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Data-Analyst Job Demands and Their Relationship With Economic Strength in the United States

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ABSTRACT

As more and more organizations recognize the importance of data analytics, more and more academic departments and professional training programs engage in training future data analysts. However, not all geographical regions, states, or business industries have the same level of demand for data analysts. Based on over 2,500 data-analyst job advertisements posted on LinkedIn and utilizing Chi Square and Wilcoxon tests, this study examined which geographical regions, which states, and which business industries in the United States have the most or least demand for data analysts; it also explored the possible relationship between a state's demand for data analysts and its economic strength. Among many findings, the study discovered that the larger a state's economic strength or growth, the stronger its demand for data analysts.

KEYWORDS

Business Industry, Data Analysis, Data Analyst, Data Analytics, Economic Growth, Economic Strength, GDP, Job Demand, LinkedIn, State Economy

INTRODUCTION

As modern organizations continue to increase their dependency on data analysis and offer more and more job opportunities in data analytics, the impact of data analytics continues to reach new heights and widths. More and more people believe that data analytics enable organizations to make better-informed decisions based on insights derived from large datasets, leading to improved operational efficiency, innovation, and new opportunities, ultimately contributing to overall economic growth.

One direct result is that more and more academic institutions begin to offer data analytics degrees or include data analytics in their curriculums to prepare their students with data analytics knowledge

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and skills. Another direct result is the increasing amount of research devoted to the study of various skills colleges and universities should teach their students in order to adequately prepare them for the job of data analyst.

As data analytics continues to attract the attention of the business and academic worlds, one might wonder where in the United States and in which industries data analyst jobs might be most needed. Furthermore, is there any correlation between demands for data analysts and economic strength or growth?

Through an investigation of relevant job advertisements on LinkedIn and an analysis of regional gross domestic products (GDPs), this study aims to discover the regions, states, and industries that have the most need for data analysts and explore any possible relationship that might exist between demand for data analysts and economic strength or growth in the United States. Specifically, this study aims to discover whether significant differences exist among the various geographic regions among the identified industries in the United States in terms of demand for data analysts, whether significant differences exist among various industries in terms of demand for data analysts, whether significant differences exist in rankings between data-analyst job postings in the states and their GDPs, and whether significant differences exist in rankings between data-analyst job postings in the states and their GDP growth rates.

This study's valuable insights not only help government and business organizations in their economic or business planning, but also help college graduates know where in the country and in which industry to develop their data-analytics careers.

LITERATURE REVIEW

LinkedIn-Related Research

Ever since the emergence of social networks, the advantages and disadvantages of business organizations' use of social media or social networks for disseminating information have been studied (Iftikhar & Khan, 2020; Le, 2019; Panigrahi, 2016; Sohaib, 2021; Sun et al., 2022; Vakeel & Li et al., 2022). One such social network is LinkedIn.

Since May 2003, when LinkedIn was officially launched, it has grown tremendously both in platform functionality and in user base, becoming one of the world's most important social platforms for knowledge sharing and information dissemination. Consequently, it has also become an important object of study for scholars. Some have examined the technological aspects of LinkedIn (Sumbaly et al., 2013), some have studied the user aspects of LinkedIn (Baruffaldi et al., 2017), and others have analyzed the effectiveness of LinkedIn applications (Cooper & Naatus, 2014; Hutchins, 2016; Unkelos-Shpigel et al., 2015).

Using data collected on LinkedIn, researchers have also completed studies of topics other than LinkedIn itself. Aiming to explore important knowledge required by Industry 4.0 jobs, Pejic-Bach et al. (2020) collected 1,460 job ads related to Industry 4.0 from LinkedIn. They found the top ten most frequently appearing phrases to be "supply chain," "project management," "machine-learning," "big data," "computer science," "internet of things," "software development," "digital manufacturing," "product development," and "business development," suggesting these to be the most important areas of knowledge for Industry 4.0 jobs. Others focused on data-analyst job ads posted on LinkedIn, identifying essential requirements of that field (Zhang et al., 2023) and exploring relationships between business domains and corresponding technical skills required (Zhang et. al., 2024).

LinkedIn as a Recruitment Platform

One particular application of LinkedIn is recruitment. LinkedIn has been regarded as the most popular professional site used by applicants and recruiters worldwide (Zide et al., 2014). Throughout the years, LinkedIn has significantly helped change the landscape of recruitment and personnel selection to a unified organizational process (Aguado et al., 2019).

Consequently, recruitment via LinkedIn has attracted the attention of many researchers. Some studied recruitment via LinkedIn by analyzing user profiles and user presentations and found LinkedIn to be an essential recruitment tool for business organizations specializing in information and communication technologies (Pinho et al., 2019). Others studied recruitment via LinkedIn from the perspective of employers. One particular study, based on interviews with recruiters, concluded that recruiters could not execute effective recruitment without applying social media tools such as LinkedIn (Koch et al., 2018). Another study concluded that LinkedIn was an important recruitment tool and that, all other things being equal, candidates with professional resumes on LinkedIn would be preferred by most employers (Hosain & Liu, 2020).

DATA ANALYTICS

As the world evolves from Industry 3.0 to Industry 4.0, more and more routine operations are being replaced by “smart decisions” in organizations. However, smart decisions often depend on the collection and analysis of large amounts of business data; in other words, to make truly smart decisions, data analytics is essential. Numerous research studies have analyzed such significance.

Some concluded that with the evolution of the social web and the massive amount of data generated, data analytics plays a critical role in the development of a smart and sustainable industry (Sharma & Pandey, 2020). Others focused on business analytics, a major area of data analytics, and performed a systematic literature review of 169 journal articles published from 2010 to 2020 on the usage of business analytics within the Industry 4.0 concept, and provided a mapping of how data analytics supported Industry 4.0 (Silva et al., 2021). Believing that the integration of artificial intelligence (AI) in data analytics was revolutionizing various industries, driving significant economic transformation, and reshaping the workforce, some researchers explored the multifaceted impact of AI-driven data analytics, identifying both the promising opportunities and formidable challenges resulting from AI. They concluded that AI significantly enhanced data processing capabilities, leading to improved decision-making and operational efficiencies (Barua et al., 2024).

As a relatively new field of specialization, data analytics is certainly gaining worldwide recognition.

Data Analytics and Economic Growth

While data analytics is a relatively new field of study, economic growth has been a century-old topic for researchers. In the United States alone, many journals are devoted to this topic such as *Journal of Economic Growth*, *American Economic Review*, *Quarterly Journal of Economics*, *Journal of Development Economics*, and *World Development*. Countless studies have been conducted, and innumerable papers have been published on topics such as economic growth theories, the role of institutions, technological innovation, human capital, trade openness, global trade and growth, human capital and growth, and environmental sustainability in driving economic growth.

Among the vast number of published studies on economic growth, a few examined the potential impact of data analytics on economic growth. One study examined existing literature on big data and identified a list of challenges linked with big data analytics in governance and achievement of sustainable development goals and compared different ways of dealing with the challenges in using big data (Vaid, 2022). Another study examined the pivotal role of data analytics in fostering business innovation and economic growth across various industries in India. Through a comparative analysis of e-commerce, fast food, and social media platforms, this study explored how data-driven insights were reshaping business strategies and market dynamics. The study investigated the implementation of big data analytics in small and medium enterprises, the growth of the fast-food industry in India, and the utilization of analytics tools across social media platforms. The study highlighted the transformative impact of data analytics on business performance, customer engagement, and overall economic development (Singh et al., 2024).

One recent study concluded that comprehensive studies of big data analytics' potential impact on innovation capability and technological cycle remained scarce. The study therefore investigated the impact of big data analytics on innovation capability, technological cycle, and firm performance and found that both innovation capability and firm performance were significantly influenced by big data technology (Sivarajah et al., 2024).

Although our literature review found a few papers that studied the impact of data analytics on various aspects of business operations as mentioned above, we were unable to find any paper that specifically analyzed demands for data analysts and their potential relationship with economic strength or growth. Therefore, in this study, we examine the distribution of data-analyst jobs across geographical regions, states, and industries in the United States, identify geographical regions, states, and industries that have the strongest demands for data analysts, and further explore possible relationships between demands for data analysts and economic strength or growth.

RESEARCH METHODOLOGY

Data Collection

The dataset underpinning this study was sourced from LinkedIn, a preeminent platform renowned for offering a spectrum of professional social-networking services to job seekers, professionals, and businesses. The platform allows job seekers to showcase their resumes and employers to advertise jobs. As of 2021, LinkedIn boasted an impressive membership of 756 million registered users in more than 200 countries and territories worldwide, thus cementing its status as one of the largest global professional networks. The robust user base and its dedicated focus on professional networking render the dataset appropriate for this study's research context.

Data collection was conducted between June 9, 2021, and June 30, 2021, focusing on full-time data-analyst job ads newly posted on LinkedIn each day, covering a range of 22 days. Throughout the study, a comprehensive compilation of 2,513 data-analyst job advertisements was amassed. Since this study was based on actual job ads and each job ad clearly described the job-location state and associated industry, we did not follow any text-mining methodology in establishing the relevant criteria for the study. Instead, we read each job description and identified and recorded the state and industry described in the job ads. This recording, together with the relevant economic data collected and aggregated from the U.S. Bureau of Economic Analysis website (2023), formed the bedrock for subsequent analyses within this study.

Data Classification

In this study, the 50 U.S. states and the District of Columbia are grouped into eight geographical regions as specified by the U.S. Bureau of Economics, shown in Table 1:

Table 1. Composition of geographical regions

Region no.	Region Name	States Included
1	New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
2	Mideast	Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania
3	Great Lake	Illinois, Indiana, Michigan, Ohio, Wisconsin
4	Plains	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota

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Table 1. Continued

Region no.	Region Name	States Included
5	Southeast	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia
6	Southwest	Arizona, New Mexico, Oklahoma, Texas
7	Rocky Mountain	Colorado, Idaho, Montana, Utah, Wyoming
8	Far West	Alaska, California, Hawaii, Nevada, Oregon, Washington

Note. No. = number.

Based on the specified organization types, the 2,513 data analytics job ads are grouped into 12 industries as specified by the U.S. Bureau of Economics, shown in Table 2:

Table 2. Classification of industries

Industry no. in This Study	Industry Code Specified by U.S. Bureau of Economics	Description
1	31–33	Manufacturing
2	53	Real estate and rental and leasing
3	61, 62	Educational services, health care, and social assistance
4	52	Finance and insurance
5	42	Wholesale trade
6	44–45	Retail trade
7	51	Information
8	71, 72	Arts, entertainment, recreation, accommodation, and food services
9	23	Construction
10	54, 55, 56	Professional and business services
11	11, 21, 22, 48–49, 81	Other services (except government and government enterprises)
12	92	Government and government enterprises

Note. No. = number; U.S. = United States.

Data Analysis

To provide direction for the study, the following four hypotheses were proposed:

Hypothesis 1: No significant differences exist among the eight geographic regions in the United States in terms of demand for data analysts as indicated by job postings on LinkedIn.
Hypothesis 2: No significant differences exist among the identified industries in terms of demand for data analysts as indicated by data-analyst job postings on LinkedIn.
Hypothesis 3: No significant differences exist between rankings of data-analyst job postings in the states and rankings of their GDPs.
Hypothesis 4: No significant differences exist between rankings of data-analyst job postings in the states and rankings of their GDP growth rates.

The significance level for the testing of all these hypotheses was set to 0.05. In other words, if a produced *p*-value from an inferential test was larger than 0.05, the corresponding hypothesis was accepted; otherwise, the hypothesis was rejected.

Chi-square tests were utilized to analyze data-analyst job distributions across the eight geographical regions of the United States and across the 12 industries. Wilcoxon tests were employed to explore possible relationships between demand for data-analyst jobs (as represented by the number of data-analyst job postings) and economic strength (as represented by GDP and GDP growth).

RESULTS AND DISCUSSION

Table 3 shows the distribution of the 2,513 data-analyst job postings across the 50 states and the District of Columbia in the United States along with 2021 GDP and 2022 GDP for each state or district.

Table 3. Data-analyst job postings and gross domestic products by state

Region	State/District Abbreviation and Name		No. of Job Postings	2021 GDP	2022 GDP	2021–2022 GDP Growth
5	AL	Alabama	20	257,986.5	281,569.0	23,582.5
8	AK	Alaska	0	58,646.0	65,698.8	7,052.8
5	AR	Arkansas	15	151,931.9	165,989.3	14,057.4
6	AZ	Arizona	46	432,279.8	475,653.7	43,373.9
8	CA	California	432	3,416,939.4	3,641,643.4	224,704.0
7	CO	Colorado	58	447,051.7	491,289.0	44,237.3
1	CT	Connecticut	20	295,907.5	319,344.8	23,437.3
2	DC	District of Columbia	52	156,139.9	165,060.5	8,920.6
2	DE	Delaware	3	82,952.8	90,208.3	7,255.5
5	FL	Florida	78	1,292,391.3	1,439,065.0	146,673.7
5	GA	Georgia	120	701,606.1	767,377.6	65,771.5
8	HI	Hawaii	1	93,089.8	101,082.6	7,992.8
7	ID	Idaho	0	98,792.8	110,871.1	12,078.3
3	IL	Illinois	135	943,993.3	1,025,667.2	81,673.9
3	IN	Indiana	20	422,951.9	470,323.6	47,371.7
4	IA	Iowa	8	220,818.2	238,342.3	17,524.1
4	KS	Kansas	17	191,831.7	209,326.1	17,494.4
5	KY	Kentucky	12	237,925.9	258,981.2	21,055.3
5	LA	Louisiana	5	263,162.7	291,951.9	28,789.2
1	MA	Massachusetts	102	645,434.0	691,460.6	46,026.6
2	MD	Maryland	45	446,941.0	480,112.7	33,171.7
1	ME	Maine	2	78,918.4	85,801.2	6,882.8
3	MI	Michigan	62	576,502.2	622,562.7	46,060.5
4	MN	Minnesota	34	413,063.1	448,032.4	34,969.3
4	MO	Missouri	41	365,145.4	396,889.9	31,744.5

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Table 3. Continued

Region	State/District Abbreviation and Name		No. of Job Postings	2021 GDP	2022 GDP	2021–2022 GDP Growth
5	MS	Mississippi	4	128,364.5	139,976.4	11,611.9
7	MT	Montana	0	59,996.7	67,071.9	7,075.2
5	NC	North Carolina	92	659,529.3	715,968.3	56,439.0
4	ND	North Dakota	1	63,208.6	72,651.3	9,442.7
4	NE	Nebraska	5	149,360.3	164,933.9	15,573.6
1	NH	New Hampshire	9	99,100.0	105,024.6	5,924.6
2	NJ	New Jersey	61	692,227.3	754,948.2	62,720.9
6	NM	New Mexico	13	111,730.6	125,540.6	13,810.0
8	NV	Nevada	10	200,127.3	222,938.6	22,811.3
2	NY	New York	270	1,911,345.8	2,048,402.6	137,056.8
3	OH	Ohio	53	759,626.2	825,990.0	66,363.8
6	OK	Oklahoma	8	217,730.8	242,738.5	25,007.7
8	OR	Oregon	30	275,444.0	297,308.9	21,864.9
2	PA	Pennsylvania	81	844,391.6	911,813.3	67,421.7
1	RI	Rhode Island	12	67,236.7	72,771.4	5,534.7
5	SC	South Carolina	13	271,494.5	297,546.3	26,051.8
4	SD	South Dakota	1	62,607.1	68,781.7	6,174.6
5	TN	Tennessee	40	438,180.0	485,657.5	47,477.5
6	TX	Texas	213	2,087,490.9	2,402,137.2	314,646.3
7	UT	Utah	46	232,125.1	256,369.9	24,244.8
5	VA	Virginia	106	613,920.3	663,105.5	49,185.2
1	VT	Vermont	3	37,593.5	40,830.8	3,237.3
8	WA	Washington	82	688,631.9	738,101.4	49,469.5
3	WI	Wisconsin	30	369,032.4	396,209.3	27,176.9
5	WV	West Virginia	1	86,509.9	97,417.3	10,907.4
7	WY	Wyoming	1	42,176.2	49,080.6	6,904.4

Note. No. = number; GDP = gross domestic product. GDP shown in millions of dollars.

Demands for Data Analysts Across States

As shown in Table 3 above, the three states that had the greatest demands for data analysts were California with 432 job postings, New York with 270 job postings, and Texas with 213 job postings. California is the most populous state and has the most diversified economy, and more importantly, it is also one of the most important technology centers in the world. New York is one of the largest finance centers in the world, and Texas is another important technology center. All three states have many world-class business organizations and deal with large business and government datasets. It is understandable that these three states should have the most demands for data analysts.

The next seven states that had sizeable demands for data analysts were Illinois with 135 job postings, Georgia with 120 job postings, Virginia with 106 job postings, Massachusetts with 102 job postings, North Carolina with 92 job postings, Washington with 82 job postings, and Pennsylvania with 81 job postings.

Twelve states had fewer than five data-analyst job postings, suggesting a minimum demand for data analysts. They were Alaska (0), Idaho (0), Montana (0), Hawaii (1), North Dakota (1), South Dakota (1), West Virginia (1), Wyoming (1), Maine (2), Delaware (3), Vermont (3), and Mississippi (4).

The differences across states in total number of data-analyst job postings are more easily notable in Figure 1 below:

Figure 1. Graphical display of demands for data analysts by states

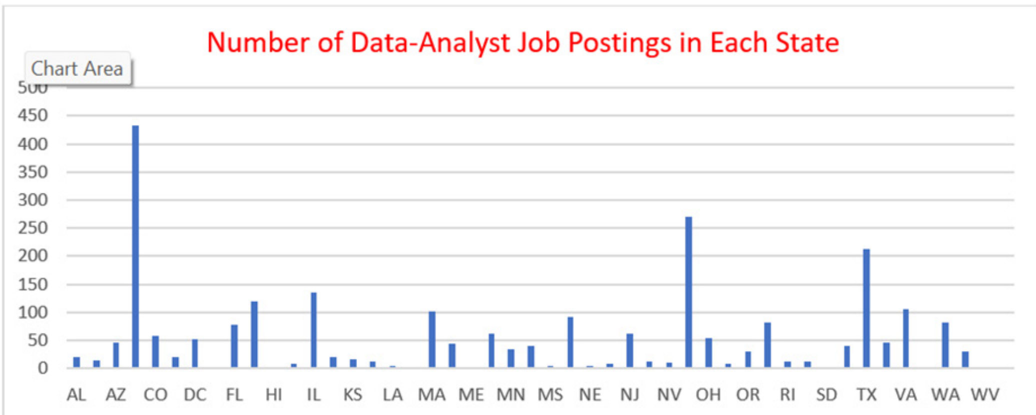

Table 4 further shows how job postings within each state or district were distributed across the 12 industries. The top 10 “hot spots” where data analysts were needed the most were Industry 7 (Information) in California with 190 job postings, Industry 7 (Information) in New York with 110 job postings, Industry 7 (Information) in Texas with 83 job postings, Industry 10 (Professional and Business Services) in California with 58 job postings, Industry 4 (Finance and Insurance) in California with 50 job postings, Industry 10 (Professional and Business Services) in New York with 48 job postings, Industry 7 (Information) in Georgia with 47 job postings, Industry 1 (Manufacturing) in California with 45 job postings, Industry 7 (Information) in Virginia with 43 job postings, and Industry 7 (Information) in Massachusetts with 38 job postings.

Table 4. Data-analyst job postings across states and industries

State/ District	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7	Ind. 8	Ind. 9	Ind. 10	Ind. 11	Ind. 12	Total
AL	1		3	3			7	3		3			20
AR			1	2		8	4						15
AZ	2	1	3	14			16	3	2	3	1	1	46
CA	45	5	27	50	7	12	190	19	4	58	15		432
CO	3		4	4	2	3	28	1	4	6	3		58
CT	2		2	2			10			2	2		20

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Table 4. Continued

State/ District	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7	Ind. 8	Ind. 9	Ind. 10	Ind. 11	Ind. 12	Total
DC		1	2	7		1	17			22	2		52
DE							3						3
FL	3	2	7	10		4	27	3	3	14	2	3	78
GA	12		6	15	5	4	47	8		20	2	1	120
HI										1			1
IA			2		1	1	2				2		8
IL	7	8	7	29	2	5	36	3		35	3		135
IN			2	3		1	4	2		6	2		20
KS	3		2	3			4			4	1		17
KY	1	1		2	1	1	4	1		1			12
LA				1			3			1			5
ND	1												1
MA	10		13	13		2	38	1		18	6	1	102
MD	2	1	5	9	1		15	1		6	4	1	45
ME	1						1						2
MI	8		2	4	3	1	25			18	1		62
MN	1	1	4	1	1	3	12		1	6	4		34
MO	2	1	4	2		2	16		4	7	1	2	41
MS	2		1				1						4
NC	5		10	17	1	1	36	1		16	2	3	92
NE	1						3		1				5
NH	1			6						2			9
NJ	7	1	5	15	1		21			8	3		61
NM			9				1			1	1	1	13
NV			2	2			2			3	1		10
NY	10	8	30	33	4	6	110	9		48	12		270
OH	6	1	7	14		4	14			3	2	2	53
OK				1			2			2	3		8
OR	3					1	14	1		8	2	1	30
PA	4	1	10	11		4	22			20	8	1	81
RI			2	8			1			1			12
SC	2			5		1	3				2		13
SD						1							1
TN	1		13	3		2	10	1		6	3	1	40
TX	9	4	17	30	5	7	83	10		34	12	2	213
UT	3		8	8			20	1		2	4		46

continued on following page

Table 4. Continued

State/ District	Ind. 1	Ind. 2	Ind. 3	Ind. 4	Ind. 5	Ind. 6	Ind. 7	Ind. 8	Ind. 9	Ind. 10	Ind. 11	Ind. 12	Total
VA	10		9	7	1		43	5	2	15	12	2	106
VT	2			1									3
WA	7	2	15	5		3	25	4		18	3		82
WI	3		2	4	1	1	10		1	5	2	1	30
WV							1						1
WY	1												1
Total	**181**	**38**	**236**	**344**	**36**	**79**	**931**	**77**	**22**	**423**	**123**	**23**	**2513**

Note. Ind. = industry; AL = Alabama; AR = Arkansas; AZ = Arizona; CA = California; CO = Colorado; CT = Connecticut; DE = Delaware; FL = Florida; GA = Georgia; HI = Hawaii; IA = Iowa; IL = Illinois; IN = Indiana; KS = Kansas; KY = Kentucky; LA = Louisiana; ND = North Dakota; MA = Massachusetts; MD = Maryland; ME = Maine; MI = Michigan; MN = Minnesota; MO = Missouri; MS = Mississippi; NC = North Carolina; NE = Nebraska; NH = New Hampshire; NJ = New Jersey; NM = New Mexico; NV = Nevada; NY = New York; OH = Ohio; OK = Oklahoma; OR = Oregon; PA = Pennsylvania; RI = Rhode Island; SC = South Carolina; SD = South Dakota; TN = Tennessee; TX = Texas; UT = Utah; VA = Virginia; VT = Vermont; WA = Washington; WI = Wisconsin; WV = West Virginia; WY = Wyoming.

Together, Tables 3 and 4 provide valuable insights to college graduates who intend to develop their data analytics careers as to which industries in which state they might have the most opportunities to succeed in. For example, one who hopes to become a data analyst in the field of manufacturing or insurance would have a better chance of success in California, one who hopes to become a business data analyst would have a better chance of success in California and New York, and one who hopes to become a data analyst in the information technology and service field would have a better chance of success in California, New York, Texas, Georgia, Virginia, and Massachusetts.

Demands for Data Analysts Across Geographical Regions

Using the classification system documented in Table 1 above, the 50 states and the District of Columbia were grouped into 8 regions, and the counts of data-analyst job postings for each state or district were also grouped into regional counts as shown in Table 5.

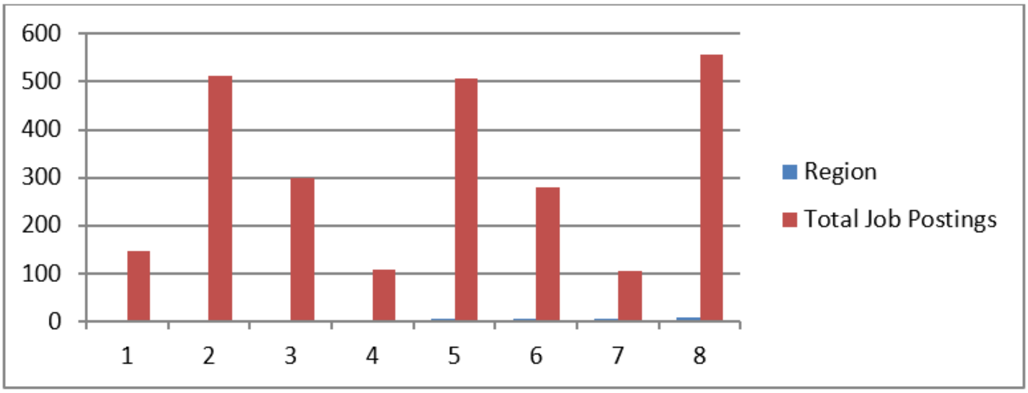
Table 5. Data-analyst job postings by geographical regions

Region no.	Region Name	No. of job Postings
1	New England	148
2	Mideast	512
3	Great Lake	300
4	Plains	107
5	Southeast	506
6	Southwest	280
7	Rocky Mountain	105
8	Far West	555
Total	**2513**	

Note. No. = number.

The differences among the eight regions in number of data-analyst job postings are more easily notable in Figure 2 below.

Figure 2. Graphical display of data-analyst job postings by geographical regions



To explore statistical significances among these regions, the following hypothesis is proposed:

Hypothesis 1: No significant differences exist among the eight geographic regions in the United States in terms of demand for data analysts as indicated by job postings on LinkedIn.

As summarized in Table 6, the results of the chi-square test show that with chi-square value = 619.271, $df = 7$, and p-value < 0.001, the proposed null hypothesis is rejected. In other words, significant differences exist among the 8 geographic regions in the United States in terms of demand for data analysts as indicated by job postings on LinkedIn.

Table 6. Chi-square test results pertaining to differences among geographical regions

Test Statistics	Region #
Chi-square	619.271[a]
Df	7
Asymp. sig.	< .001

Note. *Df* = degrees of freedom; asymp. sig. = asymptotic significance.
[a]Zero cells (0.0%) have expected frequencies fewer than 5. The minimum expected cell frequency is 316.4.

As shown in Figure 2 above, the Far West region has the largest demands for data analysts with a total of 555 job postings, followed by the Mideast region with a total of 512 job postings, and the Southeast region with a total of 506 job postings. On the other hand, the Rocky Mountain region and the Plains region have the least demand for data analysts with only 105 and 107 job postings.

These findings can be quite valuable to college graduates and other individuals who hope to develop a career of data analytics. For example, they would have a much better chance of success in the Far West, Mideast, or Southeast regions than in the Rocky Mountain or the Plains regions.

Demands for Data Analysts Across Industries

Using the classification system documented in Table 2 above, the 2,513 data-analyst job postings were classified into 12 industries, as shown in Table 7.

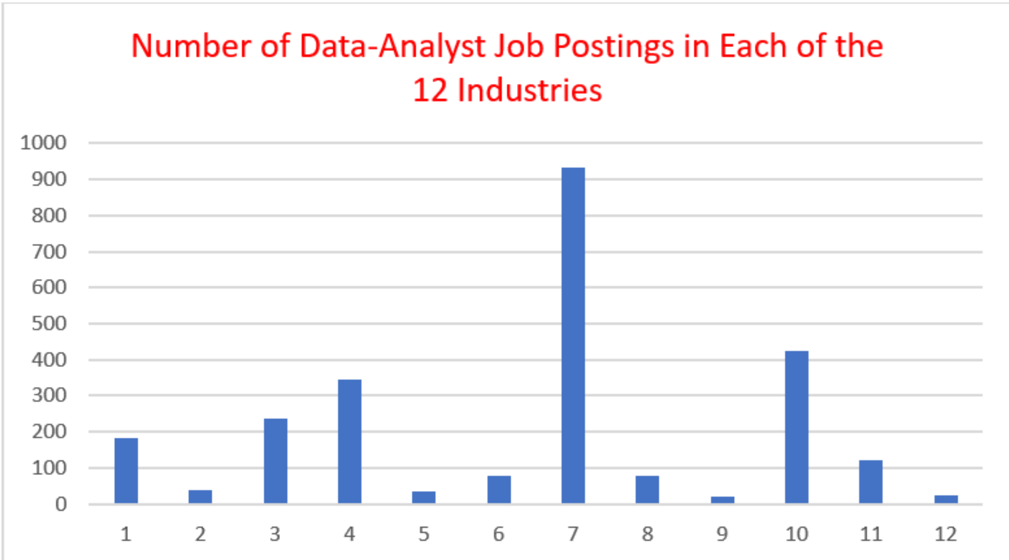
Table 7. Number of data-analyst job postings by industry

Industry no.	Industry Description	No. of Job Postings
1	Manufacturing	181
2	Real estate, rental, and leasing	38
3	Education services, health care, and social services	236
4	Finance and insurance	344
5	Wholesale trade	36
6	Retail trade	79
7	Information	931
8	Arts, entertainment, recreation, accommodation, and food service	77
9	Construction	22
10	Professional and business services	423
11	Other private industries	123
12	Government	23
Total	**2513**	

Note. No. = number.

Differences among the 12 industries in number of data-analyst job postings are more easily notable in Figure 3 below.

Figure 3. Graphical display of data-analyst job postings by industry



To explore statistical significances among these industries, the following hypothesis is proposed:

Hypothesis 2: There are no significant differences among the identified industries in terms of demand for data analysts as indicated by data-analyst job postings on LinkedIn.

As summarized in Table 8, the results from the chi-square test show that with chi-square value = 3616.097, df = 11, and p-value < 0.001, the proposed null hypothesis is rejected. It suggested that significant differences exist among the 12 industries in terms of demands for data analysts as indicated by data-analyst job postings on LinkedIn.

Table 8. Chi-square test results pertaining to differences among industries

Test Statistics	Category
Chi-square	3616.097[a]
Df	11
Asymp. sig.	< .001

Note. *Df* = degrees of freedom; asymp. sig. = asymptotic significance.
[a]Zero cells (0.0%) have expected frequencies fewer than 5. The minimum expected cell frequency is 209.4.

As shown in Table 7 and Figure 3 above, Industry 7 (information) has the largest demand for data analysts with a total of 931 job postings, followed by Industry 10 (professional and business services) with 423 job postings, Industry 4 (finance and insurance) with 344 job postings, Industry 3 (education services, health care, and social services) with 236 job postings, Industry 1 (manufacturing) with 181 job postings, and Industry 11 (other private industries) with 123 job postings, Industry 6 (retail trade) with 79 job postings, Industry 8 (arts, entertainment, recreation, accommodation, and food service) with 77 job postings. Industries 9 (construction), 12 (government), 5 (wholesale trade), and 2 (real estate, rental, and leasing) have the least demand for data analysts, with respectively only 22, 23, 36, and 38 job listings.

As nearly all organizations depend on information technology and services to function and succeed, it is understandable that the information industry has the greatest demand for data analysts. The primary products of professional and business service companies are the services they provide to other professional and business organizations. To succeed, they must constantly analyze potential client needs and potential market needs and trends. Therefore, it is also understandable that the professional and business service industry has the next largest demand for data analysts. Finance and insurance companies constantly deal with risk assessments and financial return analysis, and it is quite understandable that the finance and insurance industry has the third largest demand for data analysts.

These findings can also be valuable to college graduates and other individuals who hope to enter the career of data analytics. For example, they would have a better chance of employment in the information, professional and business services, and the finance and insurance industries than in other industries.

Analysis of Relationship Between Demand for Data Analysts and Economic Strength

Since our data collection took place in 2021, we collected the 2021 GDP data from the website of U.S. Bureau of Economics. Table 3 above summarizes the number of data-analyst job postings and the state GDP for the 50 states and the District of Columbia in 2021.

To explore the possible relationship between GDP and demand for data analysts, the following hypothesis is proposed:

Hypothesis 3: No significant differences exist between rankings of data-analyst job postings of the states and rankings of their GDPs.

As summarized in Table 9, the results of a Wilcoxon test show a *p*-value of 0.499, which is larger than the significance level 0.05; it suggests that the proposed null hypothesis is not rejected. That is, no significant differences exist between rankings of data-analyst job postings of the states and ranking of their GDPs. In other words, the states that have the largest GDPs also have the largest demand for data analysts.

Table 9. Wilcoxon test results pertaining to demand for data analysts and gross domestic product

Ranks		*N*	Mean Rank	Sum of Ranks
GDP rank–job rank	Negative ranks	21[a]	23.45	492.50
	Positive ranks	26[b]	24.44	635.50
	Ties	4[c]		
	Total	51		
Note. GDP = gross domestic product. [a]GDP rank < job rank				
[b]GDP rank > job rank				
[c]GDP rank = job rank				
Test statistics	GDP rank–job rank			

continued on following page

Table 9. Continued

Ranks		*N*	Mean Rank	Sum of Ranks
Z	-.758[b]			
Asymp. sig. (2-tailed)	.449			

Note. Asymp. sig. = asymptotic significance.
[a]Wilcoxon signed ranks test
[b]Based on negative ranks

As shown in Table 3 above, 14 states had a GDP amount of more than 575,000 million (i.e. 575 billion) dollars in 2021: California (3,416,939.4), Texas (2,087,490.9), New York (1,911,345.8), Florida (1,292,391.3), Illinois (943,993.3), Pennsylvania (844,391.6), Ohio (759,626.2), Georgia (701,606.1), New Jersey (692,227.3), Washington (688,631.9), North Carolina (659,529.3), Massachusetts (645,434.0), Virginia (613,920.3), Michigan (576,502.2). Interestingly, these same 14 states also had the largest numbers of data-analyst job postings: California (432), New York (270), Texas (213), Illinois (135), Georgia (120), Virginia (106), Massachusetts (102), North Carolina (92), Washington (82), Pennsylvania (81), Florida (78), Michigan (62), New Jersey (61), and Ohio (53).

On the other hand, 13 states had a GDP amount of fewer than 100,000 million (i.e. 100 billion) dollars in 2021: Vermont (37,593.5), Wyoming (42,176.2), Alaska (58,646.0), Montana (59,996.7), South Dakota (62,607.1), North Dakota (63,208.6), Rhode Island (67,236.7), Maine (78,918.4), Delaware (82,952.8), West Virginia (86,509.9), Hawaii (93,089.8), Idaho (98,792.8), and New Hampshire (99,100.0).

Interestingly, with the exceptions of New Hampshire and Rhode Island, 11 of these 13 states also had the fewest data-analyst job postings: Alaska (0), Montana (0), Idaho (0), Wyoming (1), South Dakota (1), North Dakota (1), West Virginia (1), Hawaii (1), Maine (2), Vermont (3), Delaware (3), New Hampshire (9), and Rhode Island (12).

One could conclude that the greater the economy scale, the larger the business datasets and the greater need for data analysis and data analysts. These findings, together with the findings pertaining to data-analyst job distributions across the eight geographical regions in the United States summarized earlier can be helpful to college graduates or other job seekers pursuing a career in data analytics. They could more effectively direct their efforts to regions and states that have greater GDPs.

Analysis of Relationships Between Demands for Data Analysts and Economic Growth

Since our data collection took place in 2021, we collected the 2021 and 2022 GDP data from the U.S. Bureau of Economics website so as to calculate each state's GDP growth from 2021 to 2022. Table 3 above summarizes the number of data-analyst job postings and the state GDP growth amounts from 2021 to 2022 for the 50 states and the District of Columbia.

To explore the possible relationship between GDP growth rates and demand for data analysts, the following hypothesis is proposed:

Hypothesis 4: No significant differences exist between rankings of data-analyst job postings of the states and rankings of their GDP growth rates.

As summarized in Table 10, the results of a Wilcoxon test show a *p*-value of 0.992, which is larger than the significance level 0.05; it suggests that the proposed null hypothesis is not rejected. That is, no significant differences exist between rankings of data-analyst job postings of the states and rankings of their GDP growth rates. In other words, the states that have the largest demands for data analysts also enjoy the largest GDP growths.

Table 10. Wilcoxon test results pertaining to demand for data analysts and gross domestic product growth

Ranks		*N*	Mean Rank	Sum of Ranks
Growth rank–job rank	Negative ranks	25[a]	25.54	638.50
	Positive ranks	25[b]	25.46	636.50
	Ties	1[c]		
	Total	51		
a. Growth rank < job rank				
b. Growth rank > job rank				
c. Growth rank = job rank				
Test statistics	Growth rank–job rank			
Z	-.010[b]			
Asymp. sig. (2-tailed)	.992			

Note. Asymp. sig. = asymptotic significance.
[a]Wilcoxon signed ranks test
[b]Based on positive ranks

As shown in Table 3 above, the 14 states that had the largest numbers of data-analyst job postings are California (432), New York (270), Texas (213), Illinois (135), Georgia (120), Virginia (106), Massachusetts (102), North Carolina (92), Washington (82), Pennsylvania (81), Florida (78), Michigan (62), New Jersey (61), and Ohio (53). With the exception of Massachusetts, these are the same states that enjoyed the largest amounts of GDP growth (in millions of dollars) in 2022: California (224,704.0), New York (137,056.8), Texas (314,646.3), Illinois (81,673.9), Georgia (65,771.5), Virginia (49,185.2), Massachusetts (46,026.6), North Carolina (56,439.0), Washington (49,469.5), Pennsylvania (67,421.7), Florida (146,673.7), Michigan (62), New Jersey (62,720.9), and Ohio (66,363.8).

On the other hand, all of the 12 states that had fewer than five data-analyst job postings (Alaska, Montana, Idaho, Wyoming, South Dakota, North Dakota, West Virginia, Hawaii, Maine, Vermont, Delaware, and Mississippi) were among the 15 states that had a GDP growth of fewer than 13,000 million dollars in 2022: Vermont (3,237.3), Rhode Island (5,534.7), New Hampshire (5,924.6), South Dakota (6,174.6), Maine (6,882.8), Wyoming (6,904.4), Alaska (7,052.8), Montana (7,075.2), Delaware (7,255.5), Hawaii (7,992.8), District of Columbia (8,920.6), North Dakota (9,442.7), West Virginia (10,907.4), Mississippi (11,611.9), and Idaho (12,078.3).

It seems that the greater the demand for data analysts, the greater the GDP growth. While many factors could contribute to a state's GDP growth, the contribution of data analytics should not be underestimated. With data analysis, business organizations could make better-informed decisions which could lead to continued business growth, and local governments could better understand the growth potential of cities, counties, and states and develop more promising initiatives that could attract more investments and better cultivate local growth potentials. The findings of this study are particularly valuable to business and government decision makers. To grow their business or local economy, they should make more efforts to incorporate data analysis into their decision making.

CONCLUSION

By investigating job advertisements on LinkedIn specifically related to data analysts, our study aims to discover which states, geographical regions, and industries in the United States have the most demand for data analysts and explore potential relationships between economic strength and demand for data analysts. Based on over 2,500 data-analyst job advertisements posted on LinkedIn and using tables, column charts, chi-square tests, and Wilcoxon tests, this study has obtained many insights pertaining to demands for data analysts.

First, this study has discovered that California, New York, and Texas have the largest demands for data analysts in the United States, followed by Illinois, Georgia, Virginia, Massachusetts, North Carolina, Washington, and Pennsylvania. The states that have the least demand for data analysts include Alaska, Idaho, Montana, Hawaii, North Dakota, South Dakota, West Virginia, Wyoming, Maine, Delaware, Vermont, and Mississippi.

The study has further identified ten hot spots where data analysts are most needed, including the information industry in California, the information industry in New York, the information industry in Texas, the professional and business services industry in California, the finance and insurance industry in California, the professional and business services industry in New York, the information industry in Georgia, the manufacturing industry in California, the information industry in Virginia, and the information industry in Massachusetts.

The study has also discovered that significant differences exist among the eight geographic regions in the United States in terms of demand for data analysts. Specifically, the Far West region has the largest demands for data analysts, followed by the Mideast region and the Southeast region. The Rocky Mountain and the Plains regions have the least demand for data analysts.

This study has found that significant differences exist among the 12 industries in terms of demands for data analysts. Specifically, the information industry has the strongest demand for data analysts, followed by the professional and business services industry, the finance and insurance industry, the education services, health care, and social services industry, the manufacturing industry, other private industries, the retail trade industry, and the arts, entertainment, recreation, accommodation, and food service industry. Industries that have the least demand for data analysts include the construction industry, the government sector, the wholesale trade industry, and the real estate, rental, and leasing industry.

This study has also found that the states that have the largest GDPs also have the largest demands for data analysts. Likewise, the states that enjoy the largest GDP growth also have the largest demand for data analysts.

The implications of the findings of this study are significant for various stakeholders. For researchers in the data analytics field, the study offers valuable insights into potential research based on job demands. These findings provide a foundation for future relevant studies and guide researchers toward areas of study that are most relevant to industry needs.

Academic departments and professional training programs in data analytics and data science can use the findings of this study to better understand where the most demands are for data analysts and to better help their students know where to grow their future professions.

Potential job candidates can also benefit greatly from the findings of this study. If they aspire to become data analysts, they will better understand in which geographical regions and states they might have greater opportunities to succeed.

The findings of this study also help governments and business organizations better understand the importance of data analytics in growing their economy or business. Data analytics plays a significant role in driving economic growth by enabling businesses and governments to make informed decisions based on insights derived from large datasets, leading to improved operational efficiency, innovation, and new market opportunities, ultimately contributing to overall economic or business prosperity.

One limitation of the study is that the data collection period is only 22 days, a relatively short period. Another limitation of the study is that the data is exclusively taken from the platform of LinkedIn. It is possible that the data collected might not necessarily reflect the entire job market of data analysts. Future studies could examine data from wider sources and longer periods.

Another limitation of the study is the use of relatively older dataset (three years late). While data-analyst jobs are relatively more mature compared with jobs in emerging new fields such as AI, and the data analysis based on this relatively older dataset can still reveal meaningful patterns and trends, using a more recent dataset would make our findings more convincing.

Future research directions include, but are not limited to, applying the research methodology to job analyses in specific industries to identify the characteristics of job needs and requirements in the specific industries. Additionally, investigating job ads for data analysts from other professional websites or platforms can provide a different perspective on demands for data analysts. Increasing the sample size of the collected dataset and extending the data collection period on LinkedIn will present a more comprehensive picture of demands for data analysts and their potential relationships to the successes of specific industries. Also, it would be interesting to conduct another project based on a more recent dataset to see whether both time periods reveal the same findings.

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