Analysis of Stack Overflow Survey Data: Technology and Demographic Trends.

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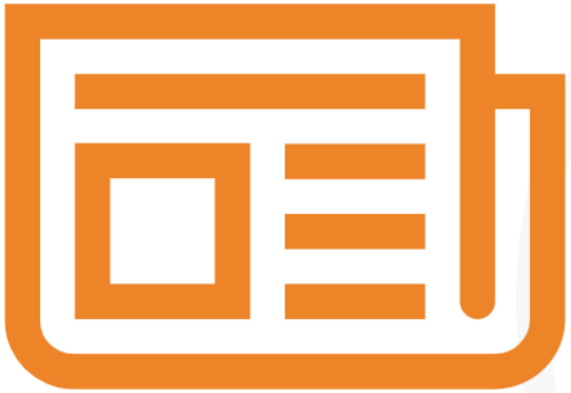
EXECUTIVE SUMMARY

- Swift earns the highest salary at $130,801, followed by Python at $114,383.
- Most respondents identify as professional developers.
- Hybrid work is the dominant work arrangement.
- Developers desire specific embedded technologies, as shown in pie charts.
- Job satisfaction increases with years of experience.
- Developers should prioritize high-demand skills like Python and adapt to hybrid work environments.

INTRODUCTION

- Developers require insights into trending technologies and demographics to make informed career decisions.
- This study addresses which programming languages and databases are most desired, the demographic profile of developers, and correlations between experience and salary.
- The analysis uses the Stack Overflow survey, which includes 65,437 respondents from 185 countries.

METHODOLOGY

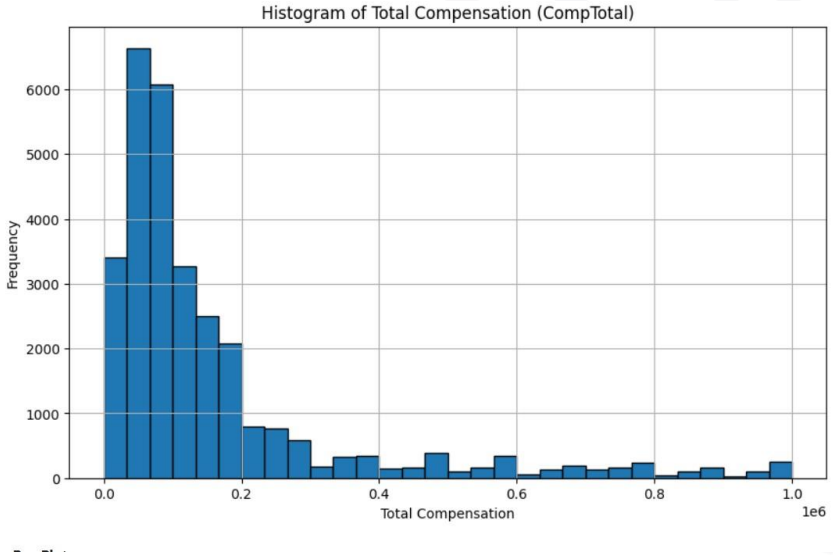


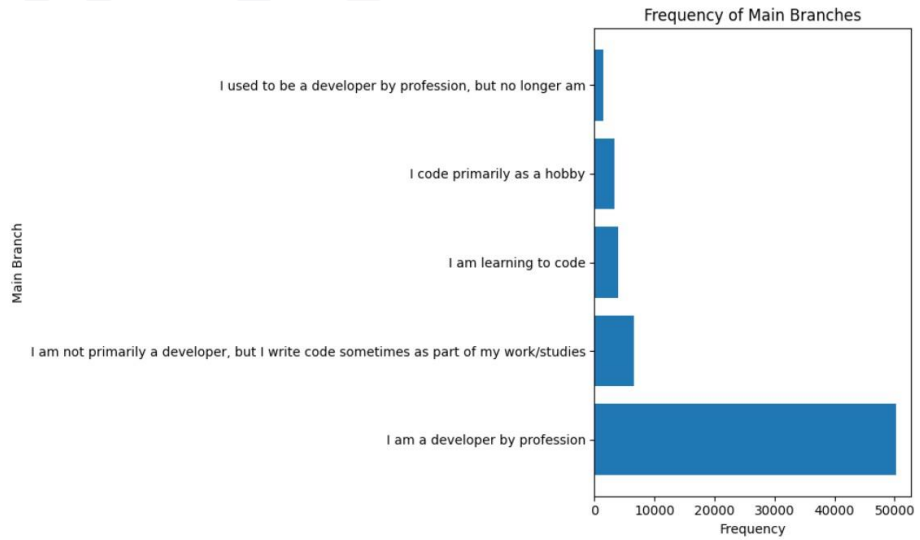
The methodology includes several steps:

- Data sources include the Stack Overflow survey dataset, web-scraped salary data, and assumed job postings data.
- Web scraping with BeautifulSoup collected programming language salaries.
- Data cleaning removed duplicates (none were found) and imputed missing values for EdLevel (most frequent), RemoteWork (hybrid), and ConvertedCompYearly (median).
- Normalization applied Min-Max and Z-score scaling to ConvertedCompYearly for consistent analysis.
- Exploratory data analysis included correlation analysis with a numeric Age variable.

RESULTS

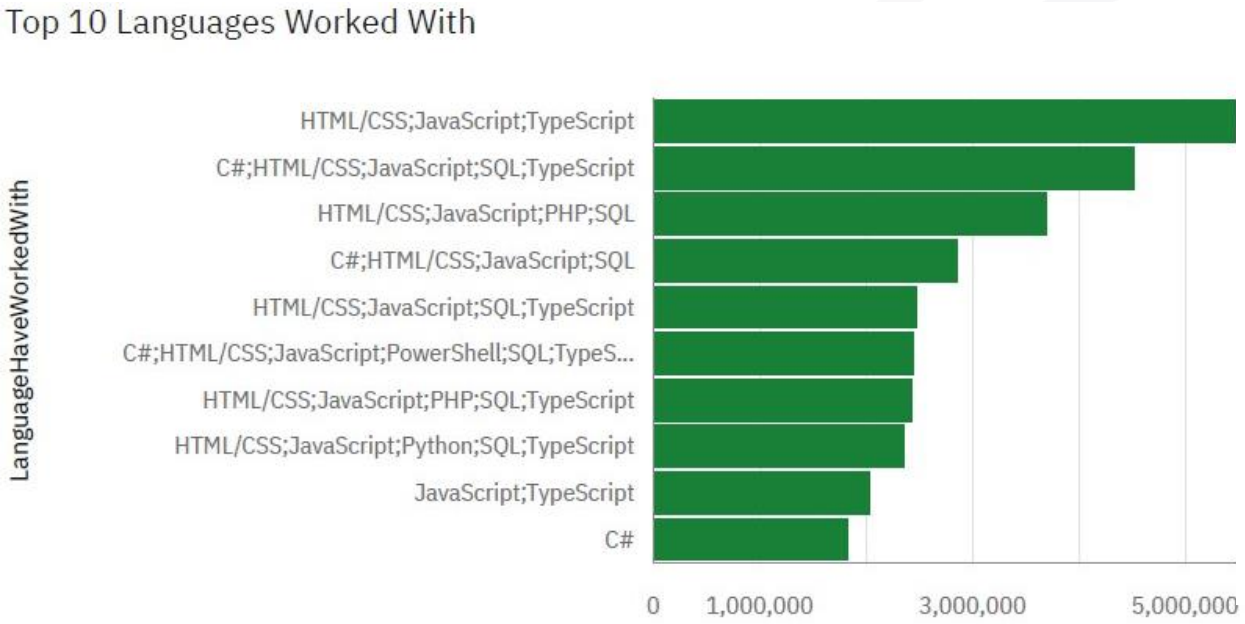
- The Stack Overflow survey dataset contains over 80,000 responses on programming languages, databases, and demographics .
- No duplicates were found in the dataset, ensuring high data reliability
- Most respondents are professional developers, as shown in frequency charts.
- The survey represents 185 countries, indicating global diversity.
- Compensation varies widely, as depicted in histograms.
- Top programming languages and databases align with industry trends, as detailed in the dashboard.



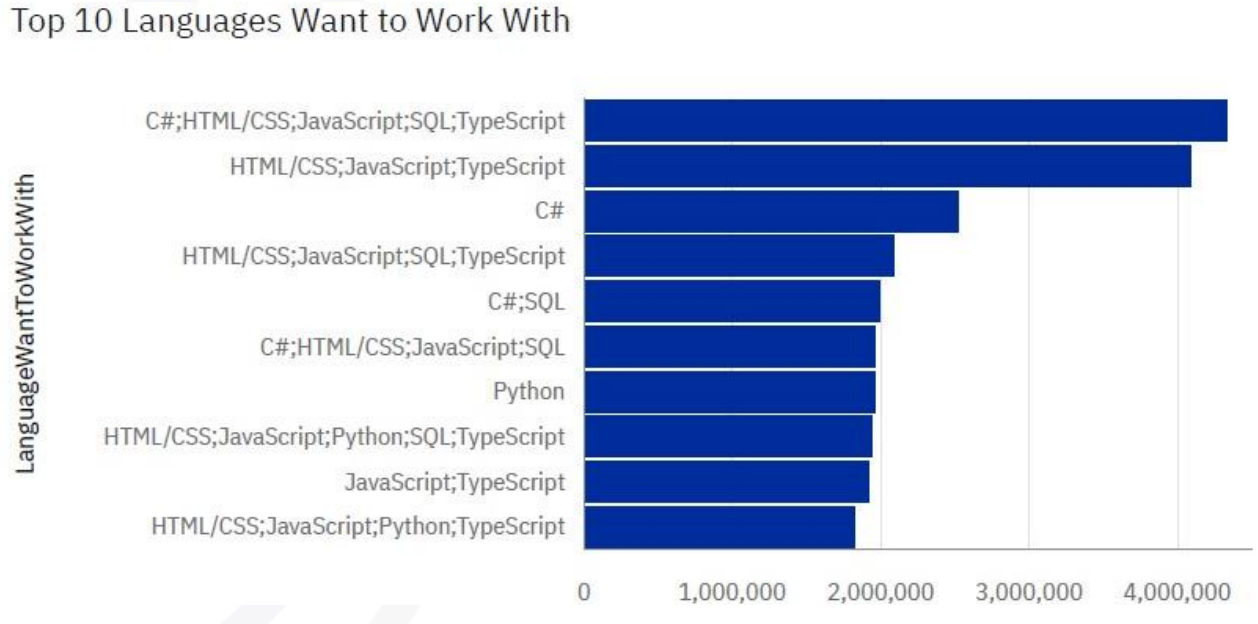


PROGRAMMING LANGUAGE TRENDS

Current Year



Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

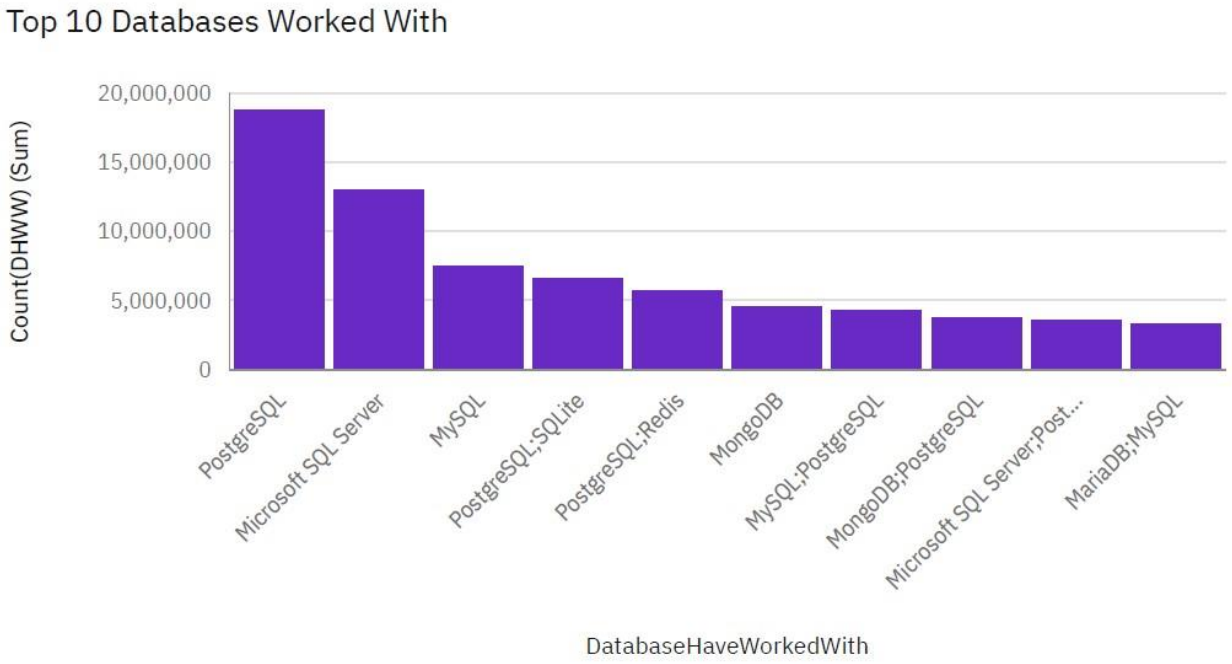
- JavaScript and Python lead in current usage, reflecting their versatility.
- Emerging languages like Rust or TypeScript show growing interest among developers.
- Swift offers the highest salary at $130,801, followed by Python at $114,383.

Implications

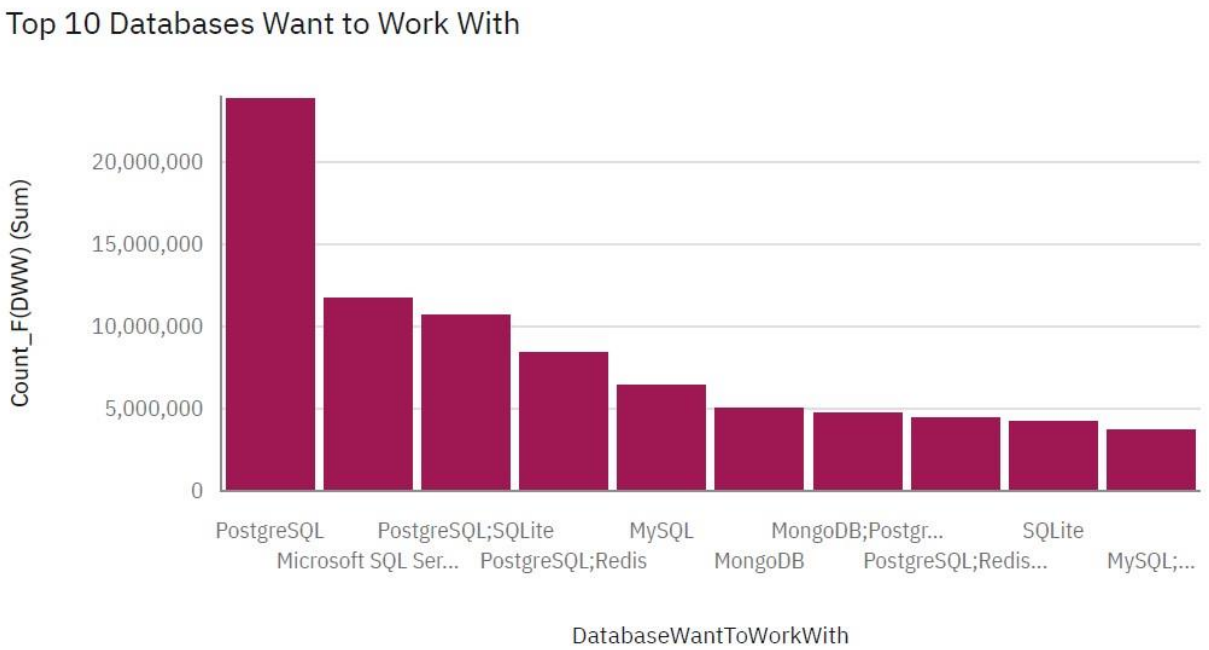
- Developers should learn Python for its versatility and high earning potential.
- They should monitor emerging languages like Rust or TypeScript for niche career opportunities.

DATABASE TRENDS

Current Year



Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

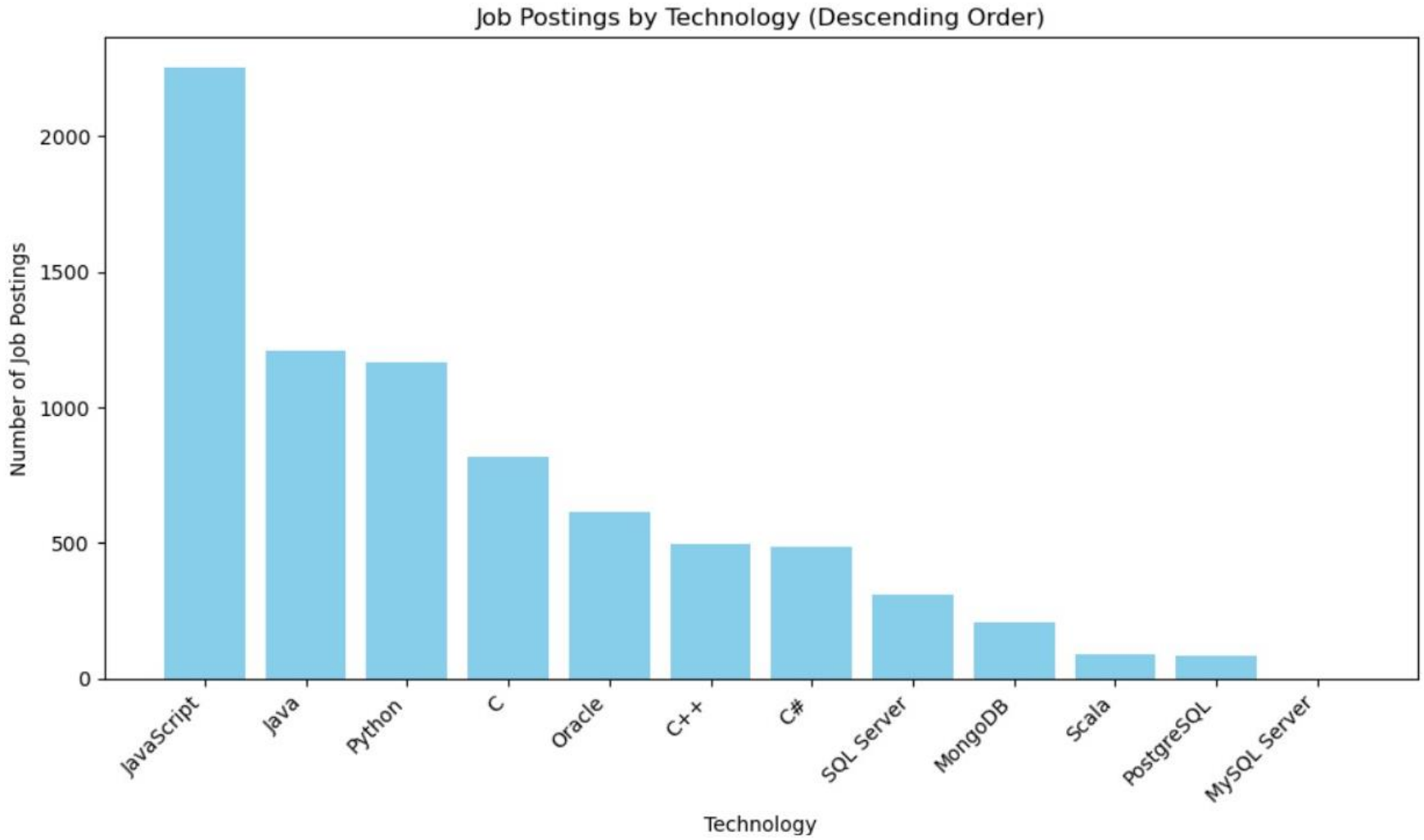
Findings

- SQL databases, such as PostgreSQL, dominate current usage.
- NoSQL databases, like MongoDB, show increasing interest among developers.

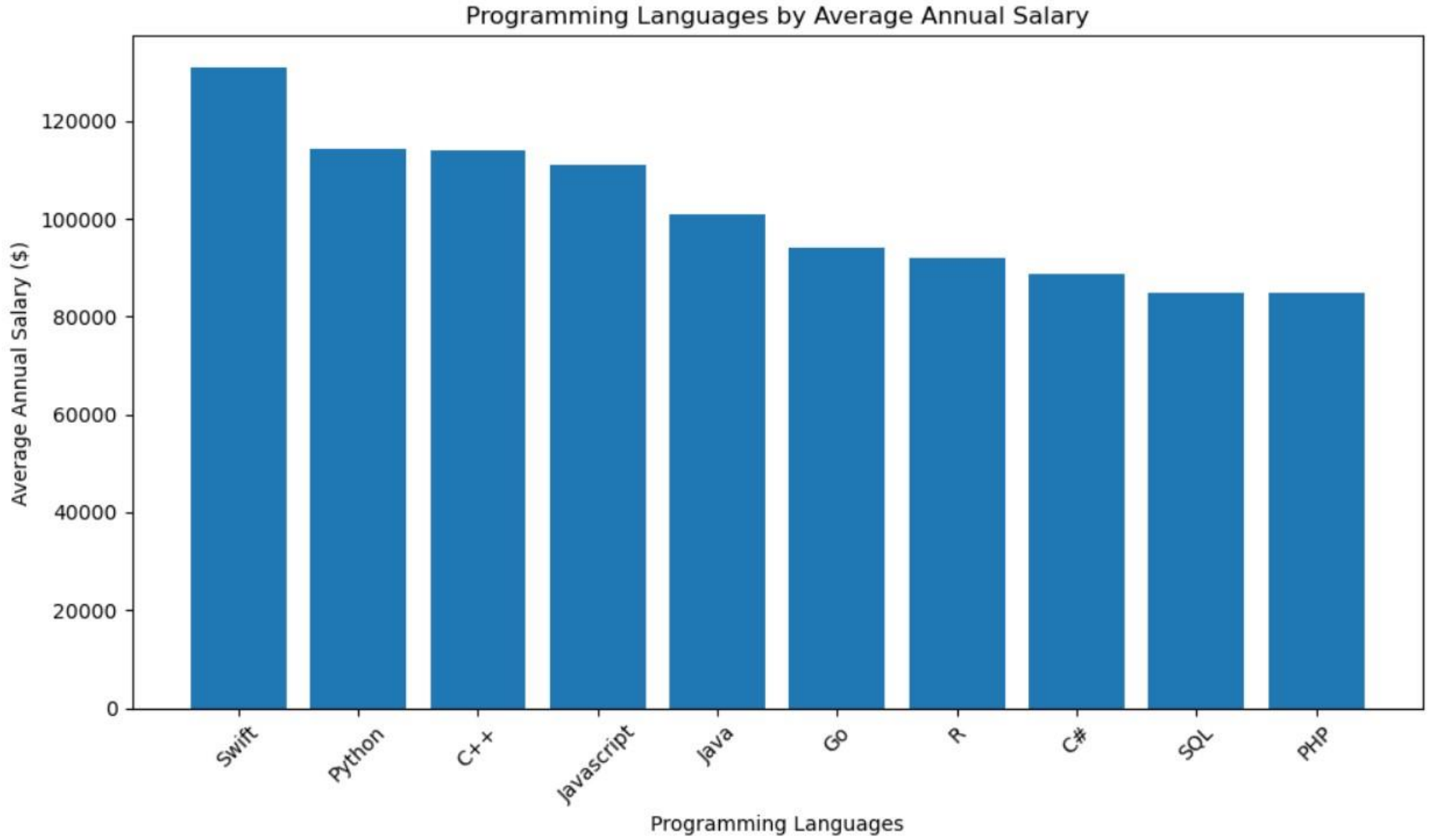
Implications

- Proficiency in both SQL and NoSQL databases enhances employability.
- Skills in cloud-based databases align with industry shifts toward cloud computing.

JOB POSTINGS



POPULAR LANGUAGES



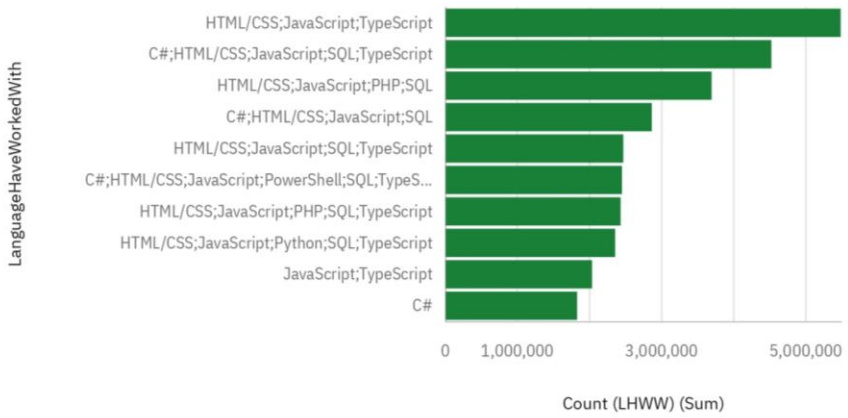
DASHBOARD

https://github.com/mansoor-mohd/IBM-DA0321/blob/ae7106e44bcebefe3021b78efba2637aa23eab7d/Technology%20and%20Demographics%20Dashboard.pdf

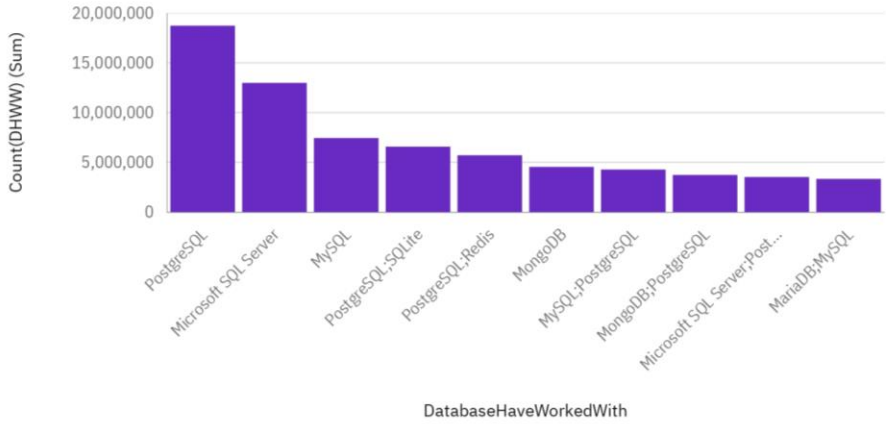
DASHBOARD TAB 1

Current Technology Usage

Top 10 Languages Worked With

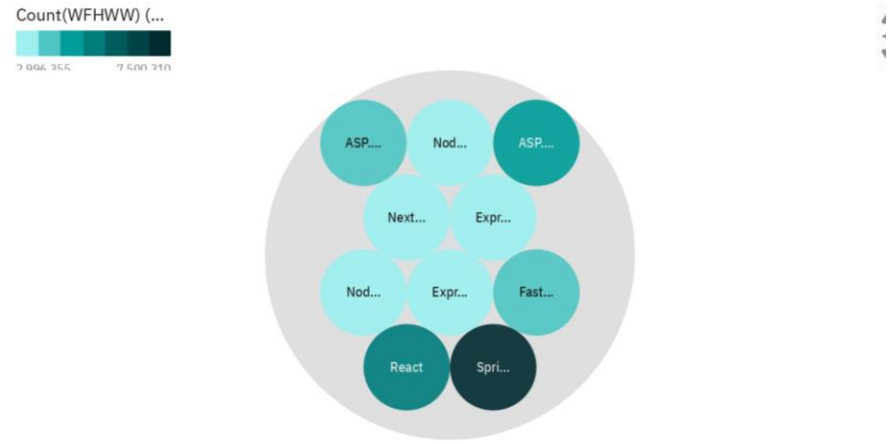


Top 10 Databases Worked With



Top 10 Platforms Worked With

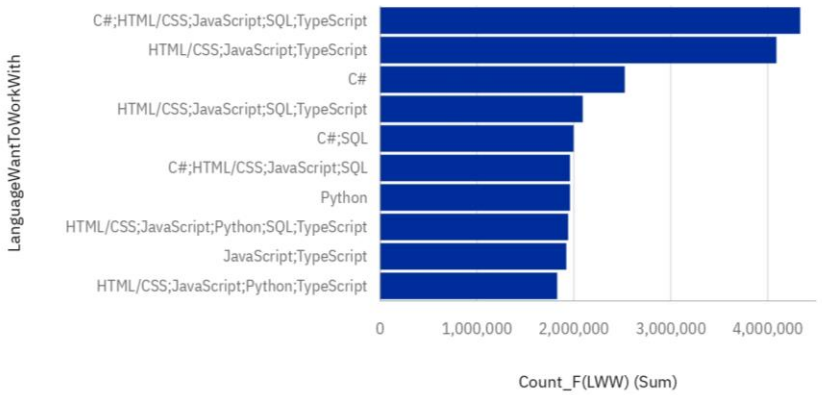
Top 10 Web Frameworks Worked With



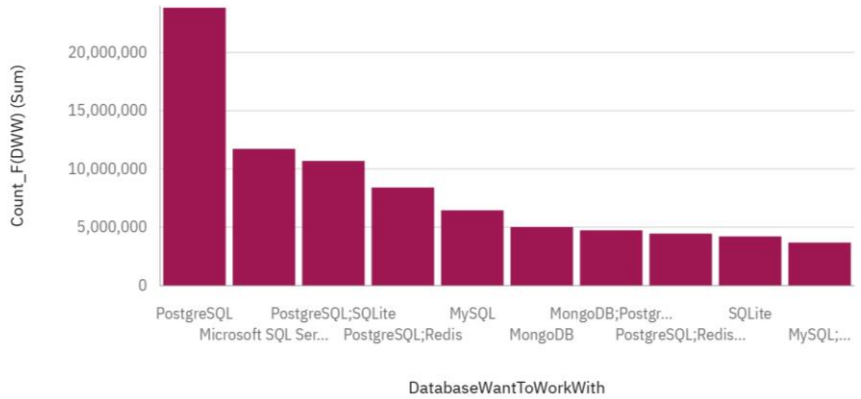
DASHBOARD TAB 2

Future Technology Trend

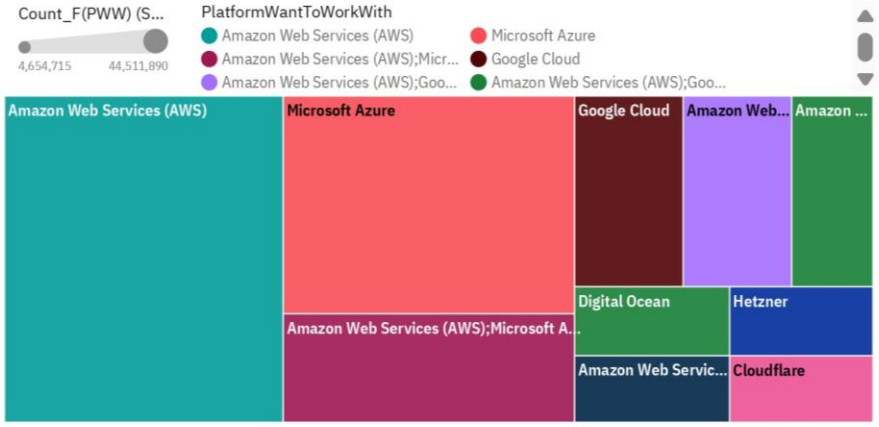
Top 10 Languages Want to Work With



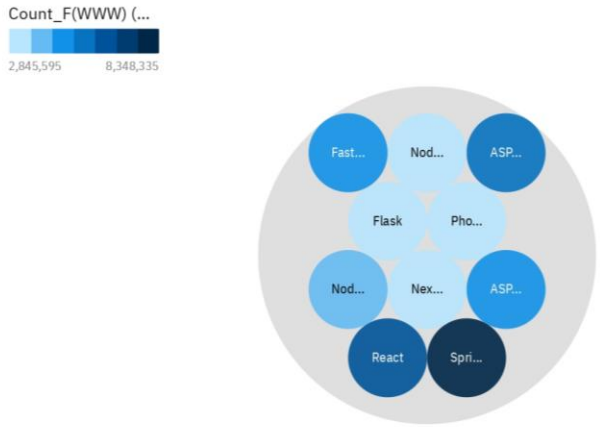
Top 10 Databases Want to Work With



Top 10 Platforms Want to Work With



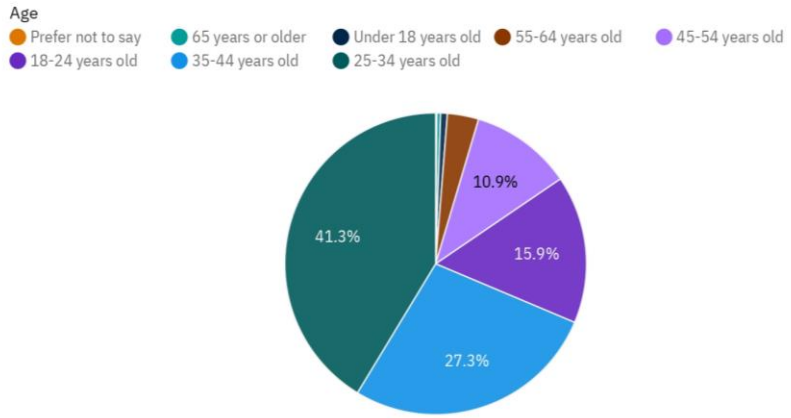
Top 10 Web Frameworks Want to Work With



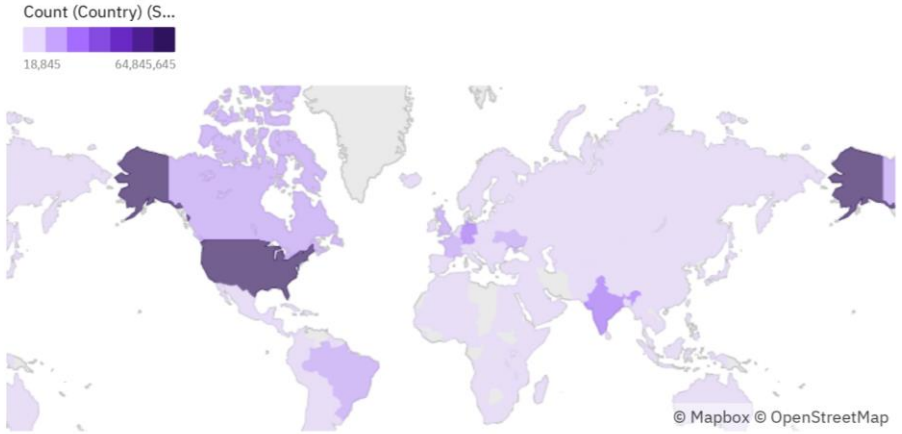
DASHBOARD TAB 3

Demographic

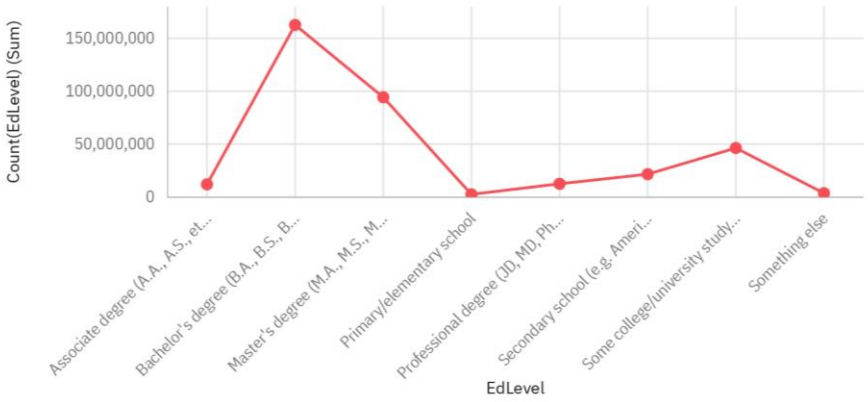
Respondent Age Distribution



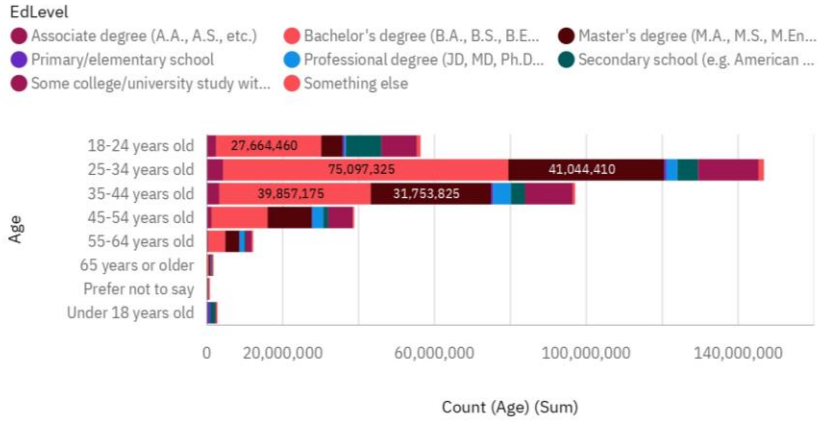
Respondent Count by Country



Respondent Education Level Distribution



Respondent Count by Age and Education



DISCUSSION

- JavaScript and Python's versatility fuels their industry demand, dominating usage.
- Job satisfaction grows with experience, per line charts, indicating long-term career fulfillment.
- Young professionals (25-34) dominate the workforce, driving innovation.
- Weak correlations between age, compensation, and experience suggest skills or location heavily influence salary.
- Hybrid work prevails, reflecting post-pandemic flexibility.
- Developers should upskill in Python and emerging languages like Rust, while employers must foster supportive environments and invest in training to retain talent and bridge skill gaps.

- The analysis benefits from clean data with no duplicates, robust imputation, and normalization techniques.
- Limitations include assumptions in imputing missing values and potential self-selection bias in the survey.

OVERALL FINDINGS & IMPLICATIONS

Findings

- Swift offers the highest average salary at $130,801, followed by Python at $114,383, based on web-scraped data .
- Hybrid work arrangements are the most common among developers, according to imputed survey data .
- The salary distribution is skewed, with most developers earning below the mean, as revealed by normalization .
- Age has a weak correlation with salary, suggesting other factors drive compensation.
- Python, JavaScript, and PostgreSQL are the most used technologies

Implications

- Developers should learn Swift or Python to maximize earning potential, particularly for mobile or data science roles.
- Employers must offer competitive salaries for Swift developers and prioritize hybrid work options to attract talent.
- Educators should incorporate Python, JavaScript, and SQL/NoSQL databases into curricula to prepare students for industry demands.
- Skills, rather than age, drive compensation, encouraging continuous learning throughout careers.

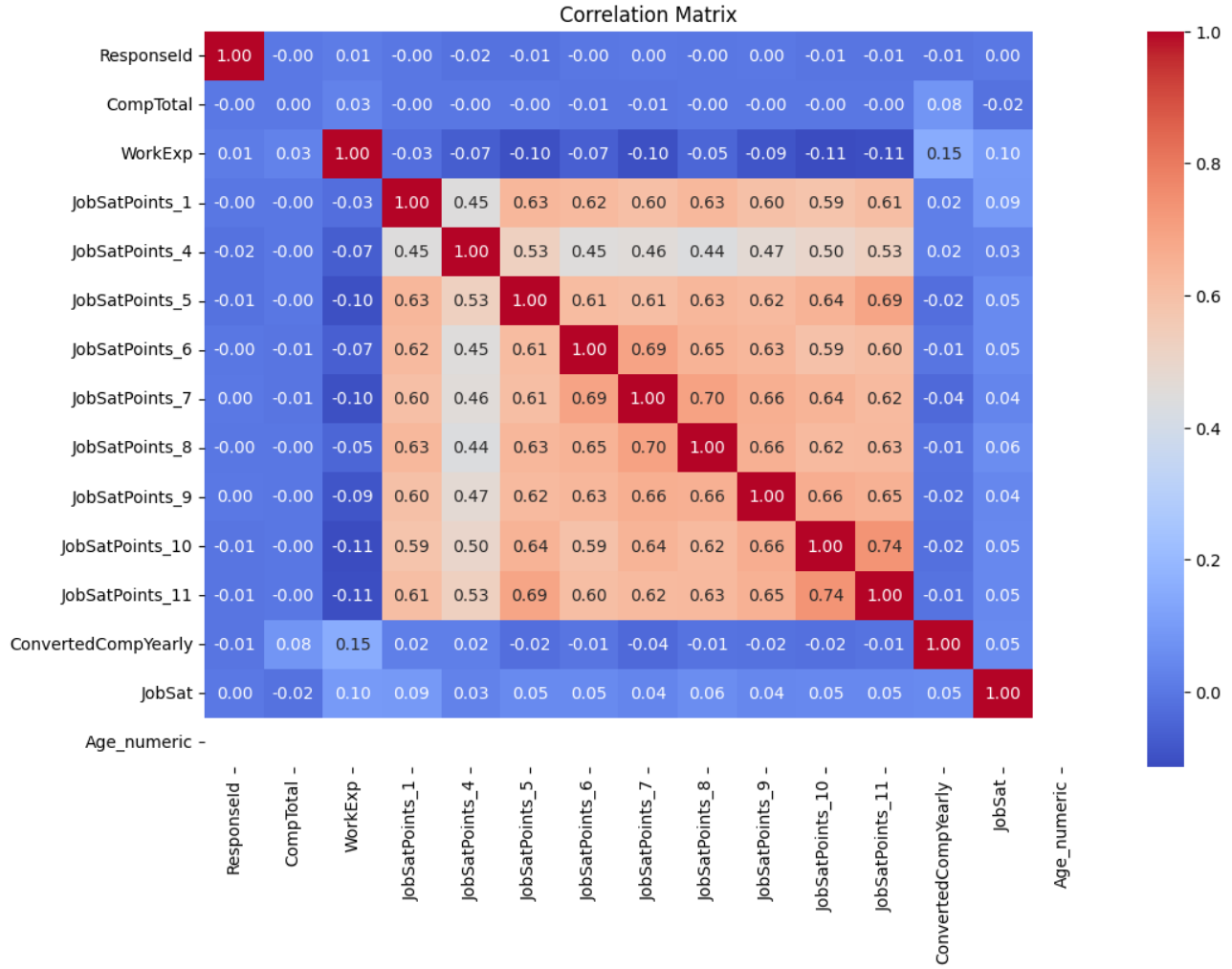
CONCLUSION

- The Stack Overflow survey analysis highlights Python's dominance, Swift's high salaries, and the prevalence of hybrid work arrangements.
- Developers should focus on learning in-demand skills, such as Python and SQL, to enhance career prospects.
- Employers and educators must align with these trends to support the evolving tech workforce.
- Future analysis could integrate job postings data and track emerging technologies over time.

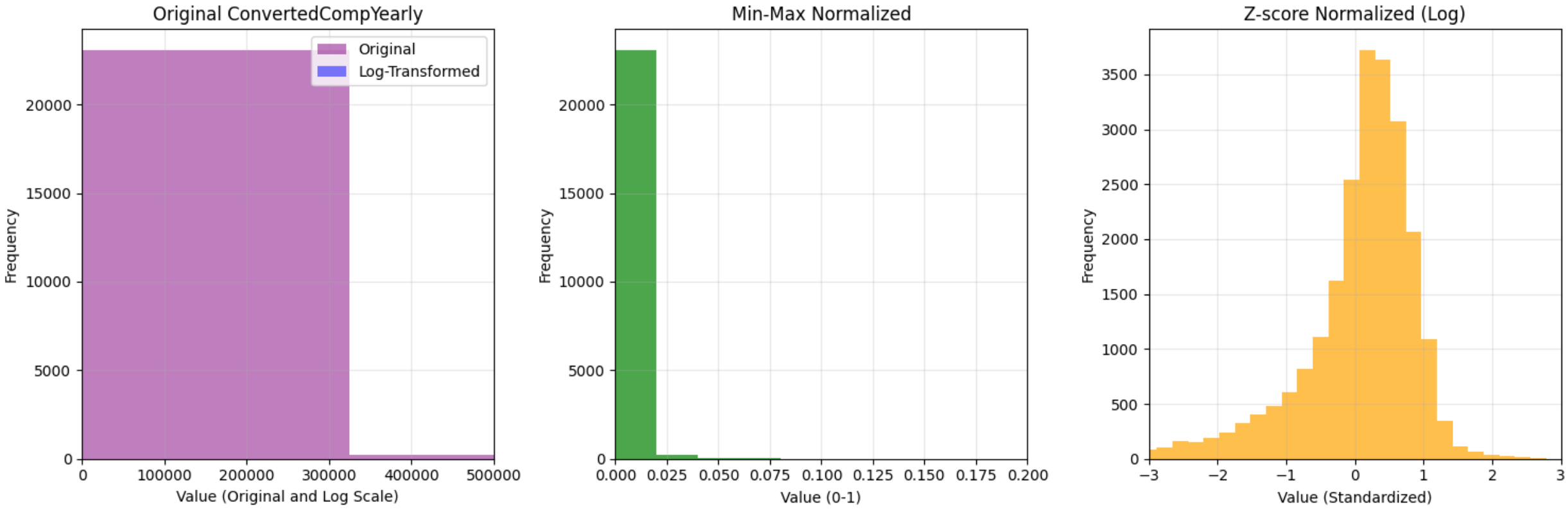
APPENDIX

Appendix: Correlation Heatmap of Numerical Variables

This heatmap visualizes correlations between numerical variables (e.g., Age_numeric, ConvertedCompYearly) to show relationships, such as the weak age-salary correlation noted in Slides 15 and 17.



Appendix:Histogram of Normalized Salary Distribution



•This histogram illustrates the distribution of normalized annual compensation (ConvertedCompYearly) after applying Min-Max and Z-score scaling.

•It highlights the skewed salary distribution, showing most developers earn below the mean, which supports findings in Slides 16 and 17.