Changes in Big Data Analytics Skills: Analyzing Post-Pandemic Job Market Trends

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***Abstract*—This study examines the evolving skill requirements for Big Data Analytics professionals in the post-COVID-19 job market. Using web scraping techniques, we collected data from 193 job postings on Indeed.com during June and July 2023. Through exploratory data analysis and visualization, we identified key trends in demanded skills and their categorization. Our findings provide insights into the current industry demands, highlighting the importance of machine learning, AI, and data science skills. This research aims to help students and professionals in the field align their skillsets with current market needs.**

Keywords—big data, data science, job market, EDA, web-scraping

I. Introduction (*Heading 1*)

The field of Big Data Analytics has seen significant changes since its initiation, particularly after the COVID-19 pandemic. As businesses increasingly rely on data-driven decision-making, the demand for skilled professionals in this area continues to grow. However, the specific skills required by the industry are in constant movement, creating a potential gap between academic preparation and market demands [1].

This study aims to analyze the current skill requirements in the Big Data Analytics job market, providing an updated perspective on the industry's needs. By examining job postings from Indeed.com, we seek to identify trends in skill demands.

II. Previous Work

Previous research has highlighted the importance of aligning academic curricula with industry needs in the field of Big Data Analytics. Wieczorek (2019) examined the congruence between data skills demanded by the industry and Canadian academic preparation [1]. Stanton and Stanton (2020) conducted a comprehensive industry assessment of entry-level requirements for analytics careers [2]. De Mauro et al. (2018) proposed a systematic classification of job roles and required skill sets for Big Data professions [3].

Persaud (2020) identified that executives rarely indicate that workers have the competencies for their work and they have to bring additional training [4]. In 2017, still before pandemic, Gardinet et al. (2017) found in their analysis how soft skills were highly valued by employers for big data [5]. Verma et al. (2019) after a similar investigation across job posts found that while decision-making, organization, communication, and data management are important across all jobs, technical skills like statistics and programming are particularly crucial for data analysts [6].

These studies provide a foundation for understanding the skills gap in the Big Data Analytics field. However, given the rapid changes in technology and the impact of the COVID-19 pandemic, an updated analysis is necessary to reflect current market trends.

III. Methodology

A. Data Collection

We used a web scraping technique based on code by Gana Ebenezer (https://github.com/Eben001/IndeedJobScraper) to collect job postings from Indeed.com. The search was conducted using keywords "Data Science" and "Big Data Analytics" for positions in Canada during June and July 2024. We collected information on job title, company, date posted, location, and job requirements for 193 job postings.

B. Data Preprocessing

The collected data was cleaned and preprocessed using Python. We extracted specific skills mentioned in the job requirements obtaining more than 1200 job-skill combinations and categorized them into 11 predefined skill categories. This categorization allows for a more structured analysis of the skill demands.

C. Exploratory Data Analysis

We conducted an exploratory data analysis using various visualization techniques to uncover patterns and trends in the data. The analysis focused on skill frequencies, skill categories, geographical distribution of jobs, and relationships between different skills.

IV. Results

Our exploratory data analysis revealed several key insights into the current Big Data Analytics job market. Figure 1 presents a word cloud visualization of all job requirements, highlighting the most frequently mentioned terms in job postings. The prominence of words like "data," "analytics," "machine learning," and "business" indicates the interdisciplinary nature of Big Data Analytics roles. We can also see how a computer science background is often required for these positions

Fig. 1. Word Cloud of Job Requirements

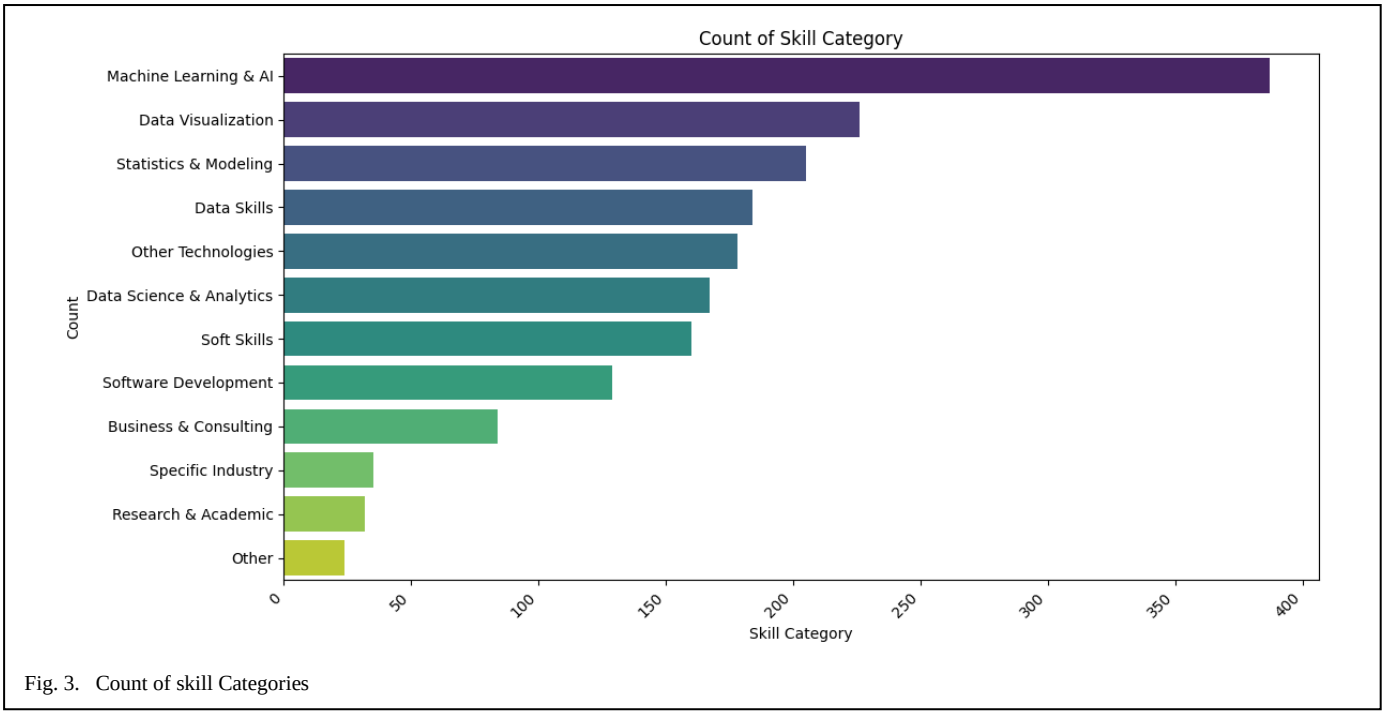

Fig. 3. Count of skill Categories

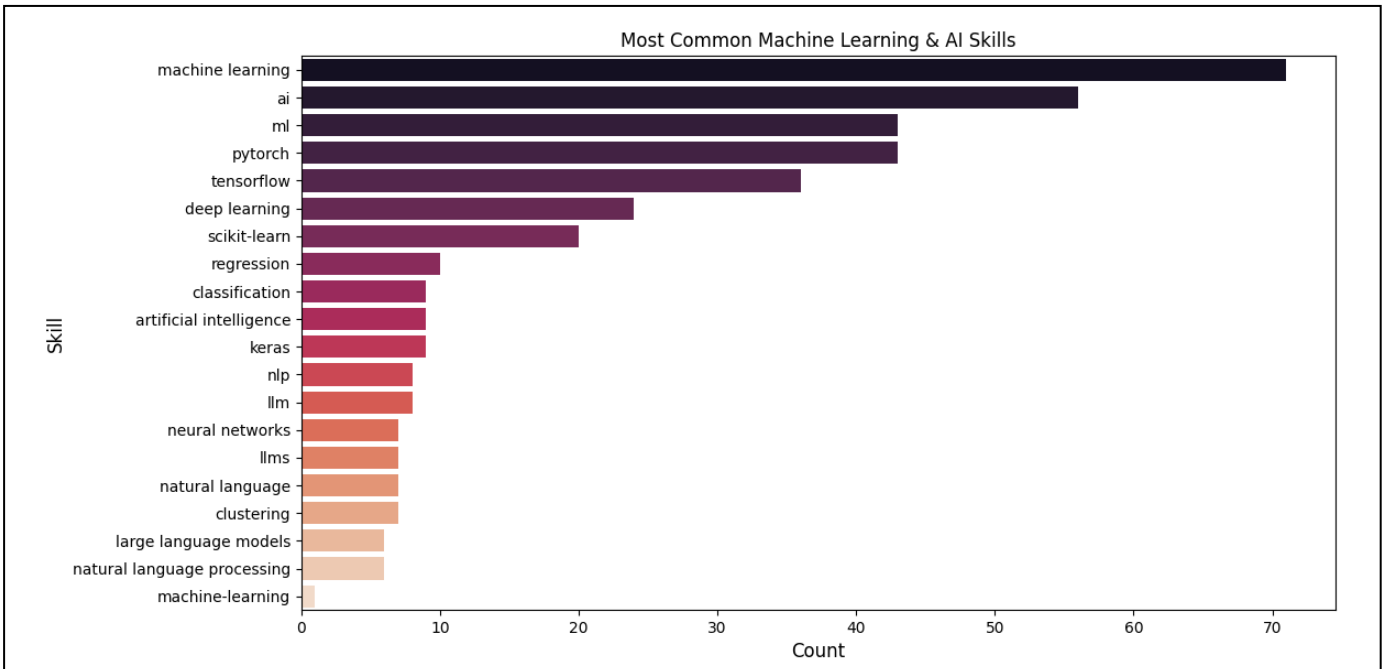

Fig. 2. Machine Learning & AI Category skills

Figure 2 displays a bar chart showing the count of skills across different categories. We observe that "Data Visualization", “Statistics & Modeling”, and a significant advantage of "Machine Learning & AI" are among the most frequently mentioned categories, indicating a strong industry focus on these areas. Figure 3 zooms in on the "Machine Learning & AI" category, showing a breakdown of specific skills within this domain. This detailed view reveals that general “machine learning” and it’s different tools are highly sought after, followed by specific areas like "AI" and "deep learning."

Figure 4 presents a histogram showing the distribution of the number of skills required per job posting. The distribution appears to be roughly normal, with most job postings requiring a moderate number of skills, while some positions demand a more extensive skill set. The statistical summary provided in Table 1 offers quantitative insights into skill demands, helping job seekers understand the typical range of skills they should aim to develop.

Table 2 shows the top 10 most common skill pairs, revealing which skills are frequently requested together. This provides valuable information for understanding how different skills complement each other in the job market. A clear example of how soft skills are important is that apart from python being in the top pair, also the communication skill appears among the top pairs.

Figure 5 illustrates the number of Data Science jobs by province, helping identify the major hubs for Big Data

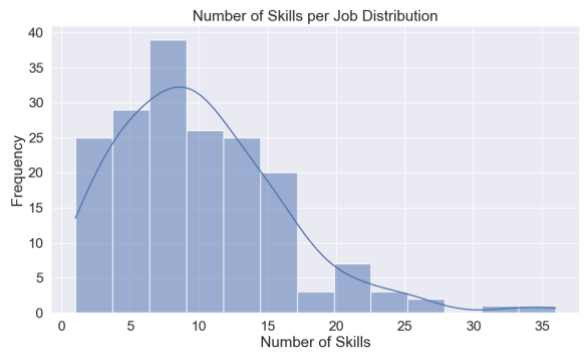

Fig. 4. Skills per job Distribution

Analytics jobs in Canada. It appears that provinces with large tech sectors, such as Ontario, Quebec, and British Columbia, have a higher concentration of job postings. In the window of time where the post were analyzed, the clear majority of job posts came from the Ontario region. This information is useful for a student searching where to develop his potential in big data.

Finally, Figure 6 presents radar charts showing the top 5 skill categories for each province. These visualizations allow us to compare how skill demands vary across different regions of Canada, potentially reflecting differences in local industry focuses. Apparently the province where companies are looking for a more complete profile is in Quebec, while most provinces focusing mainly in Machine Learning and AI

These visualizations collectively provide a comprehensive view of the current Big Data Analytics job market in Canada, offering insights into skill demands, geographical distribution, and the interrelationships between various skills and categories.

TABLE I. SKILLS COUNT PER JOB STATISTICS

Count	181
Mean	10.01
Standard Deviation	6.15
Min.	1
25%	5
50%	9
75%	13
Max.	36

TABLE II. TOP 10 MOST COMMON SKILL PAIRS

Pairs	Count
(python, machine learning)	52
(python, communication)	51
(python, sql)	42
(python, programming)	37
(communication, sql)	37
(machine learning, communication)	36
(python, pytorch)	35
(python, data science)	35
(python, models)	34
(python, development)	33

V. CONCLUSIONS

Our analysis of recent job postings in the Big Data Analytics field reveals several key trends in the post-pandemic job market. There is a strong demand for skills in machine learning and artificial intelligence, reflecting the growing importance of these technologies across industries. The job market requires a combination of technical skills (like programming and statistics) and business specific knowledge, highlighting the need for well-rounded professionals.

While the demand for Big Data Analytics professionals is widespread across Canada, there are noticeable differences in skill emphases between provinces with a strong focus of the market in Ontario. Most job postings require a diverse range of skills, indicating that professionals in this field need to be versatile and continually updating their skill sets. The presence of skills related to large language models (LLMs) in job postings suggests that the industry is quickly adapting to recent advancements in AI.

These findings can guide students and professionals in the Big Data Analytics field in focusing their skill development efforts. Additionally, academic institutions can use this information to align their courses with current industry needs. While our study provides valuable insights, it's important to note its limitations. The data is limited to a specific time frame in the year, there are periods when recruiters are more active. Also the Quebec market may be misrepresented because we only analyze job post written in English, while many postings in Quebec are in French. Future studies could benefit from a longer-term analysis and international comparison.

The evolving landscape of Big Data Analytics job requirements underscores the dynamic nature of this field. As technology continues to advance and business needs shift, professionals in this area must remain adaptable and committed to lifelong learning. The principal shift in the job market of Big Data Analytics after the pandemic is the strong focus on Machine Learning and Artificial Intelligence. Our study provides a snapshot of the current market demands, offering a valuable resource for those seeking to enter or advance in the field of Big Data Analytics.

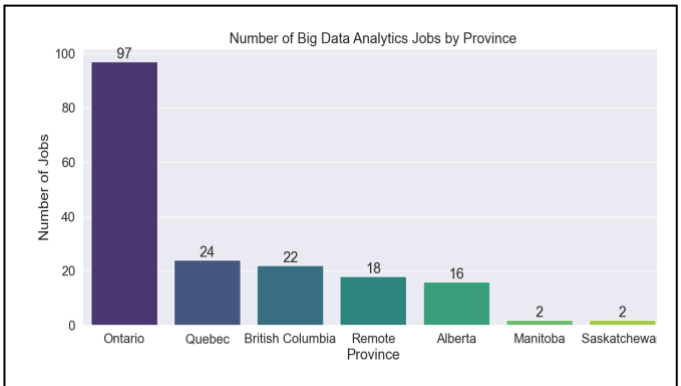

Fig. 5. Big Data Analytics jobs by Province

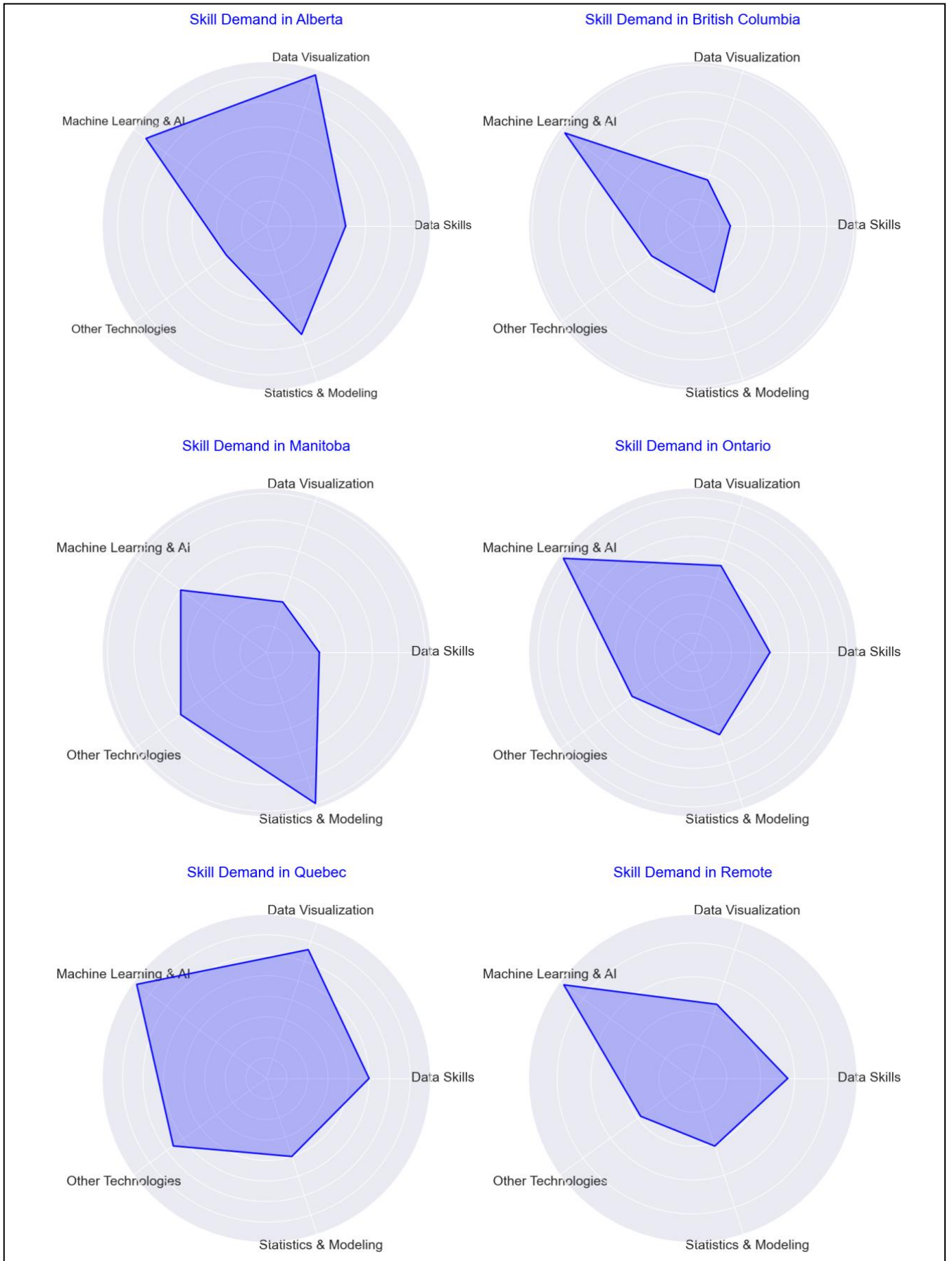

Fig. 6. Skill Demands in Provinces

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