

# Exploring the Skills Needed by the Data Scientist

Kirk Paul Lafler; @sasNerd

## Abstract

As 2.5 quintillion bytes (1 with 18 zeros) of new data are created each and every day, the age of big data has taken on new meaning. More and more organizations across industries are embracing Data Science / Computer Research Scientist skills resulting in an emerging demand for qualified and experienced talent. According to the Bureau of Labor Statistics (BLS) the number of data science jobs is expected to grow 19 percent over the next two decades – nearly three times as fast as the average growth rate for all jobs. Energized by this employment outlook, students and professionals across job functions are preparing for tomorrow's growing data science / analytic demands by acquiring a comprehensive skill set. To prepare for this growing demand, many colleges, junior colleges, Universities, and vocational training organizations offer comprehensive degrees and certificate programs to fulfill the increasing demand for analytical skills. This paper and presentation explores the skills needed by the Data Scientist / Analytics professional including non-technical skills such as critical thinking; business acumen and verbal/written communications; and technical skills such as data access; data wrangling; statistics; use of statistical programming languages like Python, R and SAS®; Structured Query Language (SQL); Microsoft Excel; and data visualization.

## Introduction

Wikipedia describes data science, “as a multi-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from structured and unstructured data.” Wikipedia further describes data science, “as the profession to unify statistics, data analysis, mathematics, computer programming, operations research, machine learning and related methods in order to understand and analyze actual phenomena with data and enhance decision making.”

Professionals with skills in data science and analytics are a “hot” commodity in the employment marketplace. The Bureau of Labor Statistics (BLS) (accessed on April 9<sup>th</sup>, 2021) projects that Employment of computer and information research scientists is projected to grow 15 percent from 2019 to 2029, much faster than the average for all occupations. One thing is certain, with the rapid increase in data collection activities by organizations that this will lead to an increased need for services related to data mining, or processing data sets to identify patterns and relationships to solve business problems.

Brian Holak, a site editor at Search Business Analytics, (January 31<sup>st</sup>, 2019) predicts, “The demand for data scientists continues to grow sharply with more employers than ever looking to hire data scientists. Data Scientists will experience a 29% increase in demand year over year, a 344% increase since 2013, with the supply of “qualified” data scientists lagging demand.” Merrimack College projects, “The Federal Government will experience a 19% growth rate in the field of computer and information research scientists by 2026.” Also, many employment / career websites (August 2022) offer students, junior professionals, and seasoned professionals with the organizations who are seeking the right candidates to hire amazing employment, contract, and internship opportunities. The exciting world of the Data Scientist is one that is experiencing an exponential rate of growth. But while demand is huge the supply of skilled applicants is still growing at a much slower pace.

## Graduate Degree Programs

The majority of Data Scientists hold an undergraduate degree in a quantitative field such as Mathematics, Statistics, Decision Sciences, Computer Science, Management Information Systems, and Economics to name a few. Many also hold graduate degrees and/or certificates in the field of data science. The next table represents a starting point for professionals seeking Colleges and Universities offering graduate degrees in Data Analytics, Big Data Analytics and Data Science. Although this table identifies many academic institutions, it most definitely does not provide a complete list of all the academic institutions offering these prestigious graduate degrees. Readers are encouraged to perform your own search using one or more search engine(s) for a more complete list of all the colleges and universities offering these popular degree programs.

## Institutions Offering Graduate Degree Programs in Data Science, Data Analytics and Big Data Analytics (Alphabetical Sampling)

<a href="#"><u>Binghamton University</u></a>	<a href="#"><u>Michigan State University</u></a>	<a href="#"><u>University of Illinois at Urbana-Champaign</u></a>
<a href="#"><u>Boston College</u></a>	<a href="#"><u>New Mexico State University</u></a>	<a href="#"><u>University of Kentucky</u></a>
<a href="#"><u>Boston University</u></a>	<a href="#"><u>New York University</u></a>	<a href="#"><u>University of Massachusetts at Dartmouth</u></a>
<a href="#"><u>California State University</u></a>	<a href="#"><u>North Carolina Agriculture and Technical State University</u></a>	<a href="#"><u>University of Miami</u></a>
<a href="#"><u>Cal Poly</u></a>	<a href="#"><u>North Carolina State University</u></a>	<a href="#"><u>University of Minnesota</u></a>
<a href="#"><u>Carnegie Mellon University</u></a>	<a href="#"><u>Oakland University</u></a>	<a href="#"><u>University of Michigan at Ann Arbor</u></a>
<a href="#"><u>Clarkson University</u></a>	<a href="#"><u>Ohio University</u></a>	<a href="#"><u>University of Nevada, Reno</u></a>
<a href="#"><u>Clemson University</u></a>	<a href="#"><u>Oklahoma State University</u></a>	<a href="#"><u>University of North Carolina at Charlotte</u></a>
<a href="#"><u>Columbia University – New York</u></a>	<a href="#"><u>Old Dominion University</u></a>	<a href="#"><u>University of North Carolina at Greensboro</u></a>
<a href="#"><u>Cornell University</u></a>	<a href="#"><u>Pace University</u></a>	<a href="#"><u>University of North Carolina at Wilmington</u></a>
<a href="#"><u>DePaul University</u></a>	<a href="#"><u>Penn State Great Valley</u></a>	<a href="#"><u>University of Notre Dame</u></a>
<a href="#"><u>Dominican University of California</u></a>	<a href="#"><u>Purdue University</u></a>	<a href="#"><u>University of San Diego</u></a>
<a href="#"><u>Drake University</u></a>	<a href="#"><u>Rice University</u></a>	<a href="#"><u>University of San Francisco</u></a>
<a href="#"><u>Drexel University</u></a>	<a href="#"><u>San Diego State University</u></a>	<a href="#"><u>University of South Dakota</u></a>
<a href="#"><u>Duke University</u></a>	<a href="#"><u>San Jose State University</u></a>	<a href="#"><u>University of Southern California</u></a>
<a href="#"><u>Elon University</u></a>	<a href="#"><u>Seton Hall University</u></a>	<a href="#"><u>University of Southern Maine</u></a>
<a href="#"><u>Florida State University</u></a>	<a href="#"><u>Stanford University</u></a>	<a href="#"><u>University of Texas at Austin</u></a>
<a href="#"><u>Franklin University</u></a>	<a href="#"><u>Texas A&amp;M University</u></a>	<a href="#"><u>University of Virginia</u></a>
<a href="#"><u>Georgetown University</u></a>	<a href="#"><u>Tulane University</u></a>	<a href="#"><u>University of Washington</u></a>
<a href="#"><u>George Washington University</u></a>	<a href="#"><u>University of Alabama at Birmingham</u></a>	<a href="#"><u>University of Wisconsin Madison</u></a>
<a href="#"><u>Georgia State University</u></a>	<a href="#"><u>University of Arizona</u></a>	<a href="#"><u>Utah State University</u></a>
<a href="#"><u>Georgia Tech</u></a>	<a href="#"><u>University of Bridgeport</u></a>	<a href="#"><u>Vanderbilt University</u></a>
<a href="#"><u>Harvard University, Extension School</u></a>	<a href="#"><u>University of California – Berkeley</u></a>	<a href="#"><u>Villanova University</u></a>
<a href="#"><u>Hofstra University</u></a>	<a href="#"><u>University of California, Irvine</u></a>	<a href="#"><u>Walden University</u></a>
<a href="#"><u>Indiana University</u></a>	<a href="#"><u>University of California San Diego MSBA</u></a>	<a href="#"><u>Wharton University</u></a>
<a href="#"><u>Johns Hopkins University</u></a>	<a href="#"><u>University of California San Diego DS</u></a>	<a href="#"><u>Willamette University</u></a>
<a href="#"><u>Kansas State University</u></a>	<a href="#"><u>University of Chicago</u></a>	<a href="#"><u>Worcester Polytechnic Institute</u></a>
<a href="#"><u>Kennesaw State University</u></a>	<a href="#"><u>University of Colorado, Boulder</u></a>	
<a href="#"><u>Lehigh University</u></a>		
<a href="#"><u>Louisiana State University</u></a>		

## Globally Recognized SAS Certifications

SAS Institute offer users with a globally recognized certification process that can help boost your prospects for success and validate your skills to employers. SAS certification testing is available in many areas and particularly for those who are interested in a Data Science career with a combination of credentials including: Data Curation, Advanced Analytics, and AI & Machine Learning. Click [here](#) for more information about [SAS Institute's Data Science certification](#).

The screenshot shows the SAS Global Certification Program website. At the top left is the SAS logo and a menu icon. To the right are icons for a flag, an envelope, a grid, and a search icon. Below the navigation bar, the page title is "SAS® Global Certification Program". The main heading is "Data Science Certification". To the left of the main content, it says "Master these skills to earn a certification." and "SAS® Certified Data Scientist". The main content area features three bullet points, each with a checkmark icon:

- Manipulate and gain insights from big data with a variety of SAS and open source tools.
- Make business recommendations with complex machine learning models.
- Deploy models at scale using the flexible, robust SAS environment.

Source: Image captured from SAS Institute's website, copyright 2022 by SAS Institute Inc.

The infographic is titled "How to Become a SAS® Certified Data Scientist". Below the title, it lists three credentials: "DATA CURATION • ADVANCED ANALYTICS" and "AI & MACHINE LEARNING". The central graphic consists of three interconnected hexagons: a blue one at the top with a database icon, a teal one at the bottom left with a brain icon, and a purple one at the bottom right with a neural network icon. Below the graphic, the text reads: "If you're interested in a data science career, our academy offers three professional-level credentials to boost your résumé. Earning one credential can launch a career – but a combination helps you earn a credential that could transform your future."

Source: Image captured from SAS Institute's website, copyright 2022 by SAS Institute Inc.



## Certified-Level: DATA CURATION

Gain a solid understanding of data management, Hadoop and other big data concepts. This credential is a good starting point if you're pursuing a data science certification because it's a required part of the series.

[Learn more about this certification](#)

Source: Image captured from SAS Institute's website, copyright 2022 by SAS Institute Inc.



## Certified-Level: ADVANCED ANALYTICS

Expand your analytical skill set by learning the latest advanced analytics technologies, such as machine learning and predictive modeling. You'll gain the ability to solve critical business challenges across every domain - and, if you combine Advanced Analytics with Data Curation, you can earn a certification as a data scientist.

[Learn more about this certification](#)

Source: Image captured from SAS Institute's website, copyright 2022 by SAS Institute Inc.



## Certified-Level: AI & MACHINE LEARNING

Learn how to analytically approach business problems while using a business case study to understand the analytical life cycle. This credential is valuable on its own - or you can combine it with Data Curation to qualify for a data science certification.

[Learn more about this certification](#)

Source: Image captured from SAS Institute's website, copyright 2022 by SAS Institute Inc.

### Data Science / Analytics Annual Base Salaries

With massive quantities of data being collected at astounding rates by organizations worldwide, the demand for Data Scientists and Analytics professionals to collect, analyze and interpret all this data is growing rapidly. The annual base salaries for all this talent are impressive as well. In a July 28, 2022 Indeed.com article, the highest paying cities for Data Scientists appear, below.

Highest Paying Salaries by City (Indeed.com)			
Los Angeles, CA	\$167,921 / year	San Francisco, CA	\$131,425 / year
Houston, TX	\$159,289 / year	Austin, TX	\$127,883 / year
New York, NY	\$153,603 / year	Atlanta, GA	\$120,049 / year
Washington, DC	\$139,768 / year	San Diego, CA	\$118,342 / year
Chicago, IL	\$135,593 / year		

Salary Information from [www.indeed.com](https://www.indeed.com/career/data-scientist/salaries) (Source: <https://www.indeed.com/career/data-scientist/salaries>)

In Rick Chen's (April 7, 2022; TeamBlind.com) article the average salaries by city for Data Scientists are shown, below.

Annual Average Salaries by City (TeamBlind.com)					
Los Gatos, CA	\$447,916	New York, NY	\$143,926	St. Louis, MO	\$122,671
Los Angeles, CA	\$196,892	Bellevue, WA	\$143,097	Bentonville, AR	\$122,285
Sunnyvale, CA	\$173,178	Redmond, WA	\$142,438	Dallas, TX	\$122,017
Cupertino, CA	\$166,712	Seattle, WA	\$141,741	Chicago, IL	\$121,975
Menlo Park, CA	\$165,761	Washington, DC	\$141,306	Wilmington, DE	\$120,800
Santa Monica, CA	\$164,272	Newark, NJ	\$139,311	Hartford, CT	\$120,491
San Francisco, CA	\$163,670	Boston, MA	\$137,567	McLean, VA	\$120,066
San Jose, CA	\$161,090	Palo Alto, CA	\$137,327	Atlanta, GA	\$118,977
Mountain View, CA	\$157,767	Portland, OR	\$136,992	Raleigh, NC	\$117,774
Cambridge, MA	\$151,500	Kansas City, MO	\$135,363	Minneapolis, MN	\$115,918
Santa Clara, CA	\$150,943	San Diego, CA	\$133,190	Columbus, OH	\$115,781
San Mateo, CA	\$149,046	Redwood City, CA	\$131,791	Philadelphia, PA	\$114,963
Boulder, CO	\$148,989	Irvine, CA	\$129,872	Tampa, FL	\$114,750
Fort Lauderdale, FL	\$148,400	Denver, CO	\$128,348	Phoenix, AZ	\$113,975
Miami, FL	\$148,250	Jersey City, NJ	\$124,638	San Antonio, TX	\$112,571
Charlotte, NC	\$145,885	Pittsburgh, PA	\$123,855	Baltimore, MD	\$110,857
Oakland, CA	\$144,625	Austin, TX	\$123,167		

Average Salaries (Source: <https://www.teamblind.com/blog/index.php/2022/04/07/best-paying-cities-data-scientist-2022/>)

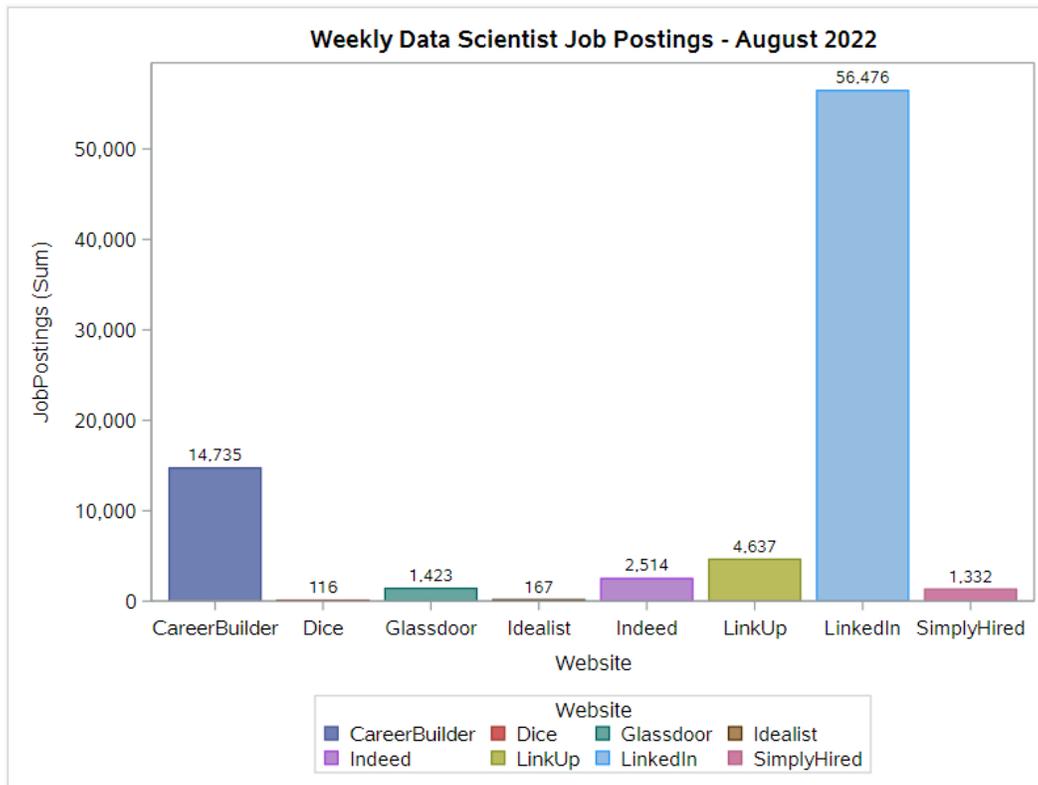
## Data Scientist / Analytics Employment / Career Opportunities

There appears to be considerable demand for "Data Scientists" when searching the various employment / career websites. Although cross-postings do exist, an exact match search for data scientist jobs was performed to ensure the results were relevant and the search keyword was processed similarly. The following VBAR chart shows the number of data scientist job postings by job listing website for the week of August 8<sup>th</sup>, 2022.

### Code:

```
data Weekly_DataScientist_Jobs ;
  input @1 Website $15.
        @16 JobPostings comma8. ;
  format JobPostings comma8. ;
datalines ;
LinkedIn      56,476
Indeed       2,514
Dice          116
Glassdoor    1,423
SimplyHired   1,332
CareerBuilder 14,735
Idealist      167
LinkUp       4,637
;
run ;
```

```
proc sgplot data=Weekly_DataScientist_Jobs ;
  title1 "Weekly Data Scientist Job Postings - August 2022" ;
  vbar Website / response=JobPostings group=Website datalabel ;
run ;
```

**Results:**

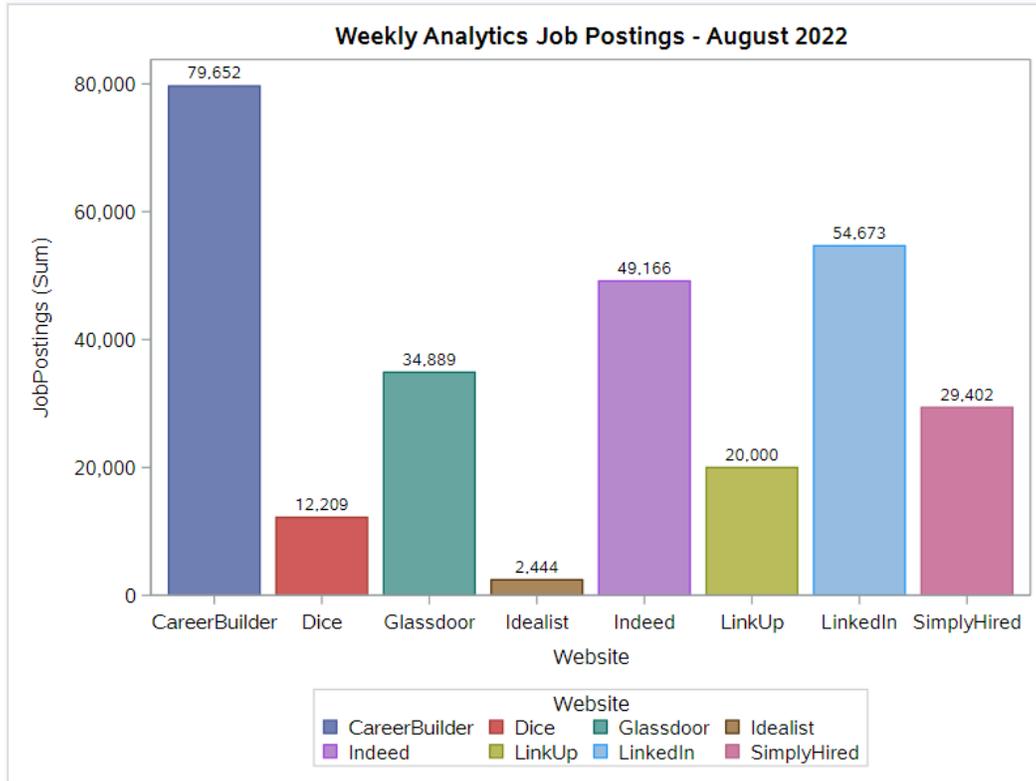
Using an exact match search, job posting results are displayed using a VBAR chart for “analytics” to show the number of analytics job postings for the week of August 8<sup>th</sup>, 2022.

**Code:**

```
data Weekly_Analytics_Jobs ;
  input @1 Website $15.
         @16 JobPostings comma8. ;
  format JobPostings comma8. ;
datalines ;
LinkedIn      54,673
Indeed       49,166
Dice         12,209
Glassdoor   34,889
SimplyHired  29,402
CareerBuilder 79,652
Idealist     2,444
LinkUp       20,000
;
run ;

proc sgplot data=Weekly_Analytics_Jobs ;
  title1 "Weekly Analytics Job Postings - August 2022" ;
  vbar Website / response=JobPostings group=Website datalabel ;
run ;
```

**Results:**



**Data Scientist Job Postings on Employment / Career Websites**

Job postings on employment / career websites for “Data Scientist” are displayed, below, for the week of August 8<sup>th</sup>, 2022.

**14,735 Data Scientist Jobs**

**JOIN US**

**LEAD DATA SCIENTIST**  
Pocket FM Corp | Work From Home, GA | Full-Time

**Job Details**

**About Pocket FM**

Pocket FM is India's largest audio OTT platform offering a vast collection of podcasts and audiobooks across a wide variety of genres and languages and making our entry to the global audience. It's an amazing time to join Pocket FM as we continue shaping the future of audio entertainment both in India and globally. We are India's leading audio OTT platform with the largest collection of podcasts and audiobooks across a wide variety of genres and languages; and making our entry to the global audience.

Source: Image captured from CareerBuilder.com’s website.

The screenshot shows the Dice.com website interface. At the top, there are navigation links for 'Tech Careers', 'Insights', 'For Employers', and 'Login/Register'. A search bar contains 'Data Scientist' and a location field is set to 'Search Location'. A 'Search Jobs' button is visible. Below the search bar, it indicates '120 Jobs' and a prominent teal banner displays '116 Data Scientist Jobs'. A secondary banner offers to 'Email me jobs for this search' with a 'Data Scientist' input field and an 'Email Jobs' button. On the left, there are filter sections for 'Remote Options' (with checkboxes for 'Remote Only', 'Exclude Remote', and 'Work From Home Available') and 'Posted Date' (with radio buttons for 'Any Date', 'Today', 'Last 3 Days', and 'Last 7 Days'). The main content area displays two job listings:

- Data Scientist (Business Intelligence)** at Black Knight Inc, Remote. Full-time, posted 18 hours ago. Description: Black Knight is the premier provider of integrated technology, services, data and analytics that lenders and servicers look to first to help successfully manage the entire loan life cycle.
- NLP Data Scientist** at ABN TECH CORP, San Francisco, CA, USA. Contract, Third Party, posted 11 hours ago. Title: NLP Data Scientist Location: San Francisco, CA (onsite after few weeks) Duration: 6+ months contract/ Full time Job Description: 9+ years of experience required Examples of the types of tasks that this Easy Apply

Source: Image captured from Dice.com’s website.

The screenshot shows the Glassdoor.com website interface. At the top, there are navigation links for 'Jobs', 'Companies', 'Salaries', and 'Careers'. A search bar contains 'data scientist' and a location field is set to 'Location'. A 'Search' button is visible. Below the search bar, it indicates '1,423 Data Science Jobs'. A secondary banner for Discover features the text 'Bring Curiosity Shine Bright' and an 'Apply Now' button. The main content area displays a list of job listings:

- Discover** Principal Data Science, Riverwoods, IL. \$106K - \$139K (Glassdoor est.). New 24h.
- AthenPollo LLC** Data Scientist, Cell Line Development, Boston, MA. \$90K - \$120K (Employer est.). Easy Apply 4d.
- Leidos** Data Scientist, Reston, VA. \$94K - \$196K (Employer est.). New 3d.
- PeritusHub LLC** Jr. Data Scientist, Lake Forest, IL. \$80K (Employer est.). Easy Apply 24h.
- The Home Depot** Data Scientist, Marketing & Online (Remote), Atlanta, GA. \$90K - \$160K (Employer est.). 24h.
- GTT, LLC** Data Scientist.

The right side of the page shows a detailed view of the Discover job listing, including a 'Job Description' section that states: 'Responsible for working closely with management to execute analytical initiatives. Responsible for providing thought leadership & strategic thinking to solve business problems by leveraging techniques such as'.

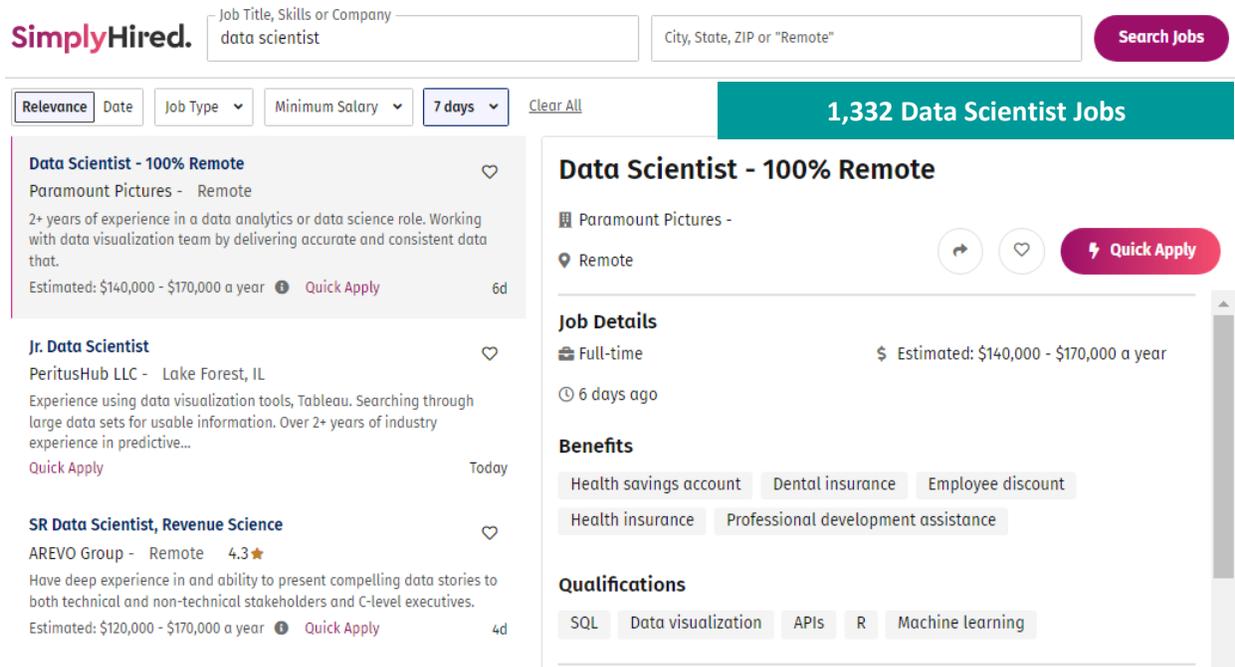
Source: Image captured from Glassdoor.com’s website.

The screenshot shows the Indeed.com search interface. At the top, there are navigation links for 'Find jobs', 'Company reviews', and 'Find salaries'. A search bar contains 'Data Scientist' and a location filter is set to 'remote'. Below the search bar are several filter buttons: 'Last 7 days', 'Remote', 'Salary Estimate', 'Job Type', 'Residency Requirement', 'Location', 'Company', 'Experience Level', and 'Education'. A large green banner indicates '2,514 Data Scientist Jobs'. Two job listings are visible: 'Senior Data Analyst' at System1 (Remote, Full-time, Estimated \$61.7K - \$78.1K a year) and 'Sr. Data Analyst' at arreglo consulting (Remote, Contract, 8 hour shift). A detailed view of the 'Senior Data Analyst' job is shown on the right, including 'Resume Insights' for SQL, R, and AWS.

Source: Image captured from Indeed.com’s website.

The screenshot shows the LinkedIn.com search interface. The search bar contains 'Data Scientist' and the location is set to 'United States'. Filter buttons include 'Jobs', 'Past Week', 'Experience Level', 'Company', 'Job Type', 'On-site/Remote', 'Easy Apply', 'All filters', and 'Reset'. A large green banner indicates '56,476 Data Scientist Jobs'. A list of job listings is shown on the left, including 'Data Scientist' at Net Pay Advance, Inc. (Wichita, KS), 'Senior Data Engineer' at VIDA (Edina, MN), 'Sr. Front End Software Developer' at DHL eCommerce Solutions (Weston, FL), 'Senior Data Migration Analyst' at Latham, The Pool Company (Latham, NY), and 'Junior SAS Programmer' at Leidos (Baltimore, MD). A detailed view of the 'Data Scientist' job at Net Pay Advance, Inc. is shown on the right, including job details like 'Part-time · Entry level', '51-200 employees · Financial Services', and 'Work Schedule Monday - Friday; 40 hours/week'. The job description mentions 'Category Analytics' and 'DEPARTMENT: Analytics'.

Source: Image captured from LinkedIn.com’s website.



Source: Image captured from SimplyHired.com’s website.

## Data Science / Analytics Skills

Data Science / Analytics skills are all encompassing and requires in-depth knowledge and experience in many technical and non-technical areas. The table, below, presents “key” areas where skills are needed by the data science / analytics community of professionals.

Technical Skills	Non-Technical Skills
SAS, Python and R	Critical Thinking
SQL and RDBMS techniques	Intellectual Curiosity
Excel	Business Acumen
Cloud Computing Services (aka, SaaS)	Verbal / Written Communication
Statistics – Descriptive and Inferential	Storytelling
Artificial Intelligence (AI)	Ability to Work in a Team
Machine Learning (ML)	
Structured and Unstructured Data	
Data Wrangling techniques	
Analytical techniques	
Data Visualization techniques	

## **Software: Programming, Database, Statistical, Visualization, Spreadsheet, and Cloud Computing Services**

### **SAS Software**

SAS is a statistical software suite of products developed by SAS Institute Inc. for advanced analytics, multivariate analysis, business intelligence, data management, predictive analytics, and criminal investigation. SAS runs on all important platforms and supports object-oriented and structured programming along with other programming paradigms. Developed by Dr. James Goodnight, Anthony Barr, John Sall and Jane T. Helwig. The SAS software suite has more than 200 components including Base SAS, SAS/STAT, SAS/GRAPH, SAS/OR, SAS/ETS, SAS/IML, SAS/AF, SAS/QC, SAS/INSIGHT, SAS/PH, Enterprise Miner, Enterprise Guide, SAS/EBI, and SAS Grid Manager.

### **SQL**

Structured Query Language (SQL) is a relational database language that is used in programming relational database management systems (RDBMS). It is specifically useful in handling structured data. SQL comprises many types of statements including a data query language (DQL), a data definition language (DDL), a data control language (DCL), and a data manipulation language (DML). There are several types of SQL implementations including SAS' PROC SQL, Microsoft's SQL-Server, Oracle, and IBM. SQL was originally developed by Edgar Frank "Ted" Codd, Donald D. Chamberlin, and Raymond F. Boyce in the early 1970s.

### **Python**

Python is an open-source programming language that is available under a free software license. It supports object-oriented and structured programming along with other programming paradigms. Developed by Guido van Rossum in the late 1980s, Python is designed to be an "easy to read language" with numerous third-party modules to interact with other languages; extensive support libraries such as web service tools; text processing; string operations; internet protocols; a powerful scripting language; an extensive user community; and many other features.

### **R**

R is a powerful open-source programming language and is used for statistical computing, graphics and data analysis. Available under a free software license, R runs on all important platforms and is used by statisticians, data miners and thousands of major corporations and institutions worldwide. Developed by Ross Ihaka and Robert Gentleman at the University of Auckland, New Zealand, their initial version of R was released in 1995 with a stable beta version in 2000. R boasts an extensive array of packages including data wrangling; data analysis; plotting; graphing; reporting; statistics; an extensive user community; and many other features.

### **Excel**

Microsoft Excel is widely used spreadsheet software operating under Windows, macOS, Android and iOS platforms to allow users to format, organize, manipulate, and calculate data in spreadsheets. Common Excel uses include the collection and storage of data, business analysis, data analysis, statistical analysis, accounting and budgeting, account management, project management, performance reporting, administrative and managerial management, operations management, and office administration. Users can arrange data in a spreadsheet using graphical tools, formulas, and pivot tables to work with large quantities of data to identify sums, averages, percentages, unique values, minimum and maximum values, ranges, outliers, and other needs.

### **Cloud Computing Services**

Cloud computing is the delivery of computing services (aka, SaaS) including software, databases, servers, storage, networking, analytics, and intelligence over the Internet to offer users improved and affordable computing speed, flexibility, and scale. From my own experience using a few cloud services and from reviewing an article on cloud service providers ([Peterson, Richard. July 26, 2022](#)) cloud services are offered by SAS Institute Inc., Amazon Web Services (AWS), Microsoft, IBM, Google, ServerSpace, Adobe, Kamatera, VMware, Rackspace, Red Hat, Salesforce, Oracle, SAP, Verizon, Linode, HostPapa, DigitalOcean, ScalaHosting, OVHcloud, LiquidWeb, Vultr, CloudSigma, LimeStone, Navisite, and Dropbox.

## Conclusion

Professionals with skills in data science and analytics are a “hot” commodity in the employment marketplace. With the Bureau of Labor Statistics (BLS) employment projections estimating growth of 15 percent from 2019 to 2029, data science careers are poised to accelerate greatly. Wikipedia mentions that, as a multi-disciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from structured and unstructured data,” data science “is the profession to unify statistics, data analysis, mathematics, computer programming, operations research, machine learning and related methods to analyze and better understand actual phenomena with data and enhanced decision making.”

This paper and e-poster has attempted to share the many ways that students, junior professionals, and those who are already pursuing a career as a Data Scientist can acquire greater knowledge as well as the ability to hone your skills for this exciting profession. From obtaining an advanced degree in data science, analytics, or big data analytics from one of the many distinguished universities and organizations; pursuing a certification offered by SAS Institute and others; and enhancing essential skills using the “free” SAS OnDemand for Academics (ODA) software; anyone seeking to enhance their skills to become a “skilled” data scientist. We also explored the many employment / career websites (August 2022) that are available to students, junior professionals, and seasoned professionals with the many organizations who are seeking the right candidates to hire for amazing employment, contract, and internship opportunities. The exciting world of the Data Scientist is one that is experiencing an exponential rate of growth, but while demand is huge the supply of skilled applicants is still growing at a much slower pace.

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## Author Information

Kirk Paul Lafler is an entrepreneur and consultant who has worked with SAS software since 1979 as an application developer, programmer, data analyst, educator, and author. Kirk currently serves as a lecturer and adjunct professor at San Diego State University; and an online educator who teaches SAS courses, workshops, seminars, and webinars to thousands of users around the world. Kirk has also authored or co-authored several books including PROC SQL: Beyond the Basics Using SAS, Third Edition (SAS Press. 2019) and Google® Search Complete (Odyssey Press. 2014); hundreds of papers and articles on a variety of SAS topics; an Invited speaker, educator, keynote and section leader at SAS user group conferences and meetings worldwide; and is the recipient of 27 "Best" contributed paper, hands-on workshop (HOW), and poster awards.

Comments and suggestions can be sent to:

Kirk Paul Lafler, sasNerd

SAS® / SQL / Python Consultant, Application Developer, Programmer, Data Analyst, Educator and Author

E-mail: [KirkLafler@cs.com](mailto:KirkLafler@cs.com)

LinkedIn: <https://www.linkedin.com/in/KirkPaulLafler/>

Twitter: @sasNerd