Trends for Emerging Technologies

Ifeoma M. Megwai ifeomamegwai@gmail.com

18 February, 2023

OUTLINE

- Executive Summary
- Introduction
- Methodology
- Results
  - Visualization – Charts
  - Dashboard
- Discussion
  - Findings & Implications
- Conclusion
- Appendix

EXECUTIVE SUMMARY

- A presentation to the stakeholders and IT professionals of a global IT and business consulting services firm
- It is a presentation of the analysis and findings that showed current and future trends in programing languages, Database, Platforms and WebFrames..
- The goal of the analysis is to identify top technologies/IT skills that would be in demand next year to enable the firm make data driven decision regarding future hiring of IT professionals and keep pace with changing technologies and remain competitive.
- My task as a Data Analyst included:
  - Collection of data relevant to the analysis from various sources.
  - Data wrangling to clean up collected data and prepared same for analysis.
  - Exploratory and tailored analysis on data to understand data, identify distribution, relationships and trends among data.
  - Visualization of distribution of data, relationships between features , composition of data and comparison of data by means of appropriate charts and graphs and data visualization packages.
  - Creation of a real-time dashboard using IBM Cognos Analytics to capture the current technology usage, future technology trends and some demographics.

- The analysis in this presentation is limited to programing languages, databases, platforms and WebFrames technologies.

INTRODUCTION

- This is a descriptive, predictive, prescriptive and exploratory data analysis carried out using data from various which includes data from current technologies job posting APIs; technologies data scraped from the web and to a large extent, data from the Stack Overflow Developer Survey, 2019.
- The purpose of this analysis is to help my firm identify trend for emerging technologies and future skill requirements to enable the firm make data driven decision regarding future hiring of IT professionals and thereby keep pace with changing technologies and remain competitive in the IT and business consulting industry
- In performing this exploratory data analysis, statistical techniques were employed to analyze available data and identify insights and trends by answering questions such as:
  - What are the top programing languages that are currently in demand?
  - What are the top 5 languages likely to be in demand in the future?
  - What are the top 5 database skills that are currently in demand?
  - What are the top 5 database skills likely to be in demand in the future?
- In this presentation, the above questions will be answered as Current technology usage and Future technology trend.

METHODOLOGY

- Descriptive, Predictive and Prescriptive, and exploratory analytic approach was employed extensively.

- The dataset used in the analysis are two modified subsets of the full 2019 Stack Overflow Developer Survey dataset in csv files named m5_survey_data_demographics.csv and m5_survey_data_technologies_normalised.csv. Same were uploaded to the IBM Cognos Analytics Dashboard Embedded (CDE), and was utilized for the creation of the dashboard displayed in this presentation.

- Data from other source including tech job postings and training portals were also used. The data was gathered using job APIs, web scrapping tools (such as BeautifulSoup) that enabled the scraping of links and images from webpages and data from HTML tables. Data gathered was read to DataFrame, and subsequently read to a csv file. Analysis done using other dataset not part of 2019 Stack Overflow Developer Survey can only be seen in the Appendix section of this presentation.

- Dataset underwent data wrangling process to clean it up for analysis. Under this process, duplicate rows were identified and removed; missing value were replaced with appropriate values; normalization was also performed were necessary to make comparison among features fair.

- Next, Data underwent Exploratory and tailored analysis with the means of appropriate python libraries for better understanding of data, and to identify distribution of data in the dataset, to identify outliers and removed same and to identify relationships and trends among data such as correlation between features in the dataset.

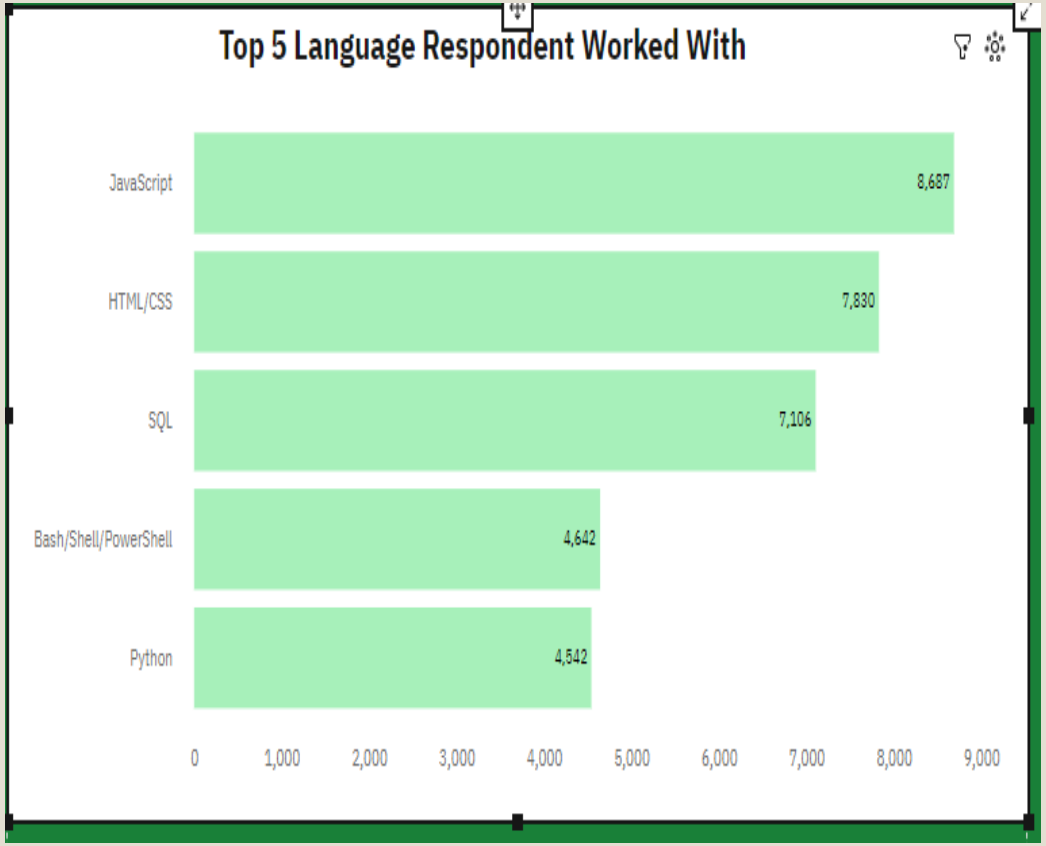
- Next, the dataset was presented in the form of RDBMS, connection was made to the database and SQL queries were used too extract necessary data from the database with which distribution of data, relationship in data between features, composition of data and comparison of data were all visualized by means of appropriate charts and graphs and data visualization packages. At the end, connection to the database was closed to free up resource.

- Lastly, based on the exploratory and tailored analysis carried out, a real-time dashboard was created using IBM Cognos Analytics Dashboard Embedded(CDE) to capture the current technology usage, future technology trends and some demographics.

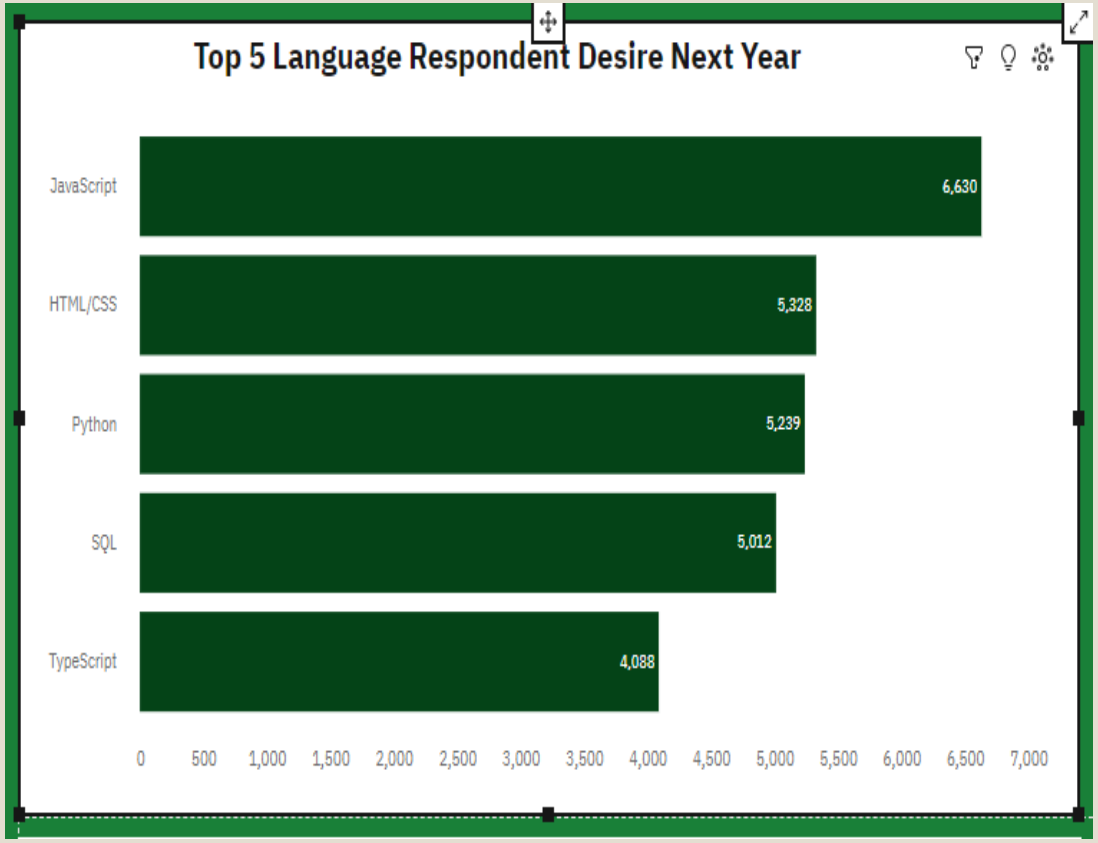
RESULTS

PROGRAMMING LANGUAGE TRENDS

Current Year



Next Year



PROGRAMMING LANGUAGE TRENDS - FINDINGS & IMPLICATIONS

Findings

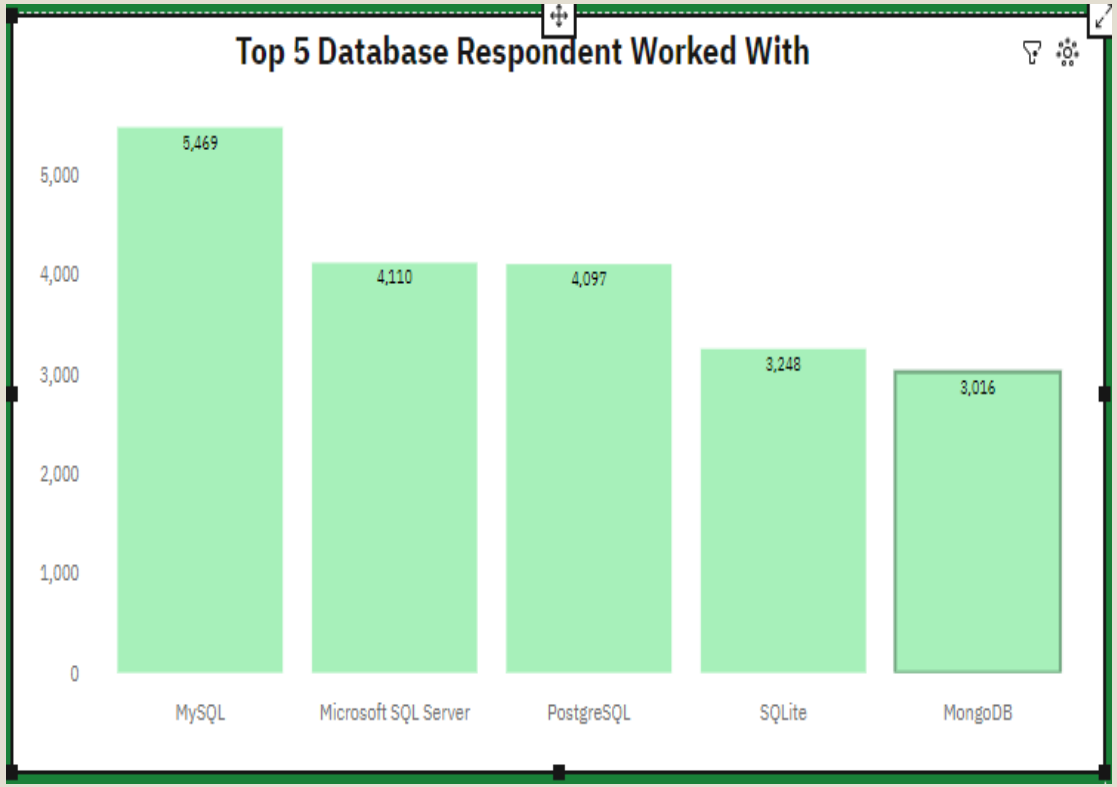
1. **Interest in JavaScript and HTML/CSS continued to top the list both in current year and next year.**
2. **Interest in Python and TypeScript appreciated largely as languages desired Next year, the bar chart showed an increase from current usage and future/next year's trend**
3. **The future trend/next year bar chart show a decline of interest in SQL and Bash/Shell/PowerShell for with the later failing to appear among the top 5 programming languages**

Implications

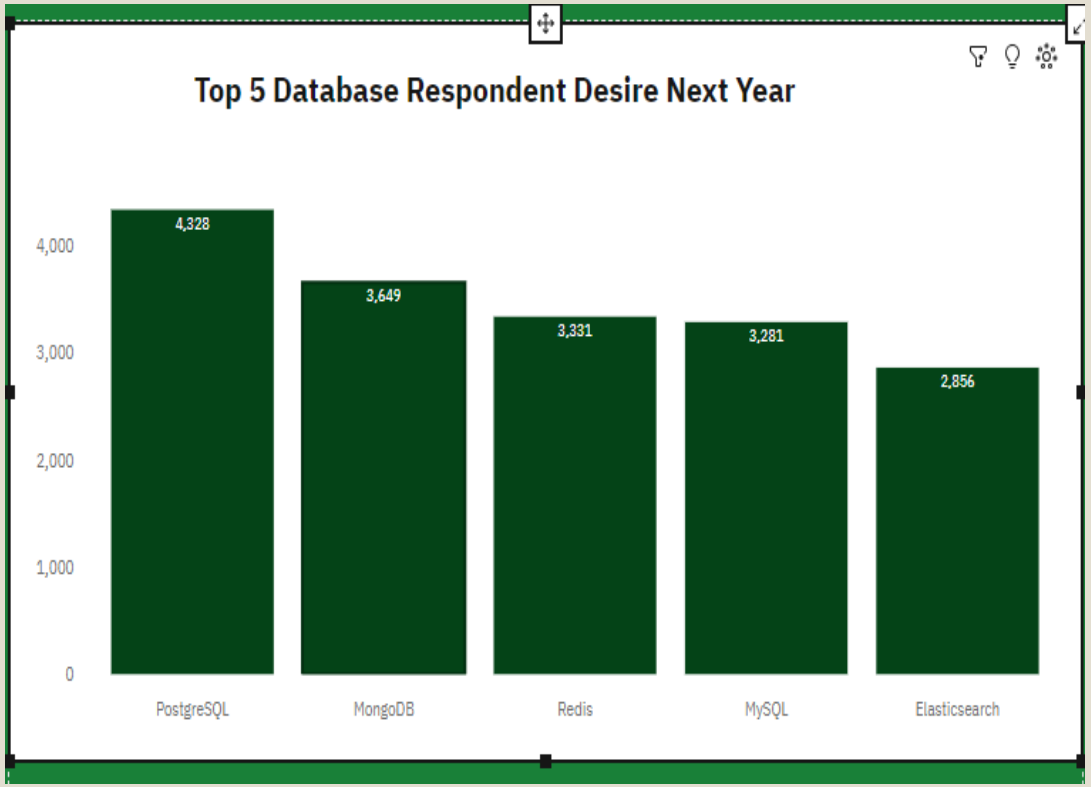
1. **JavaScript and HTML/CSS will continue to trend and demand for those skills will continue next year. The firm needs to continue to employ people skilled in those two languages. The is also need to upskill Existing employees of the firm skilled in those languages.**
2. **There will be an increased interest and demand for Python and TypeScript next year. The firm should consider employing more people skilled in those two languages. The is also need to upskill Existing employees of the firm skilled in those languages.**
3. **Demand and interest in SQL and Bash/Shell/PowerShell will decline next year. The firm should consider not making any new hire for those skills.**

DATABASE TRENDS

Current Year



Next Year



DATABASE TRENDS - FINDINGS & IMPLICATIONS

Findings

1. For the DataBase Trend, Next Year bar chart showed a large increase in Interest for PostgreSQL and MongoDB DataBase, in comparison with their position in the Current Year Bar chart. Infact, the duo topped the chart of top 5 database to trend next year.
2. Although MySQL still falls within the top 5 database in the Next Year chart, interest in same seems to be in the decline in the next year chart. Unfortunately, Microsoft SQL Server and SQLite failed to make it to the top 5 Database in the Next Year bar chart.
3. Redis and Elasticsearch made a drastic appearance among the top 5 databases in the Next Year chart.

Implications

1. There will be an increased interest and demand for PostgreSQL and MongoDB next year. To keep pace with changing technologies and remain competitive, The firm should consider employing more people skilled in those two databases. The is also need to upskill Existing employees of the firm skilled in those databases.
2. MySQL database skill will still trend next year, yet the firm should consider making less new hires for MySQL next year. The firm may also consider not making new hiring for Microsoft SQL Server and SQLite skills next year
3. There will be an increased interest and demand for Redis and Elasticsearch next year. The firm should consider making new hiring in those direction.

DASHBOARD

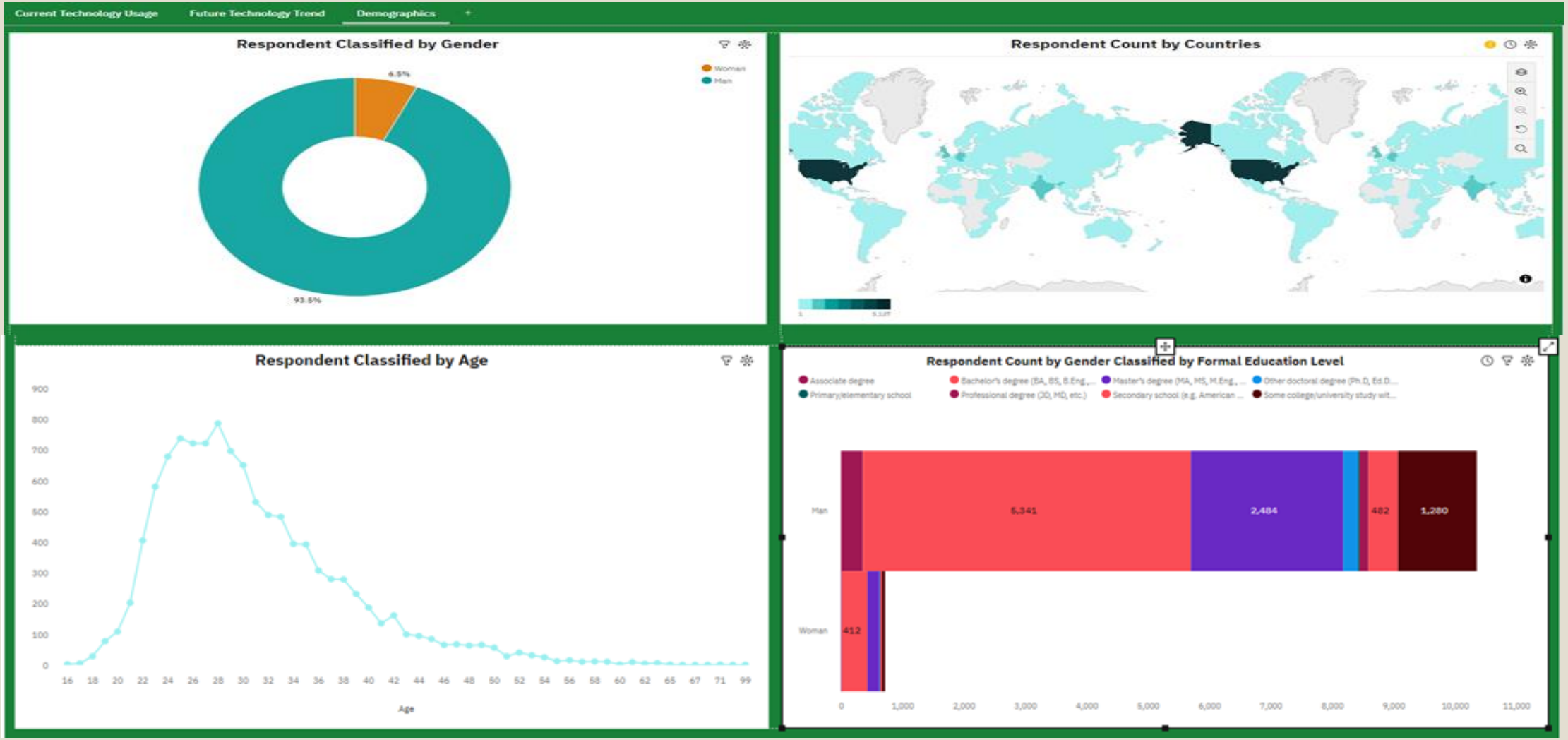
Click here to view Cognos Dashboard.

https://github.com/ifeomamegwai/mercyworks/blob/5debed1ab825600f74c9c7fae0ed7f3881910844/M5.%20IBM%20DATA%20ANALYST%20CAPSTONE%20PROJECT-%20DASHBOARD%20.pdf

DASHBOARD TAB 1: CURRENT TECHNOLOGY USAGE

DASHBOARD TAB 2: FUTURE TECHNOLOGY TREND

DASHBOARD TAB 3: DEMOGRAPHICS



DISCUSSION

OVERALL FINDINGS & IMPLICATIONS

Findings

1. Programming Language Trend: TypeScript and Python gained significant interest in the Next Year chart. Interest in JavaScript and HTML/CSS continued to grow in the Next Year. Interest in SQL and Bash/Shell/Power Shell declined in the Next Year chart.
2. Database Trend: PostgreSQL, MongoDB, Redis and Elasticsearch trended significantly in the Next Year chart. Interest in MySQL, Microsoft SQL Server and SQLite declined.
3. Platforms Trend: Linus, Docker and AWS trended significantly in the Next Year chart. Interest in Windows declined significantly.
4. Webframe Trend: Interest in React.js and Vue.js increased significantly in the Next Year chart. Angular/Angular.js and ASP.NET remained relevant. Interest in JQuery declined drastically next year, seemed same is going into extinction.

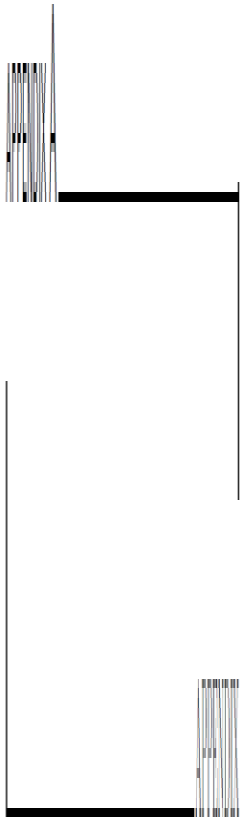
Implications

1. There will be need to upskill existing staff (if any) for JavaScript, HTML/CSS, TypeScript and Python. There will also be need to hire more people skilled in those languages. Adjustment in staff need to be made for SQL and Bash/Shell/Power Shell for which demand will likely decline next year.
2. There will be need to upskill existing staff (if any) and also hire more people skilled in PostgreSQL, MongoDB, Redis, and Elasticsearch. Adjustment in staff need to be made for MySQL, Microsoft SQL Server and SQLite for which demand will likely decline next year.
3. There will be need to upskill existing staff (if any) and also hire more people skilled in Linus, Docker and AWS. Adjustment in staff need to be made for Windows for which interest is likely to decline significantly next year.
4. There will be need to upskill existing staff (if any) and also hire more people skilled in React.js, Vue.js, Angular/Angular.js and ASP.NET. On the other hand, adjustment in staff need to be made for JQuery which is almost gone into extinction.

CONCLUSION

The essence of this analysis, as earlier stated was to help identify trends for emerging technologies and future skill requirements to enable the firm make data driven decision regarding future hiring of IT professionals so as to keep pace with changing technologies and remain competitive in the IT and business consulting industry. Following the result and findings from the analysis as included under the result and discussion section of the report, the following is recommended:

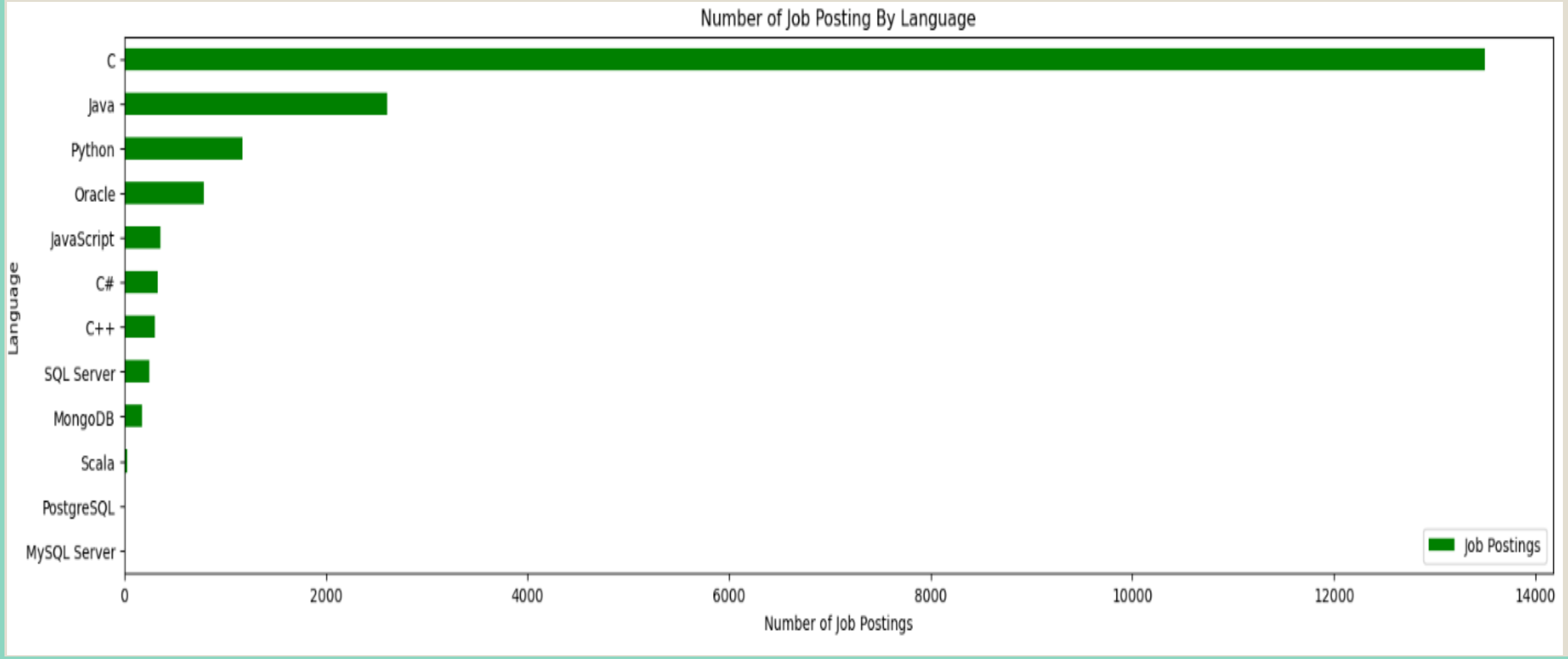
- Make plans to upskill existing staff (if any) for technologies identified under the result and discussion section of the report as technologies likely to trend next year.
- Make plans to hire more staff to fill up vacancies (if any) for technologies identified under the result and discussion section of the report as technologies likely to trend upwardly next year.
- Make necessary adjustment in existing staff for technologies identified under the result and discussion section of the report as technologies that will likely not be in demand next year in order to free up resources for other essential hires.
- Update existing work tools, libraries and licenses. Install necessary new tools, libraries and acquire corresponding licenses to accommodate the new technologies that will trend next year.
- Finally, due to the changing nature of technologies, it is recommended that the results discussed in this report is to be considered as valid only for next year, after which another analysis is advised to accommodate the emerging technologies.



APPENDIX

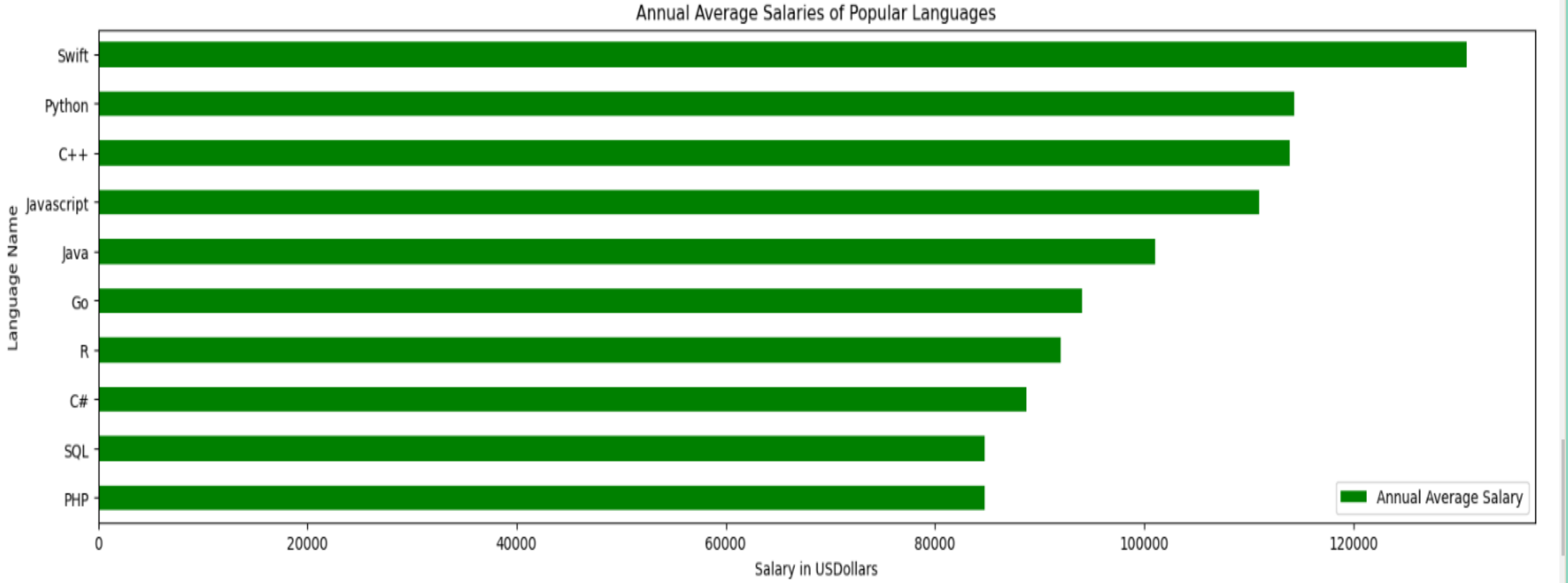
JOB POSTINGS

In Module I of this project, I have collected the job posting data using Job API in a file named "job-postings.xlsx". The data is presented below using a horizontal bar chart. The bar chart is ordered in the descending order of the number of job postings.



POPULAR LANGUAGES

In Module 1, I have collected the job postings data using web scraping in a file named "popular-languages.csv". The collected data is presented below using a bar chart and the bar chart is ordered in the descending order of salary in US Dollars.



RESOURCES

- https://stackoverflow.blog/2019/04/09/the-2019-stack-overflow-developer-survey-results-are-in/
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/LargeData/m5_survey_data_demographics.csv
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/LargeData/m5_survey_data_technologies_normalised.csv
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/labs/datasets/Programming_Languages.html
- https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DA0321EN-SkillsNetwork/labs/module%201/Accessing%20Data%20Using%20APIs/jobs.json