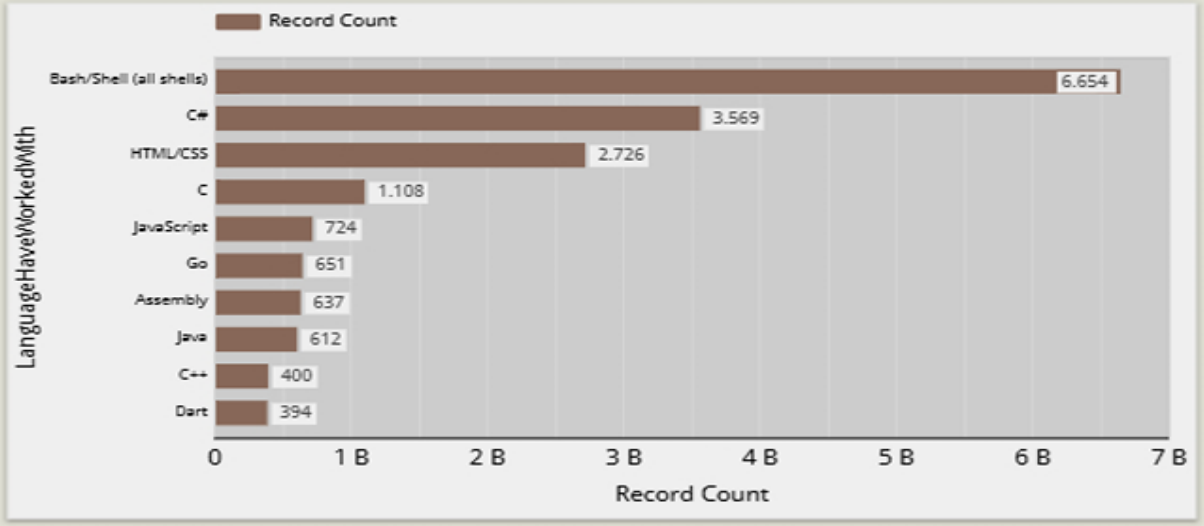
- **Insight: Participation drops significantly after age 45, showing that younger generations are more engaged with digital surveys and emerging tech.**
- **Observation: Since the distribution is concentrated in specific regions, the results should be interpreted as representative of key global tech hubs rather than a perfect global average.**

📌 Summary Conclusion

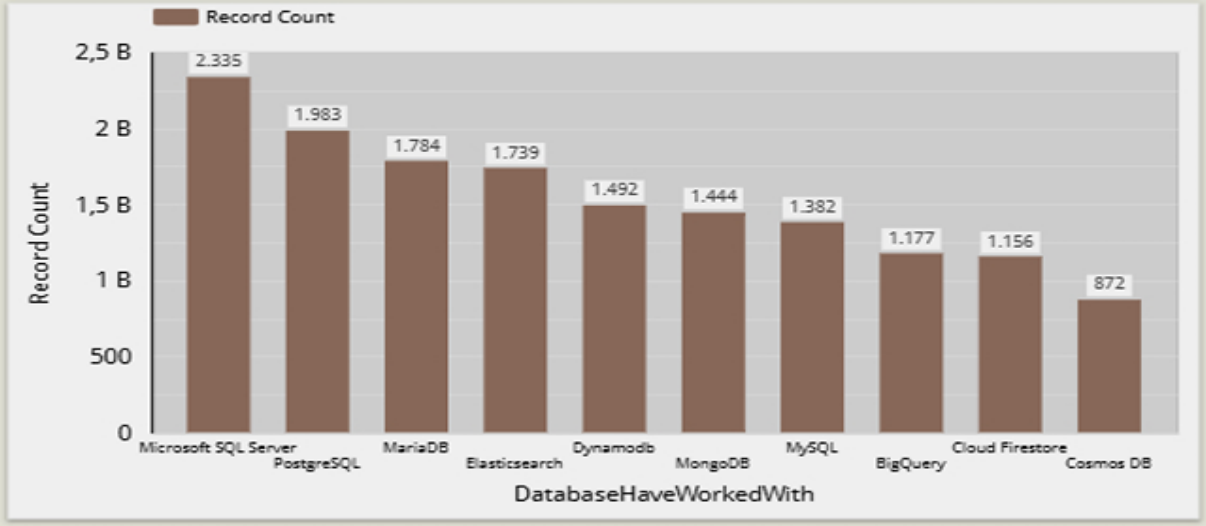
"The survey captures a highly educated, career-driven demographic (primarily ages 25–44). This suggests our findings reflect the strategic choices of the modern, professional workforce that is currently shaping the industry."

"First we asked who they were, then we saw what they said."

Most Used Programming Languages

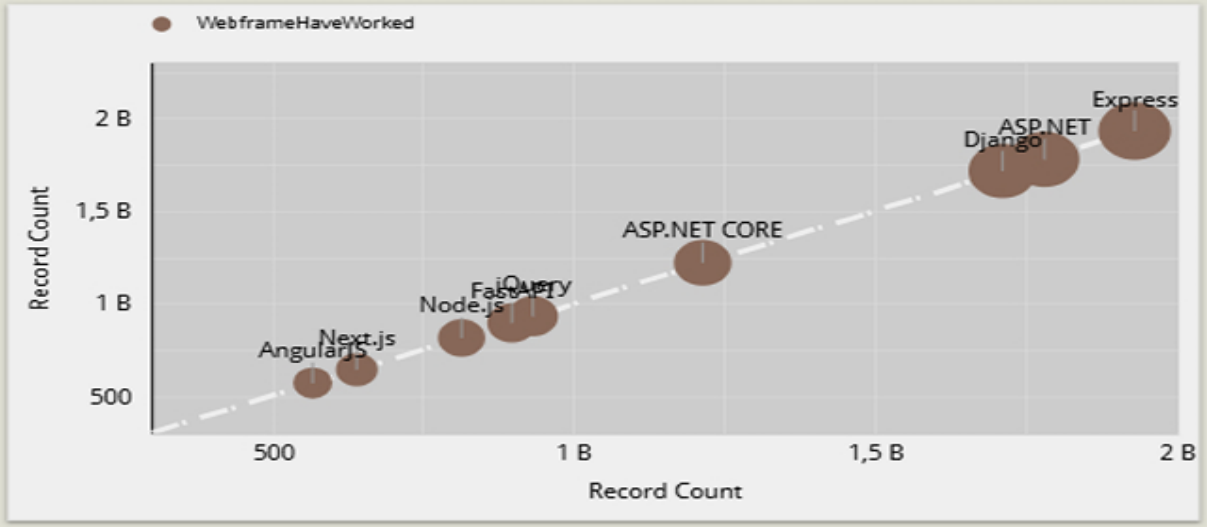


Most Used Databases



Most Used Platforms

Most Used Web Frameworks



Dashboard Tab 2: Current Techonolgy Usage

📊 Technology Trends Analysis Summary

1. Programming Languages: Bash/Shell Dominance

- **Insight:** Bash/Shell is the clear leader due to the rise of infrastructure and automation.
- **Observation:** Following closely, C# and HTML/CSS show that enterprise application development and web technologies still form the core backbone of the industry.

2. Databases: Relational Giants at the Top

- **Insight:** Microsoft SQL Server and PostgreSQL dominate the market.
- **Observation:** Even in modern projects, relational databases maintain their superiority over NoSQL alternatives like MongoDB and DynamoDB due to their robust structure.

3. Cloud Platforms: AWS is Unrivaled

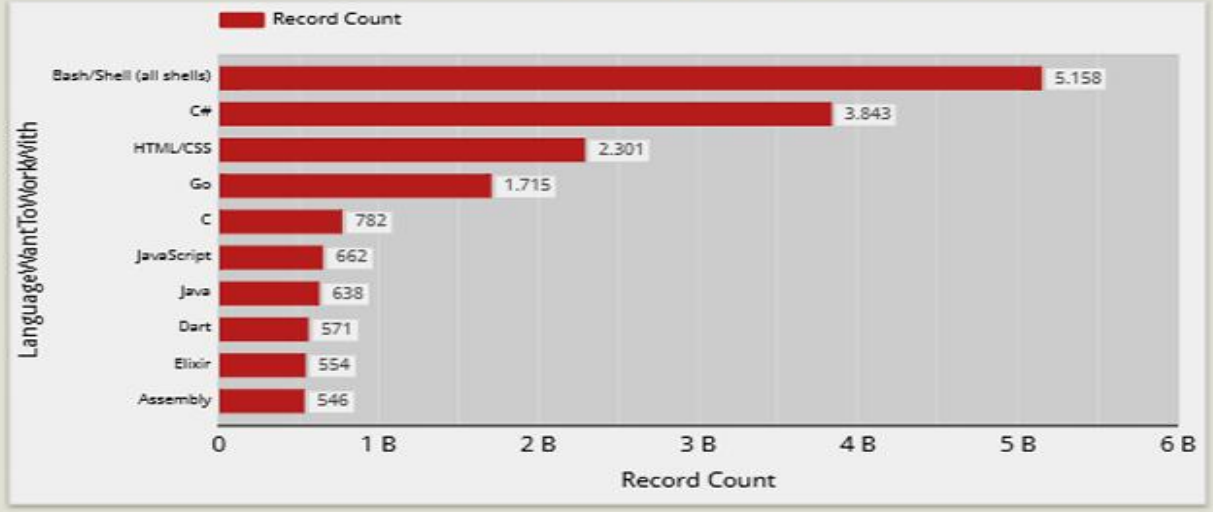
- **Insight:** Word cloud data clearly demonstrates AWS's massive influence in the sector.
- **Observation:** While Azure and Google Cloud are in pursuit, the developer ecosystem still prefers Amazon first when it comes to "Cloud" solutions.

4. Web Frameworks: The Rise of Core and Express

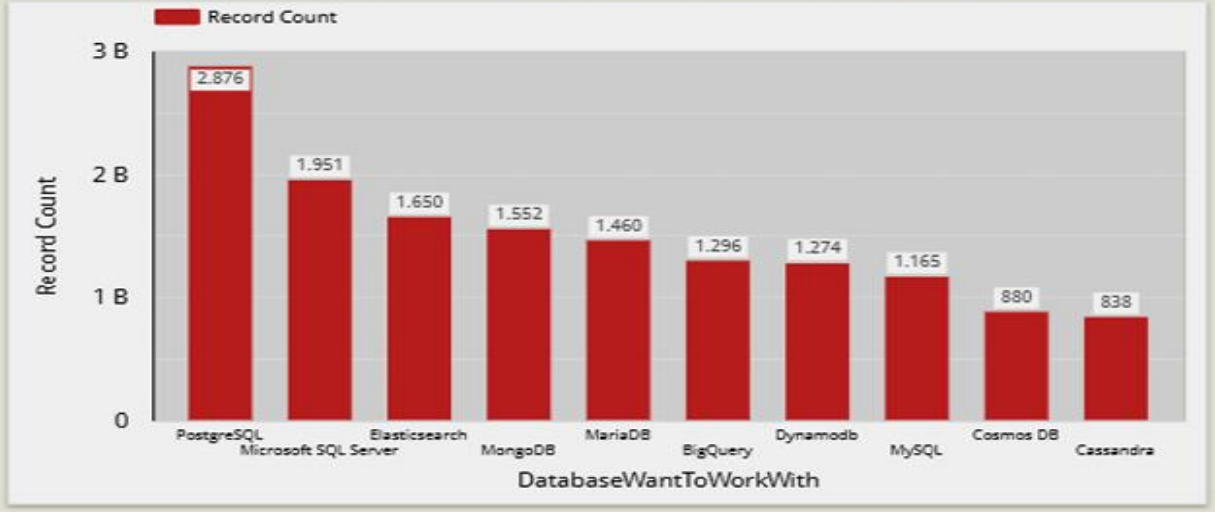
- **Insight:** Express and ASP.NET (Core) exhibit the highest usage volumes.
- **Observation:** The graph displays a linear growth, showing that developers are gravitating toward both lightweight solutions like Node.js/Express and performance-oriented enterprise solutions like ASP.NET Core.

FINAL CONCLUSION: "This data demonstrates that the industry is not just chasing innovation, but also establishing a firm balance between reliability (SQL Server, C#, AWS) and automation (Bash)."

Most In-Demand Languages Next Year

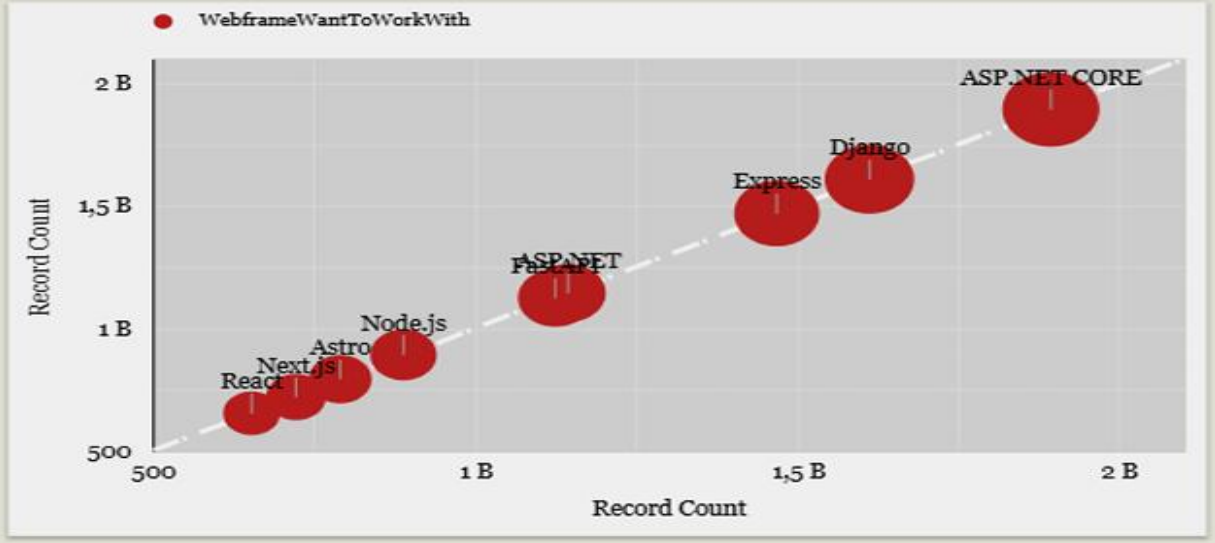


Most In-Demand Databases Next Year



Most In-Demand Platforms Next Year

Most In-Demand Web Frameworks Next Year



Dashboard Tab 3: Future Technology Trends

🚀 Future Technology Trends: In-Demand Analysis

1. Languages: The Rise of Go and Automation

Insight: While Bash/Shell and C# maintain their top positions, Go shows a significant surge in future demand. This indicates a shift toward high-performance cloud-native development.

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2. Databases: PostgreSQL Takes the Lead

Insight: In future preferences, PostgreSQL (2.87B) overtakes Microsoft SQL Server (1.95B) as the most desired database. This reflects a strong industry trend toward open-source relational systems.

3. Platforms: AWS Dominance Continues

Insight: Amazon Web Services (AWS) remains the undisputed leader in planned infrastructure, significantly ahead of Microsoft Azure and Google Cloud.

4. Frameworks: ASP.NET CORE is the Future

Insight: ASP.NET CORE is projected to become the most sought-after web framework, surpassing Express in future interest. The industry is moving toward more robust, scalable, and cross-platform enterprise solutions.

FINAL CONCLUSION: "The upcoming year signals a transition where open-source flexibility (PostgreSQL) and modern cloud performance (Go, ASP.NET Core) meet the established reliability of AWS."