



The

Burtch *Works* Study

Salaries of Data Scientists
April 2015

Burtch Works Executive Recruiting
Linda Burtch, Managing Director

TABLE OF CONTENTS

Introduction: Quantitative Coup d'État	3
Quantitative Coup d'État: Rise of the Data Scientist	4
Section 1: Insights & Advice from Burtch Works	5
Compensation of Data Scientists: Insights from the Past Year	6
Advice for Employers	7
Advice for Data Scientists	8
About Burtch Works	9
Section 2: How Compensation Has Changed	10
How Changes in Compensation Were Measured	11
Changes in Base Salaries	12
Changes in Base Salary When Changing Jobs	15
Section 3: Demographic Profile & Current Compensation	17
Compensation by Job Category	18
Compensation of Data Scientists vs. Other Predictive Analytics Professionals	20
Education	22
Region	25
Industry	27
Residency Status	29
Gender	30
Age	31
Section 4: Appendix A/Study Objective & Design.....	33
Study Objective.....	34
Why the Burtch Works Studies Are Unprecedented	34
The Sample	34
Identifying Data Scientists	35
Completeness & Age of Data	36
Segmentations of Data Scientists	37
Section 5: Appendix B/Glossary	39
Glossary of Terms	40

Burtch Works Executive Recruiting, 1560 Sherman Avenue, Suite 1005, Evanston, IL 60201
847-440-8555 | www.burtchworks.com | info@burtchworks.com

© 2015, Burtch Works LLC. Unauthorized reproduction is strictly prohibited. Opinions reflect judgment at time of publication and are subject to change.

Introduction

QUANTITATIVE COUP D'ÉTAT: RISE OF THE DATA SCIENTIST

Quantitative Coup d'État: Rise of the Data Scientist

Although “Big Data” may have been the hot topic last year, this year data science has been permeating the discussion in every board room across the country. Nearly every company wants to know more about data scientists: Who are they? What do they do? How do we get one? This report endeavors to answer many of those burning questions, including perhaps the most burning question of all: What do they earn?

In April of 2014, Burtch Works released *The Burtch Works Study: Salaries of Data Scientists*, the first-ever comprehensive look at the demographics and compensation of this sought-after group. This year, we are able to look at how salaries have changed over the past year, as well as other short-term trends, with a sample that is more than twice the size of last year's.

However, we want to be very clear about how we define data scientists. Put simply, a data scientist has formidable experience with statistics and computer science, as well as the business acumen to derive actionable insights from data and prescribe actions based on those insights.

More precisely, a data scientist is a predictive analytics professional who uses statistics and predictive modeling to solve business problems, and who has experience with tools for organizing unstructured, often streaming Big Data. They can work with a wide variety of data, as they have the skills to build their own utilities to acquire and clean it, and don't rely on out-of-the-box solutions to structure their data.

In the **Identifying Data Scientists** section we go into more detail about their typical background, skills, datasets, and job responsibilities. It is important to note that true data scientists will be equipped to work on every stage of the end-to-end analytical process, and that a skill set limited to only one or two of these steps is characteristic of different positions, such as data engineers, programmers, or data analysts.

It is also crucial to distinguish business intelligence/reporting professionals from data scientists. BI/Reporting is descriptive, but is not predictive (predicting what will happen) or prescriptive (prescribing actions using analytics).

Although other predictive analytics professionals, like data scientists, work with Big Data, the Big Data they typically work with are not unstructured and so do not present the same data management challenges that confront data scientists.

Section 1

COMPENSATION OF DATA SCIENTISTS: INSIGHTS & ADVICE FROM BURTCH WORKS

Compensation of Data Scientists: Insights from the Past Year

We are pleased to present our update to the first-of-its-kind 2014 report, *The Burtch Works Study: Salaries of Data Scientists*. This year, we compiled information on 371 data scientists for whom we know compensation as well as in-depth demographic information and job characteristics. This information was collected by our recruiting staff during the 12 months ending March 2015.

This report shows salary distributions for data scientists – both individual contributors and managers – as well as how these have changed since the last study was published in April 2014. Finally, it shows how these vary with job characteristics, such as level, industry, and location, and with other demographic traits, such as education.

Seventy-one percent of the sample consists of individual contributors. Their median base salary is \$120,000, and 71% are eligible for a bonus. The median bonus received is \$15,650. The other 29% of the sample are managers. Their median base salary is \$170,000, and 82% are eligible for a bonus. The median bonus received is \$36,000.

From the 2014 study to the 2015 study, data scientists who are individual contributors saw an increase in median base salary that ranged from 14% for those at level 1 to 0% for those at level 3. For those who are managers, the increases ranged from less than 1% for those at level 1 to 8% for those at level 3.

Compensation varies most significantly with job type and level: whether one is an individual contributor or manager, and with scope of responsibility. The median base salary of individual contributors varies from \$91,000 for those at level 1 to \$150,000 for those at level 3. The median base salary of managers varies from \$140,500 for those at level 1 to \$250,000 for those at level 3. The proportion of individual contributors eligible for a bonus varies from 69% for those at level 1 to 75% for those at level 3. Between 79% and 87% of managers at all levels are eligible for bonuses.

The median years of experience of data scientists declined significantly from the last study, from 9 years to 6 years. This is indicative of the influx of new people into the data science field. With data science being declared the “sexiest job of the 21st century”, and the increasing prevalence of MOOCs and boot camps in addition to the new programs at more traditional universities, students are flocking to this booming profession. Only time will tell if these fledgling programs are successful at producing industry-ready data scientists.

Data scientists realize a median base salary increase of 16% when changing jobs, which is crucial information for organizations looking to hire and retain data scientists. Since these professionals can realize such a high increase in pay if they choose to change organizations, it is important for companies to make sure their salary bands are competitive to avoid attrition, and to offer compelling compensation packages when recruiting.

A significant shift since the 2014 study is the decline in the proportion of data scientists employed by startups. Startups accounted for 14.3% of the employers in our 2015 sample, a sharp drop from last year’s 29.4%. In an increasing number of industries, data science capabilities are becoming mandatory in order to stay competitive. Even more traditional legacy corporations are hiring data scientists, and many are launching entire data science departments. This influx of opportunities at more traditional firms is being welcomed by data science job seekers. Many data scientists are

turning to more stable options after witnessing or experiencing first-hand the uncertainty of the startup world.

Advice for Employers

Although assertions about data scientists sometimes border on hyperbolic (I've yet to meet a newly-graduated data scientist earning \$300,000+) one thing is very clear: the demand for data scientists is rapidly increasing, and as a result, they are frequently contacted by recruiters.

In fact, in our recent flash survey of hiring managers for data science and analytics teams, we discovered that 89% of them are looking to hire in 2015. Additionally, a flash survey of data scientists revealed a high demand for these professionals: 96% say they are contacted at least monthly by recruiters and 31% are being contacted several times per week. Coupled with the well-reported shortage of quantitative professionals, this can make finding and hiring data scientists very difficult.

While we can't promise that this advice will make hiring data scientists easy, there are several ways you can make your organization a more appealing environment for data scientists:

- **First, your organization must have a clear commitment to data driven decision making.** Data scientists want to know that their employer is serious about data science and will allow them to keep up with the constantly evolving field. The last thing data scientists want is a role where they spend more time justifying the need for their work than doing the work itself. Now that data science has moved from the back room to the board room at many firms, **data scientists will want to see top level buy-in**, and know that their work influences decisions.
- Develop clear criteria for evaluating candidates for data science jobs, and **carefully screen candidates based on their skills – not just their titles.** With the increase in media attention, there has also been a sharp increase in the number of professionals who label themselves “Data Scientist” without having the necessary skills.
- **Hire a leader to lay out the roadmap** and get your team in place. Fill in the team by recruiting thoroughly and aggressively, but also look internally for staffers interested in learning and adapting their skills.
- **Be ready to teach business skills.** It is easier to teach business skills to a data scientist than it is to teach an MBA or general analyst all of the technical skills required to be a data scientist, as the skill set required to work with unstructured or streaming data to solve complex problems is time intensive and challenging. However, teaching business skills still requires proactive effort from management. Keep your data scientists updated with news, books, and articles about your industry. Invite data scientists to high level meetings, and always explain the full context of their work. Understanding the greater business objective is an invaluable learning opportunity, and it will lead to analyses that are tailored to your business' priorities.

- **Carefully determine whether you actually need a data scientist.** Develop an understanding of what a data science position entails and see if it lines up with your organization’s goals and budget.
- And last, but certainly not least, make sure to **adjust your salary bands with the market.** This report aims to give you up-to-date salary information for data scientists across the country and in every industry, and to paint a clear picture of the hiring market. Our study shows that data scientists currently realize a 16% salary increase when changing jobs, so clearly your compensation of data scientists must be informed by current data about what the market bears for their skills.

Advice for Data Scientists

You probably don’t need us to tell you that this is a remarkable time to be a data scientist – you already know. With the demand for data-driven decision making only increasing, and the scramble for talent growing as more traditional firms get on board, the market is becoming richer with opportunities, especially for those who are proactive about managing their career.

Despite the rosy picture that this paints for many of you, it is still very important to be strategic about your career. With so many different opportunities and so many people approaching you, it is critical that you keep your career goals in mind when evaluating offers and companies.

Here is some advice for navigating the current landscape and managing your data science career:

- **Plan your career carefully.** Don’t jump ship just for money or just because you got a call from a friend about an “amazing opportunity”. Evaluate career moves based on how you can learn, grow your skill set, and position yourself to achieve long-term goals.
- **Consider the level of support data science has organization-wide.** Your success will depend on your opportunities to present your findings and solutions to senior leadership. If the quantitative team does not have leadership support, then you will constantly be fighting an uphill battle. You don’t want to spend most of your time trying to sell your ideas (and not actually implementing them) only to get nowhere.
- **Make sure the organization (or team) has the funding and patience to see the fruits of your labor** – it won’t happen overnight.
- **Be realistic about startups.** Very few startups become profitable, let alone reach the success of Facebook or Uber, and most fail within a few years. Evaluate opportunities pragmatically, and be prepared for the very real possibility that it will be a losing venture. If you do try one and it fails, be very careful about trying it again. Never do it a third time.
- **Build your business knowledge.** The number one complaint we hear from companies about data scientists is that they lack business knowledge and skills. Always keep in mind that your analysis and presentation *must* be relevant to the company’s business goals. Your focus should be to develop actionable insights that the company can monetize, not just chase down cool or interesting problems. Always keep the business’ goals top of mind, and

learn as much as you can about your industry. It's important to be able to distinguish what's important from what's interesting.

- **Develop your communication skills.** Presenting findings to a non-technical audience (such as the marketing team or the C-Suite) is a crucial part of being a data scientist. Practice and hone your ability to communicate and present just as you would with any technical skill. Data science can be complex and hard to explain, so you will need to develop your storytelling ability and boil it down to the necessary details.

About Burtch Works

Founded by Linda Burtch, Burtch Works Executive Recruiting is the go-to resource for quantitative talent, opportunities, and information about hiring and compensation trends. Our team of recruiters has over 85 years of collective experience in their quantitative specialties, which include data science, direct and digital marketing, web analytics, credit/risk analytics, marketing research, and many more. In specializing, each recruiter is adept at recognizing the subtle nuances of their unique area of expertise, which allows them to find the ideal fit for each role and follow current trends.

With the increased media attention the quantitative fields have received over the past few years, Burtch Works recruiters have continued to build strong networks of distinctively talented individuals, and fostered relationships with hiring managers and HR professionals in a wide variety of companies in every industry across the country. It is this approach to growing our business – by building personal relationships with extraordinary people and companies – that makes us uniquely placed to report on hiring trends and talent movement in the industry that we see from both sides of the fence. Burtch Works has a network of over 20,000 quantitative professionals, many of whom we have kept in touch with throughout their careers, starting at the completion of their graduate programs.

With over 30 years' experience recruiting in quantitative disciplines, Linda Burtch has developed a thorough understanding of the analytics fields, including the developing field of data science. She has maintained a blog on quantitative hiring for almost ten years, and has been interviewed for her insights on the analytics hiring market by The Wall Street Journal, CNBC, Mashable, Forbes, The Chicago Tribune, Fox News, All Analytics, Analytics Magazine, and InformationWeek.

The talented professionals that we work with every day, the “unicorns” in the “sexiest field of the 21st century”, in supplying their compensation, demographic, and job characteristics, have given these studies an unprecedented view of the data science profession. Whether being used by a manager hiring for their team, or by a professional developing benchmarks for their career, our salary reports are full of essential information for the predictive analytics, marketing research, and data science fields.

Section 2

DATA SCIENTISTS: HOW COMPENSATION HAS CHANGED

How Changes in Compensation Were Measured

In the spring of 2014, Burtch Works published *The Burtch Works Study: Salaries of Data Scientists*, which provided demographic and compensation data for data scientists. The information was derived from demographic and compensation data provided by 171 data scientists during interviews conducted over the 30 months ending with March 2014, most within the preceding year. During the year ending with March 2015, the staff at Burtch Works interviewed 371 data scientists, many of whom were among those interviewed during the preceding 30 months, and asked them to describe their current compensation (see **Appendix A** for more information about the sample).

A comparison of the compensation data obtained over the past year to the compensation data summarized in the 2014 study shows that base salaries have generally increased, and these increases have been significant for some job categories. Because the compensation data for the 2014 study were obtained over a period of 30 months, which is typical of compensation studies, and not just over a year, the changes in compensation reported here cannot be described as changes that occurred over only a year. Nevertheless, the trend is clear: compensation of data scientists is on the rise.

Changes in Base Salaries

- For data scientists in all job categories, base salaries reported during the past year are equal to or greater than those reported in last year's study.
- Salaries of level 1 individual contributors increased the most: the median salaries of these data scientists increased by 14%. This is the result of the increased demand for junior talent within data science.
- Level 3 managers saw a healthy increase in base salary of 8%. This is likely because many firms established data science departments and hired leaders to staff and organize those new departments. There are relatively few data scientists with the experience and personal attributes required to do this successfully.

Figure 1. Comparison of Data Scientists' Median Base Salary by Job Category

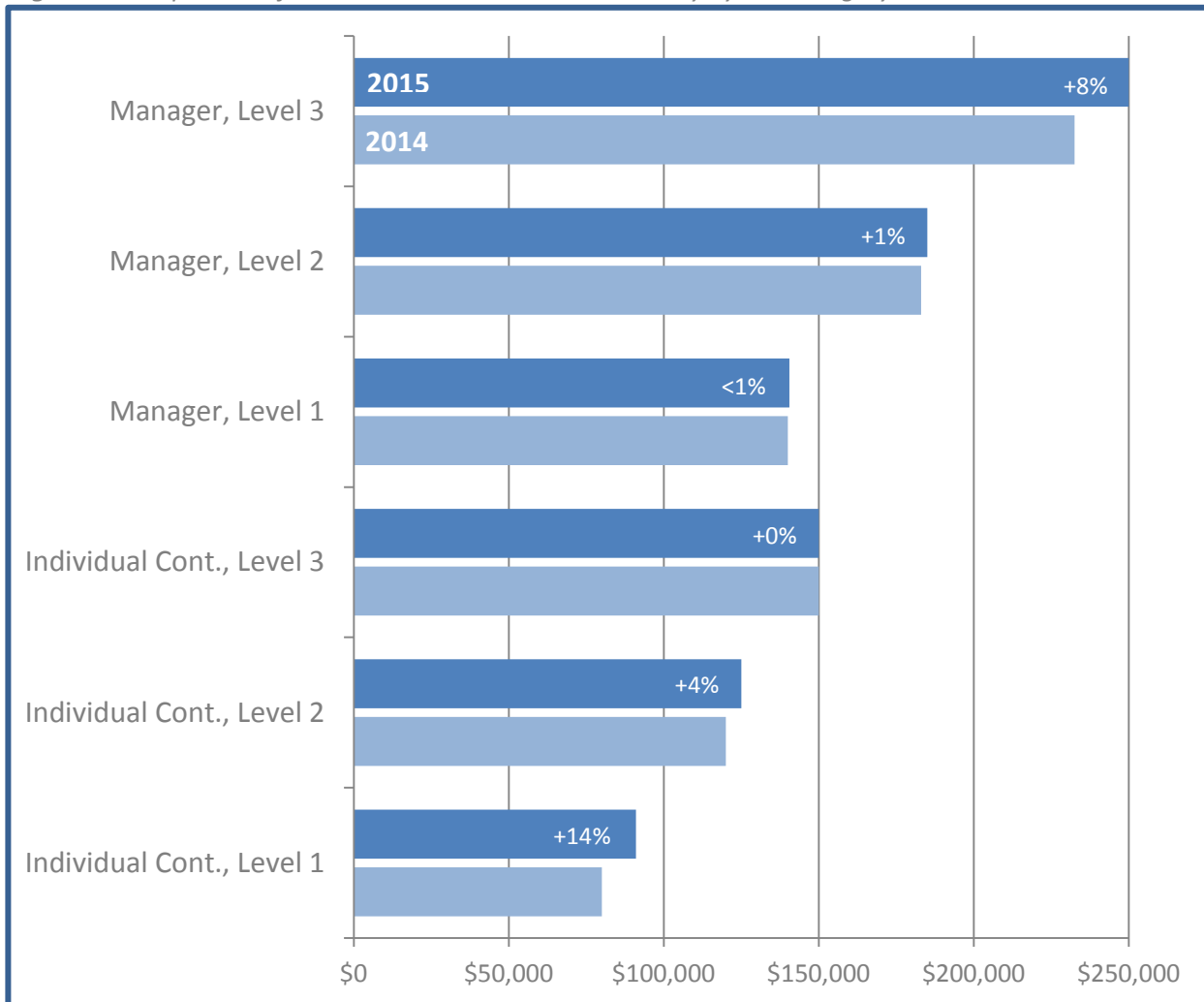


Figure 2. Change in Base Salaries of Data Science Individual Contributors by Job Level

Job Level	Year	25%	Median	75%
<i>Individual Contributor, Level 1</i>	2015	\$75,000	\$91,000	\$110,000
	2014	\$75,000	\$80,000	\$100,000
	Change	0%	14%	10%
<i>Individual Contributor, Level 2</i>	2015	\$104,500	\$125,000	\$140,000
	2014	\$100,000	\$120,000	\$136,250
	Change	5%	4%	3%
<i>Individual Contributor, Level 3</i>	2015	\$132,000	\$150,000	\$175,000
	2014	\$136,250	\$150,000	\$167,500
	Change	-3%	0%	5%

Figure 3. Change in Base Salaries of Data Science Managers by Job Level

Job Level	Year	25%	Median	75%
<i>Manager, Level 1</i>	2015	\$130,000	\$140,500	\$153,750
	2014	\$128,000	\$140,000	\$149,000
	Change	2%	0%	3%
<i>Manager, Level 2</i>	2015	\$160,000	\$185,000	\$206,000
	2014	\$156,000	\$183,000	\$200,000
	Change	3%	1%	3%
<i>Manager, Level 3</i>	2015	\$202,500	\$250,000	\$283,500
	2014	\$197,500	\$232,500	\$256,250
	Change	3%	8%	11%

Changes in Base Salary When Changing Jobs

Among the data scientists interviewed by Burtch Works staff for this study, there were 55 who had changed jobs and received a salary increase. There were also a small number of data scientists who changed jobs but did not realize a salary increase, or whose salary declined. Those individuals are excluded from the sample used to derive the data below, because the purpose here is to show how compensation changes when data scientists voluntarily change jobs to pursue career goals. When there is no increase or a decline in salary, the job change most likely occurred for another reason, such as a lay-off or to accommodate a spouse who accepted a job requiring relocation.

- On average, data scientists realize substantial base salary increases when they change jobs. The median base salary increase was 16.0% and the mean increase was 16.8%.
- This 16% median increase is higher than the 13% median increase seen by other predictive analytics professionals who perform analyses on structured data sets.

Figure 4. Increase in Base Salary for Data Science Job Changes

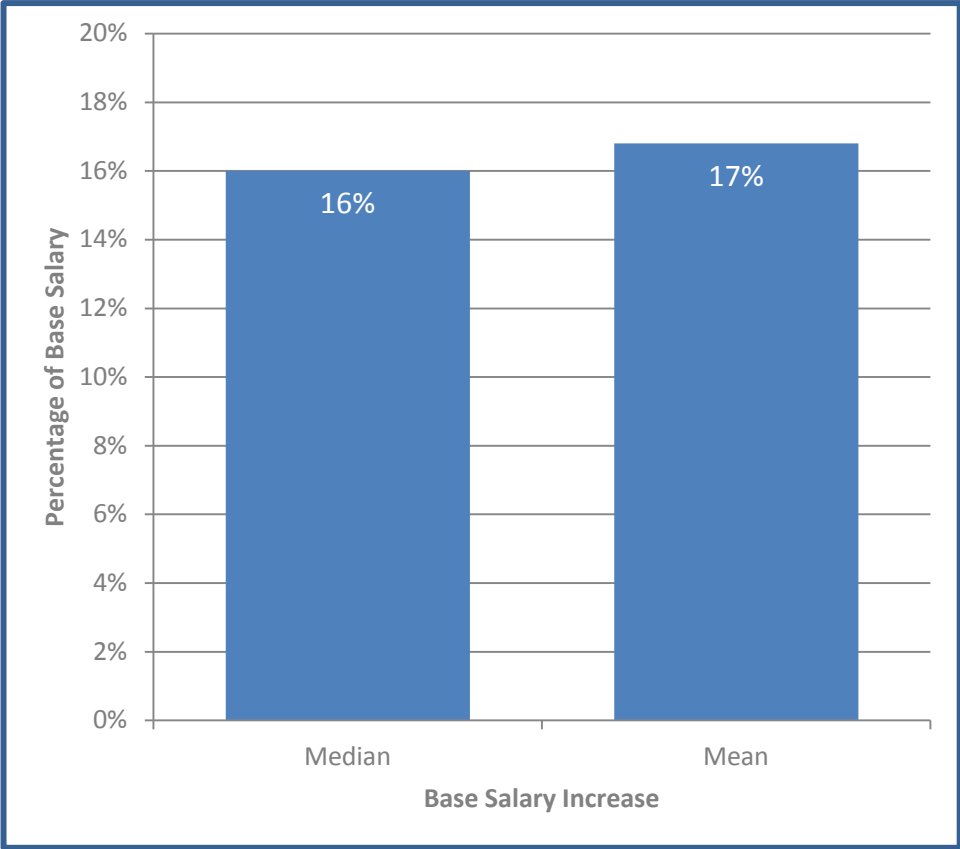
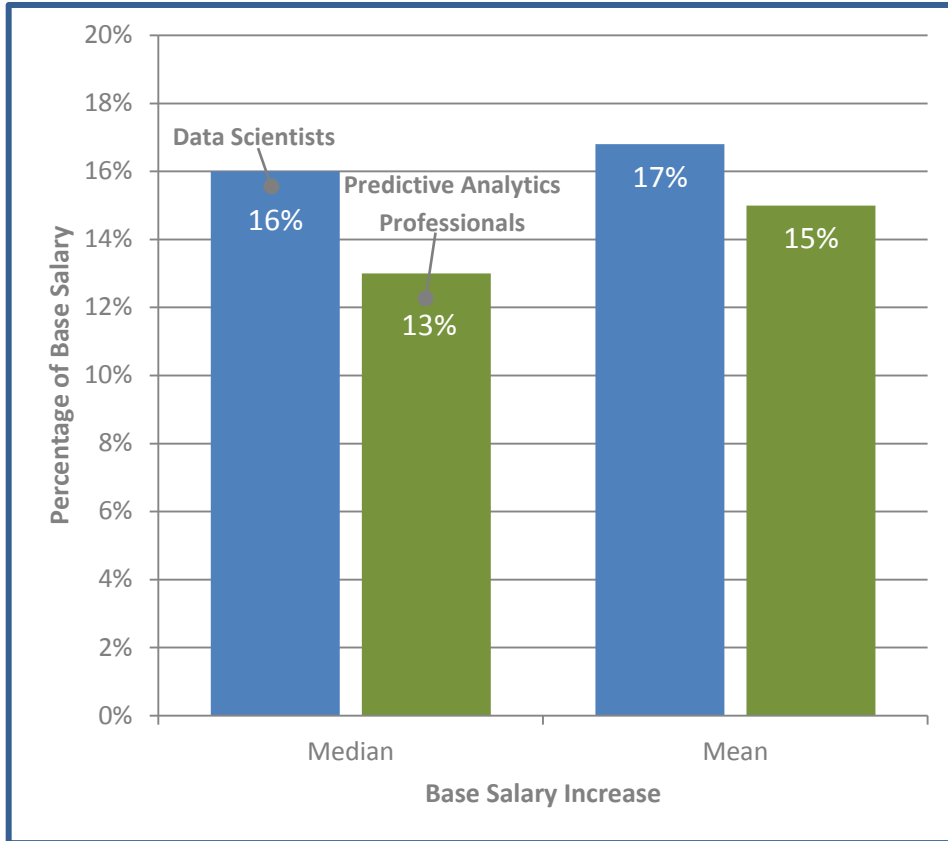


Figure 5. Increase in Base Salary for Data Science & Predictive Analytics Job Changes



Section 3

DATA SCIENTISTS: DEMOGRAPHIC PROFILE & CURRENT COMPENSATION

Compensation by Job Category

Compensation of data scientists varies considerably with job category: whether a data scientist is an individual contributor or manager, and by their scope of responsibility (job level).

- The median salary of individual contributors ranges from \$91,000 for those who are at level 1 to \$150,000 for those who are at level 3. The median salary of managers ranges from \$140,500 for those who are at level 1 to \$250,000 for those who are at level 3.
- Aside from being eligible for bonuses, a number of data scientists are eligible for stock or equity grants from their employers. For example, 71% of individual contributors are eligible for bonuses, while 80% are eligible for a bonus and/or equity. This is likely due to the number of data scientists employed by technology firms on the West Coast or by other young companies, in which equity packages are frequently used as a recruiting tool.

Figure 6. Distribution of Data Scientists by Management Responsibility

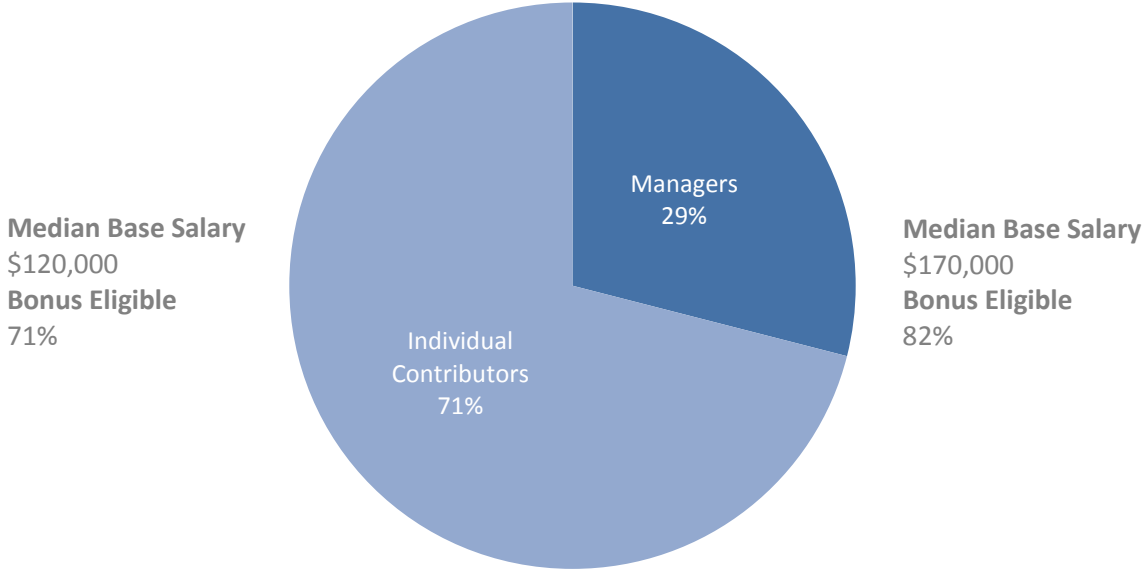


Figure 7. Compensation of Data Science Individual Contributors by Job Level

Individual Contributor Job Level	N	Base Salary				Bonus		
		25%	Median	Mean	75%	Eligible	Median	Mean
Level 1	105	\$75,000	\$91,000	\$93,201	\$110,000	68.6%	\$10,500	\$13,090
Level 2	83	\$104,500	\$125,000	\$129,795	\$140,000	68.7%	\$17,250	\$19,630
Level 3	77	\$132,000	\$150,000	\$157,851	\$175,000	75.3%	\$28,000	\$34,151

Figure 8. Compensation of Data Science Managers by Job Level

Manager Job Level	N	Base Salary				Bonus		
		25%	Median	Mean	75%	Eligible	Median	Mean
Level 1	38	\$130,000	\$140,500	\$147,993	\$153,750	78.9%	\$21,000	\$24,329
Level 2	53	\$160,000	\$185,000	\$187,906	\$206,000	83.0%	\$41,000	\$44,999
Level 3	15	\$202,500	\$250,000	\$241,867	\$283,500	86.7%	\$56,250	\$66,725

Figure 9. Median and Mean Base Salaries of Data Science Individual Contributors by Job Level

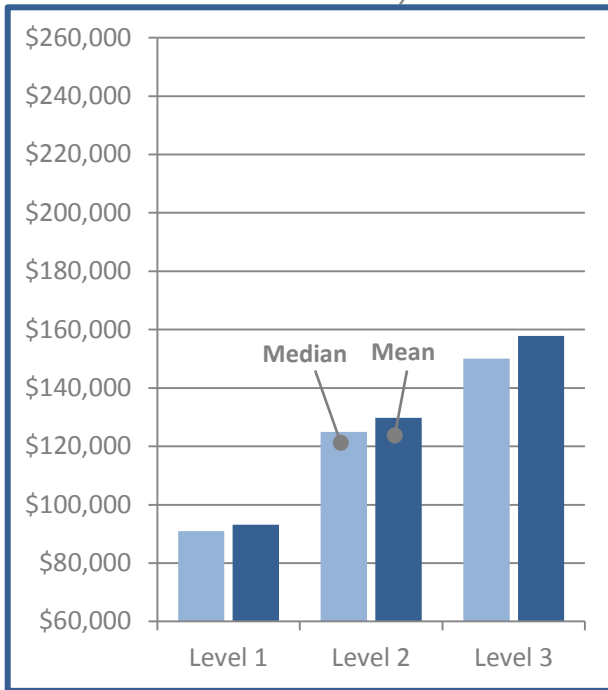
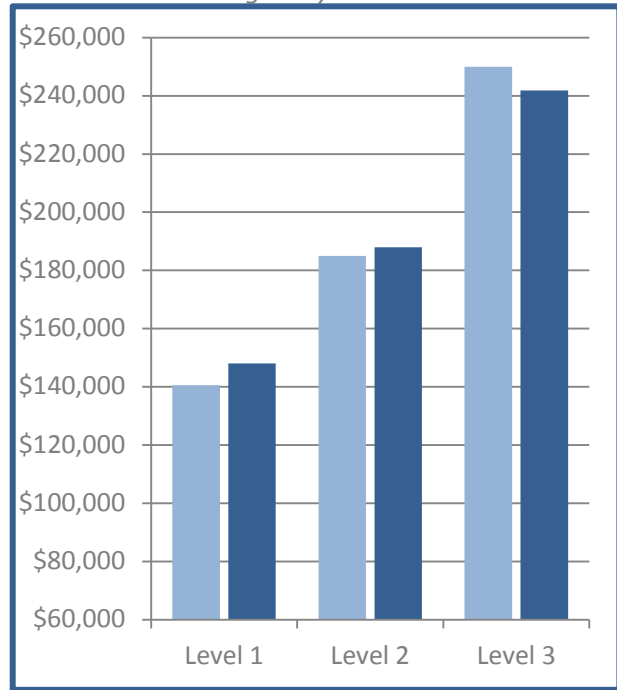


Figure 10. Median and Mean Base Salaries of Data Science Managers by Job Level



Compensation of Data Scientists vs. Other Predictive Analytics Professionals

In every job category, data scientists earn a higher median base salary than other predictive analytics professionals, as Figure 11 shows below.

Individual contributors within data science earn significantly higher base salaries than other predictive analytics professionals. The overall median base salary for data science individual contributors is \$120,000, compared to \$95,000 for other predictive analytics professionals. This trend is also seen among managers: the median base salary of those who are data scientists is \$170,000, while other predictive analytics professionals who are managers have a median base salary of \$145,000.

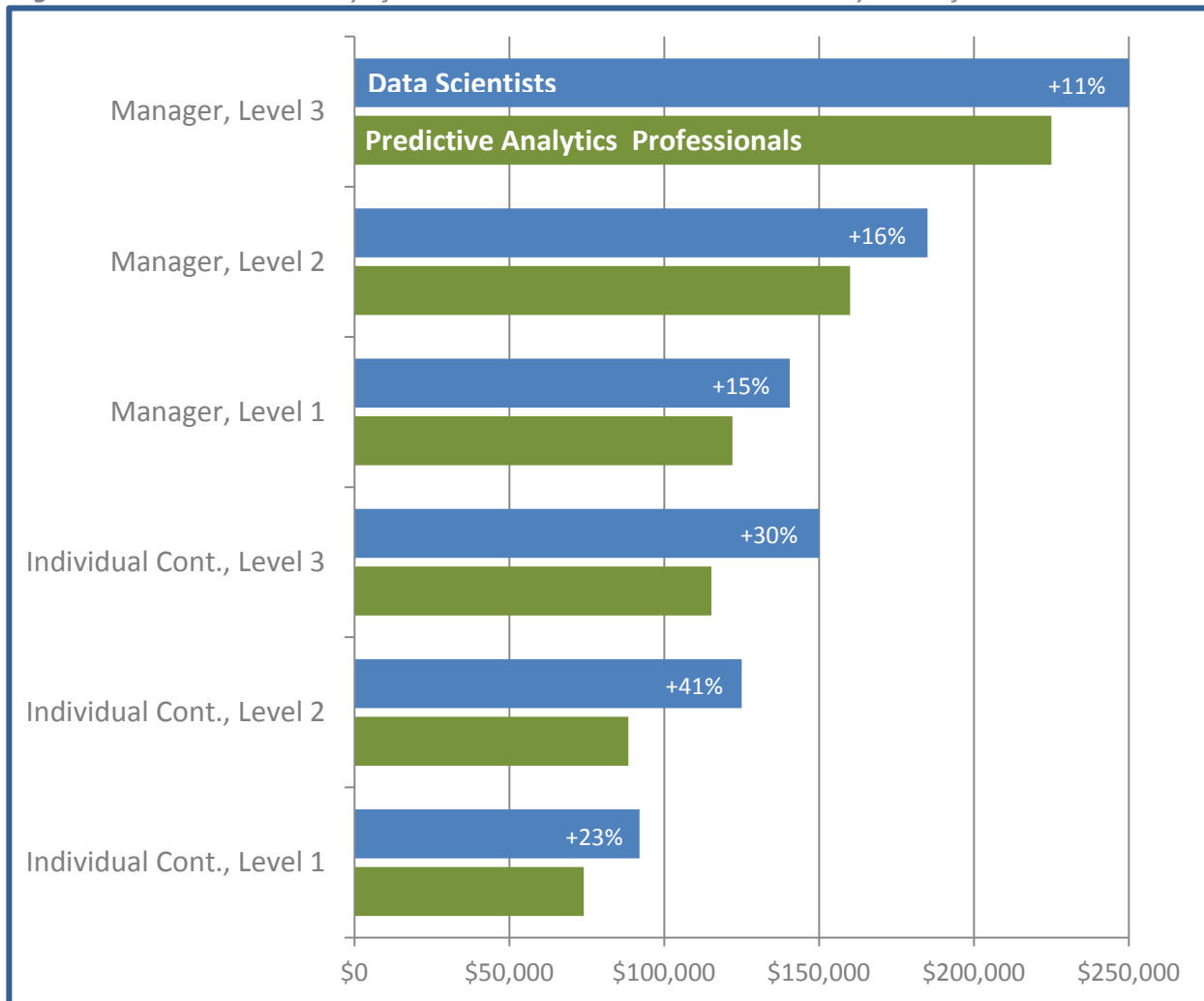
The difference between data science salaries and the salaries of other predictive analytics professionals ranges from 11% greater (for level 3 managers) to 41% greater (for level 2 individual contributors), depending on job level.

The higher salaries realized by data scientists are likely a result of several factors:

- Many more data scientists hold a Ph.D. than other predictive analytics professionals (48% in data science, vs. 17% in predictive analytics).
- The scarcity of individuals with data science skills in the “war for talent” is putting an upward pressure on salaries.
- A larger proportion of data scientists are located on the West Coast (nearly 40%) where firms pay a premium for data science talent.

For the time being, it appears that the difference between salaries in data science and predictive analytics is remaining steady. As the lines between these two fields continue to blur, however, it is likely that the gap in salaries will narrow. It will be interesting to watch how this trend develops in the coming years.

Figure 11. Median Base Salary of Data Scientists vs. Other Predictive Analytics Professionals



Education

A large majority (92%) of data scientists have a graduate degree, with 48% holding a Ph.D. Those with a Ph.D. generally earn more than those with a Master's or Bachelor's degree.

- 92% of data scientists have an advanced degree: 48% have a Ph.D., and another 44% have a Master's degree.
- Nearly one-third of data scientists hold a degree in mathematics or statistics, with another one-fifth holding a degree in computer science.
- At almost every level, data scientists with a Ph.D. earn more than their counterparts with a Bachelor's or Master's degree.
- Significantly more data scientists hold a Ph.D. compared to other predictive analytics professionals (48% in data science vs. 17% in predictive analytics).

Figure 12. Data Scientists by Education

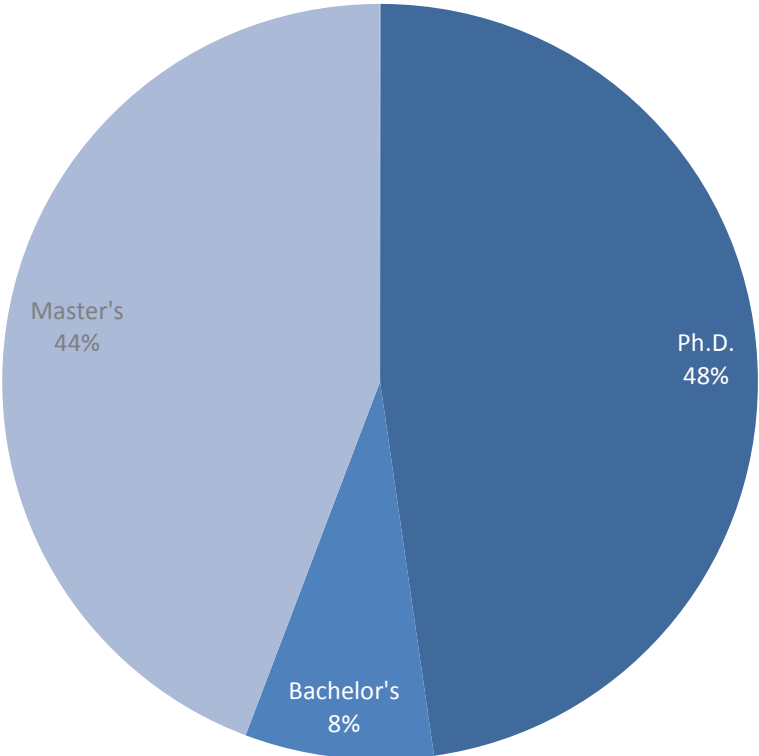


Figure 13. Data Scientists by Area of Study

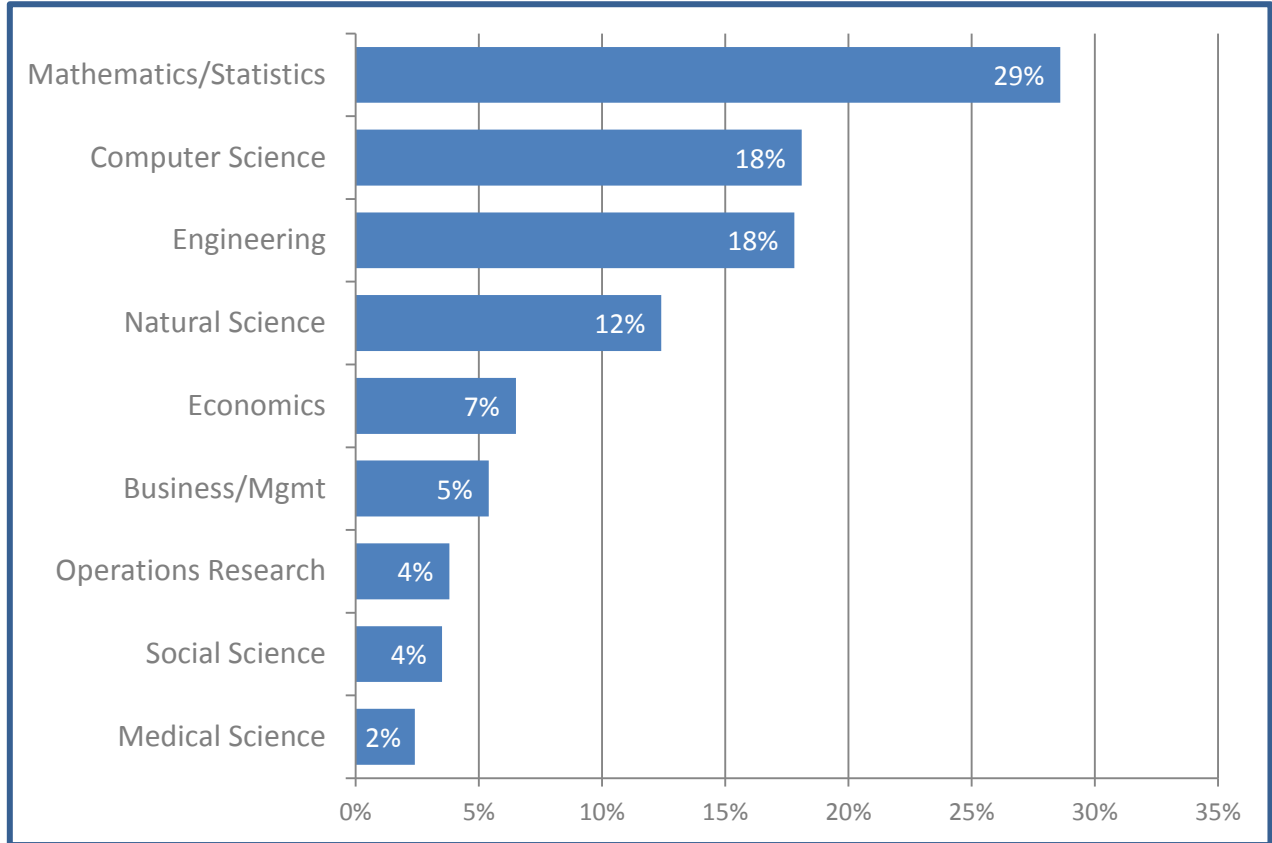


Figure 14. Distribution of Data Scientists and Other Predictive Analytics Professionals by Education

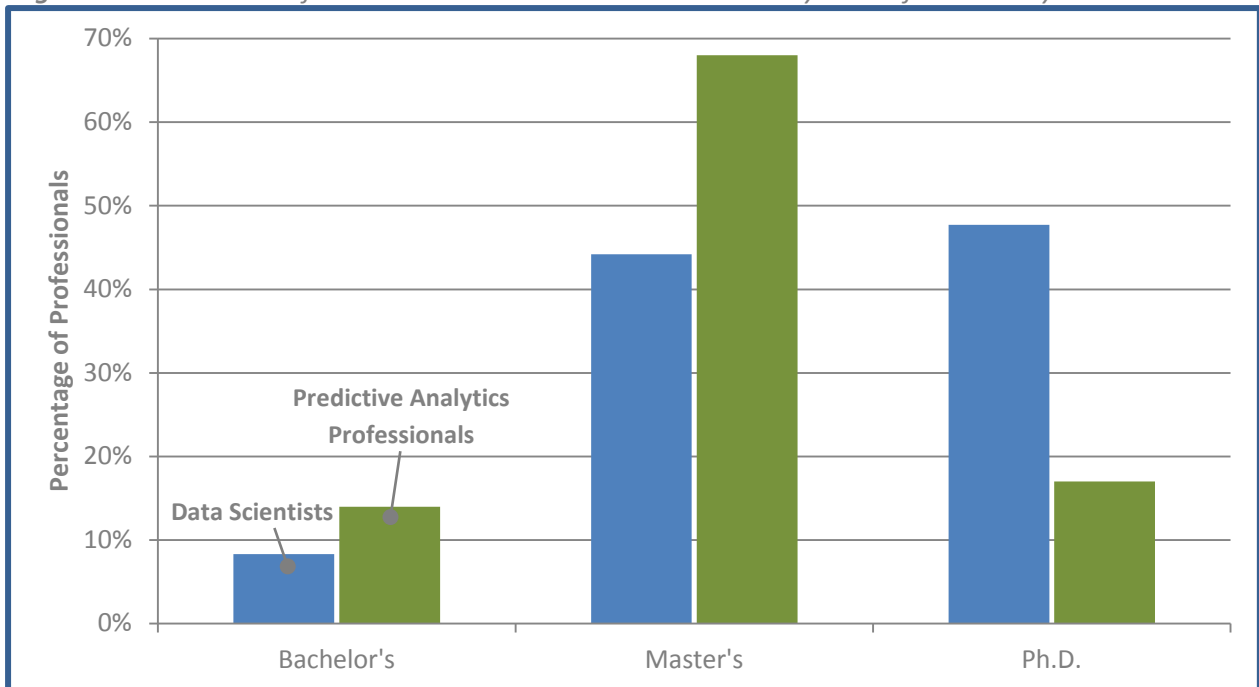


Figure 15. Base Salary of Data Science Individual Contributors by Job Level and Education

Job Level	Education	Base Salary				
		N	25%	Median	Mean	75%
Individual Contributor, Level 1	Master's	50	\$72,750	\$90,000	\$87,863	\$104,500
	PhD	45	\$80,000	\$100,000	\$100,311	\$124,000
Individual Contributor, Level 2	Master's	31	\$90,000	\$120,000	\$124,935	\$137,500
	PhD	46	\$110,000	\$126,000	\$132,152	\$141,500
Individual Contributor, Level 3	Master's	34	\$130,875	\$143,500	\$146,956	\$160,000
	PhD	36	\$133,750	\$160,000	\$167,361	\$189,250

Note: Sample size for professionals with a Bachelor's degree was too small to report.

Figure 16. Base Salary of Data Science Managers by Job Level and Education

Job Level	Education	Base Salary				
		N	25%	Median	Mean	75%
Manager, Level 1	Master's	14	\$130,000	\$139,500	\$145,696	\$161,250
	PhD	18	\$140,000	\$145,000	\$154,111	\$158,750
Manager, Level 2	Master's	27	\$158,500	\$185,000	\$186,593	\$207,500
	PhD	25	\$162,000	\$185,000	\$190,840	\$206,000
Manager, Level 3	Master's	8	\$191,750	\$215,000	\$225,875	\$259,750
	PhD	7	\$230,000	\$254,000	\$260,143	\$293,500

Note: Sample size for professionals with a Bachelor's degree was too small to report.

Region

The majority of data scientists are employed on the coasts. Over one-third are employed on the West Coast, and nearly one-third in the Northeast.

- In every job category, data scientists in the Northeast and on the West Coast earn higher base salaries than those who reside in the Middle U.S., and those on the West Coast typically out-earn those in the Northeast. For example, level 1 individual contributors who live on the West Coast earn a median base salary of \$110,000: 22% more than their Northeast counterparts, and 38% more than those in the middle-U.S.

Figure 17. Data Scientists by Region

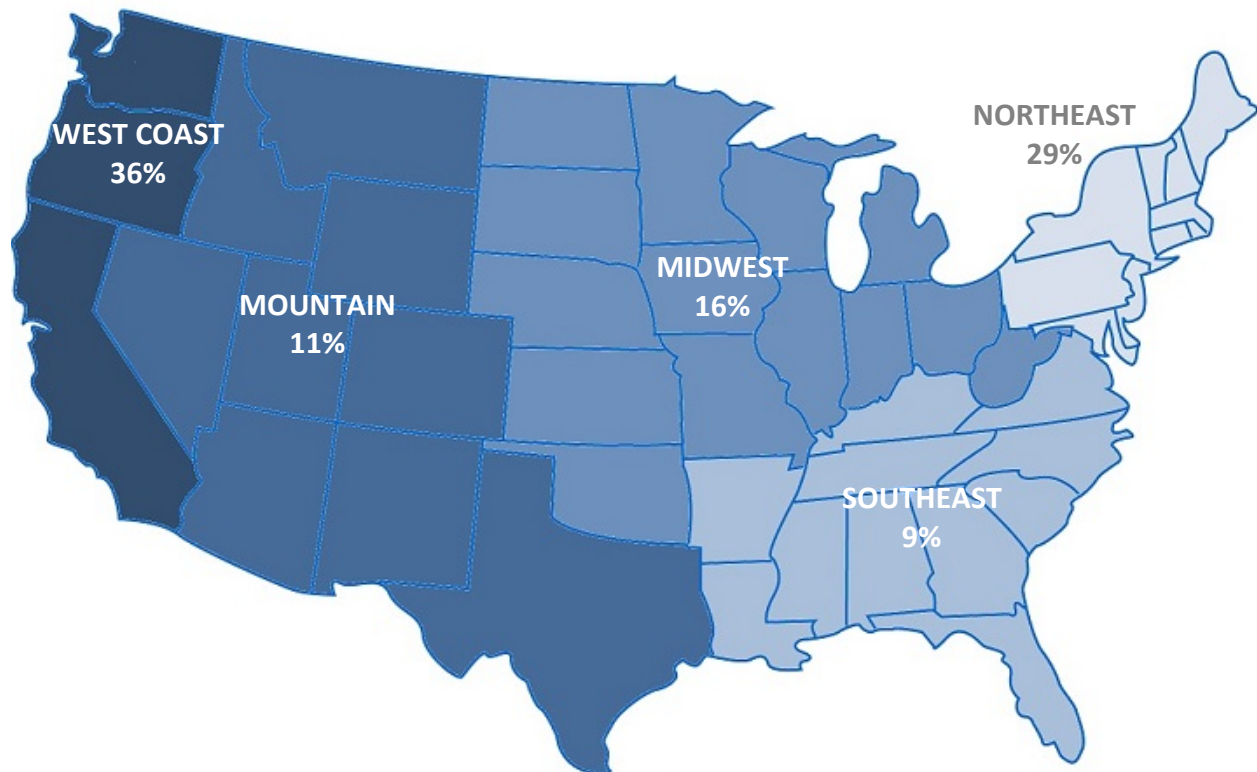


Figure 18. Distribution of Base Salaries of Data Science Individual Contributors by Job Level and Region

Job Level	Region	Base Salary				
		N	25%	Median	Mean	75%
<i>Individual Contributor, Level 1</i>	Northeast	26	\$75,000	\$90,000	\$90,923	\$108,750
	Middle U.S.	47	\$60,000	\$80,000	\$81,723	\$96,000
	West Coast	32	\$100,000	\$110,000	\$111,911	\$126,250
<i>Individual Contributor, Level 2</i>	Northeast	21	\$105,000	\$120,000	\$124,738	\$140,000
	Middle U.S.	29	\$100,000	\$110,000	\$113,517	\$130,000
	West Coast	33	\$125,000	\$131,000	\$147,318	\$153,000
<i>Individual Contributor, Level 3</i>	Northeast	25	\$130,000	\$150,000	\$161,920	\$170,000
	Middle U.S.	23	\$130,250	\$140,000	\$145,543	\$167,500
	West Coast	29	\$140,000	\$160,000	\$164,103	\$180,000

Figure 19. Distribution of Base Salaries of Data Science Managers by Job Level and Region

Job Level	Region	Base Salary				
		N	25%	Median	Mean	75%
<i>Manager, Level 1</i>	Northeast	12	\$137,500	\$145,500	\$154,250	\$161,250
	Middle U.S.	13	\$130,000	\$138,000	\$137,750	\$150,000
	West Coast	13	\$130,000	\$141,000	\$152,462	\$178,000
<i>Manager, Level 2</i>	Northeast	19	\$160,000	\$180,000	\$182,211	\$200,000
	Middle U.S.	14	\$151,000	\$167,500	\$171,357	\$186,500
	West Coast	20	\$168,000	\$200,000	\$204,900	\$240,000
<i>Manager, Level 3</i>	Northeast	4	-	-	-	-
	Middle U.S.	5	\$194,000	\$205,000	\$217,800	\$225,000
	West Coast	6	\$220,000	\$251,500	\$247,500	\$278,500

Industry

- Technology companies are, by far, the largest employers of data scientists: 41% of data scientists are employed in the technology industry.
- Since the period of the 2014 study, the proportion of data scientists employed by startups has declined sharply, from 29.4% to 14.3%. This is not because fewer startups are employing data scientists but, instead, because so many more established firms have hired data scientists to exploit unstructured data they have begun to accumulate.
- For individual contributors at every level and managers at levels 1 and 2, those employed by technology or gaming companies are paid higher base salaries than those employed in other industries.

Figure 20. Data Scientists by Industry

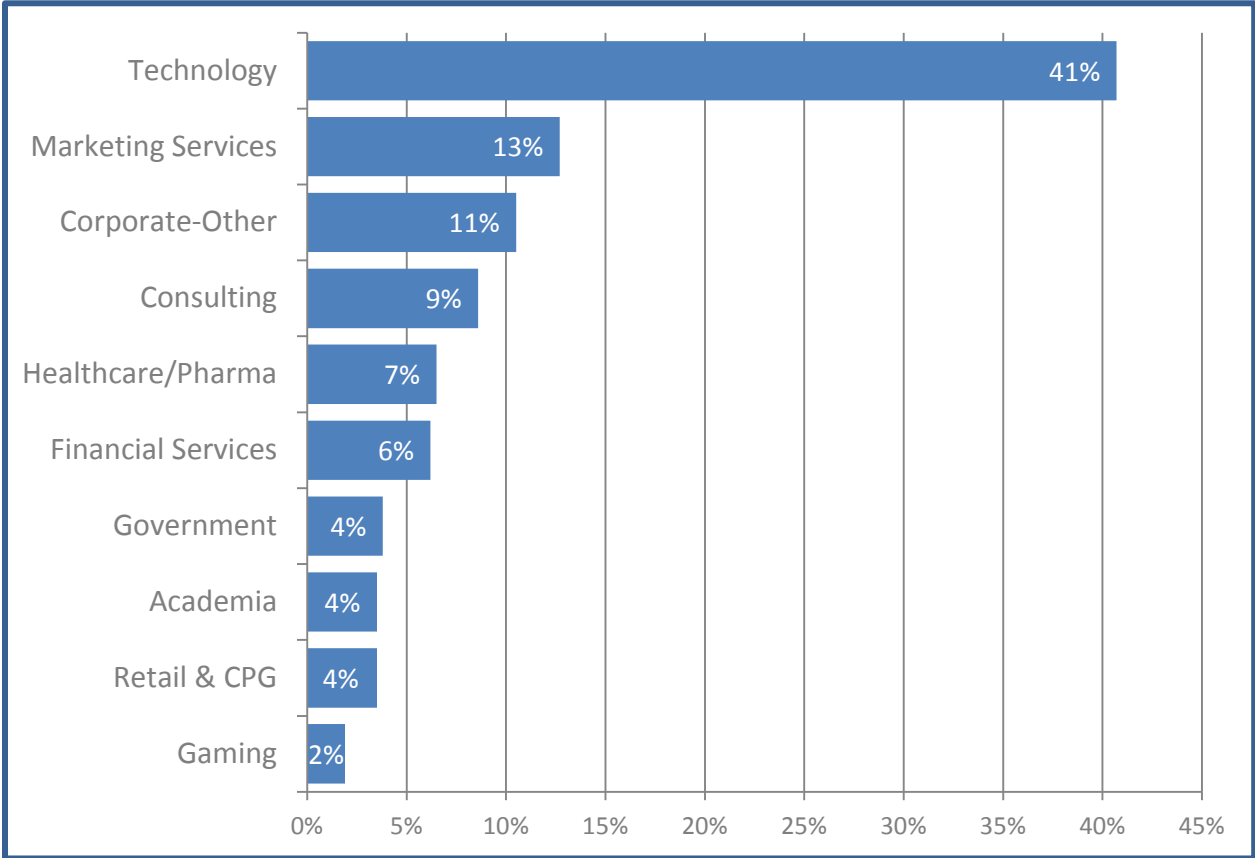


Figure 21. Distribution of Base Salaries of Data Science Individual Contributors by Job Level and Industry

Job Level	Industry	Base Salary				
		N	25%	Median	Mean	75%
Individual Contributor, Level 1	Technology & Gaming	42	\$91,500	\$108,000	\$106,381	\$124,750
	All Others	63	\$70,000	\$82,000	\$84,415	\$101,500
Individual Contributor, Level 2	Technology & Gaming	37	\$124,000	\$130,000	\$145,243	\$150,000
	All Others	46	\$90,000	\$110,000	\$117,370	\$130,000
Individual Contributor, Level 3	Technology & Gaming	32	\$150,000	\$167,500	\$171,000	\$200,000
	All Others	45	\$130,000	\$140,000	\$148,500	\$160,000

Figure 22. Distribution of Base Salaries of Data Science Managers by Job Level and Industry

Job Level	Region	Base Salary				
		N	25%	Median	Mean	75%
Manager, Level 1	Technology & Gaming	15	\$135,000	\$141,000	\$153,267	\$165,000
	All Others	23	\$130,000	\$140,000	\$144,554	\$150,000
Manager, Level 2	Technology & Gaming	24	\$160,750	\$188,000	\$188,250	\$201,500
	All Others	29	\$160,000	\$180,000	\$187,621	\$207,000

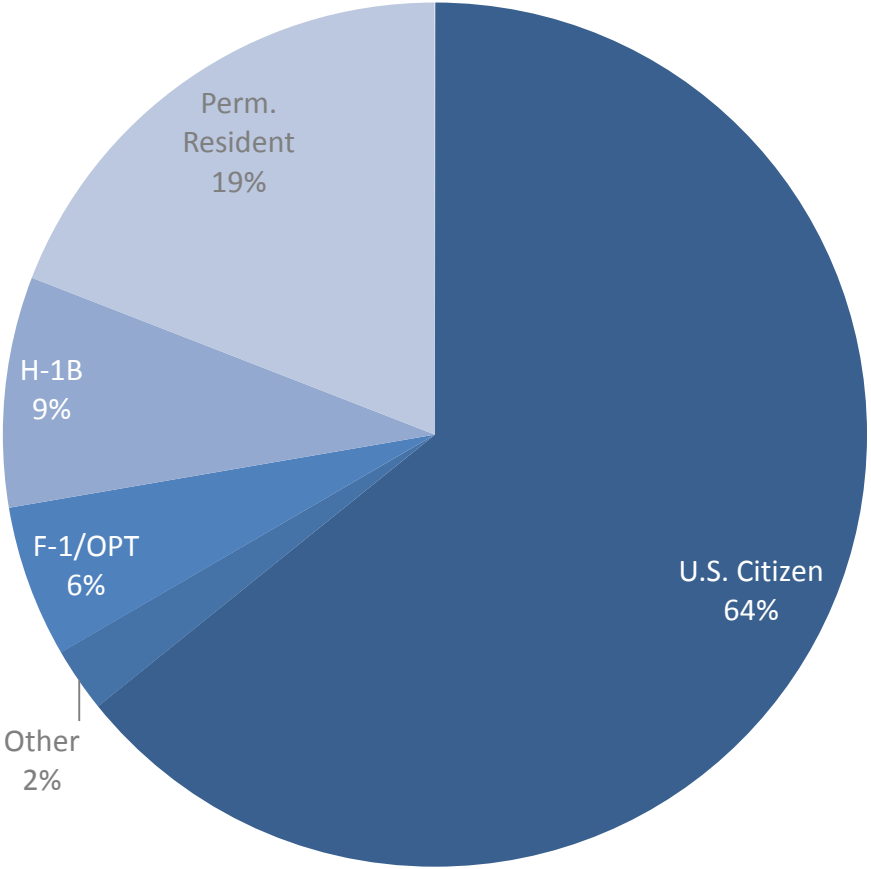
Note: Sample size for level 3 managers was too small to report.

Residency Status

More than one-third of data scientists are not U.S. citizens.

- 36% of data scientists are non-U.S. citizens with F-1/OPT, H-1B, green card, or another visa that allows them to work in the U.S.

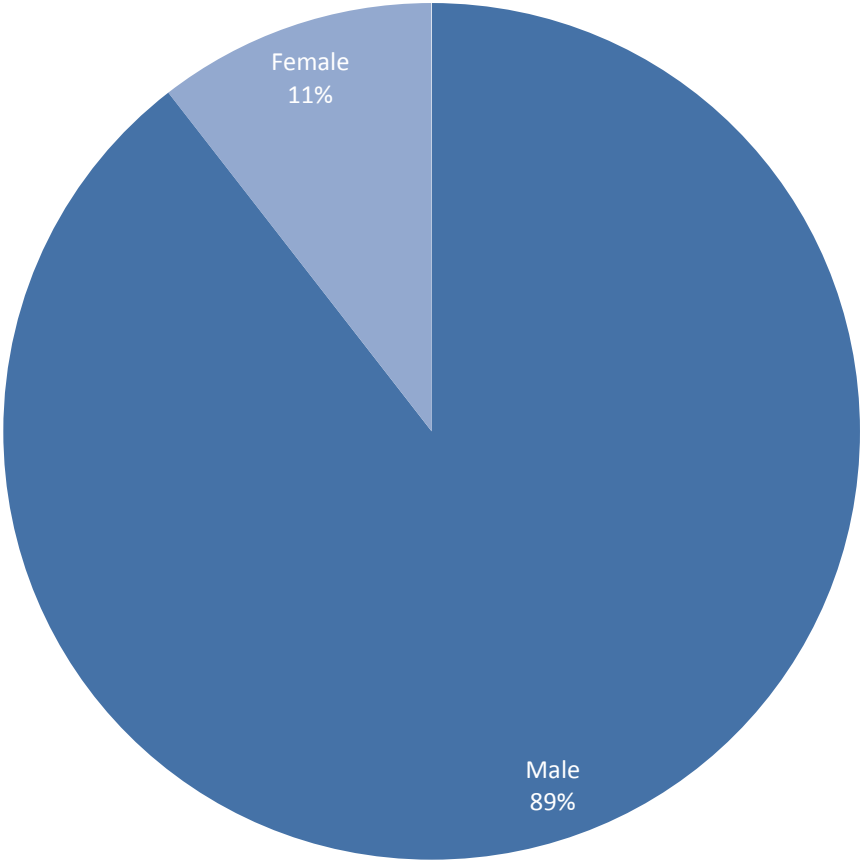
Figure 23. Data Scientists by Residency Status



Gender

- The 2015 study, like the 2014 study, shows that the large majority of data scientists (89%) are men.

Figure 24. Data Scientists by Gender



Age

The recruiters at Burtch Works do not ask the age of the professionals with whom they work. However, they do ask them for their years of work experience, which is highly correlated with age, and shown below is the distribution of data scientists by years of experience. However, salary information is not shown here, because salaries are indirectly related to years of experience through job level.

- Median years of experience of data scientists interviewed for this year's study is significantly lower (6 years) than those interviewed for the 2014 study (9 years). This is because so many new people have entered the data science field.
- 70% of data scientists have fewer than 10 years of experience.

Figure 25. Data Scientists by Years of Experience

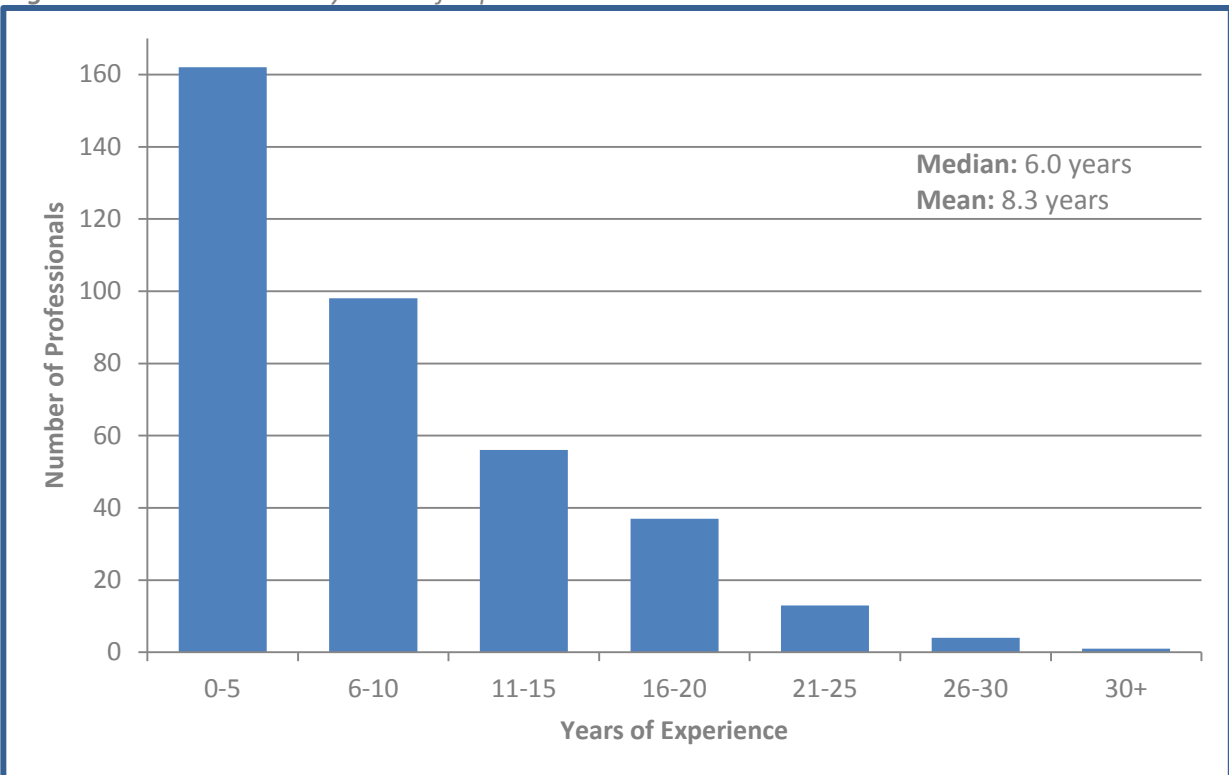
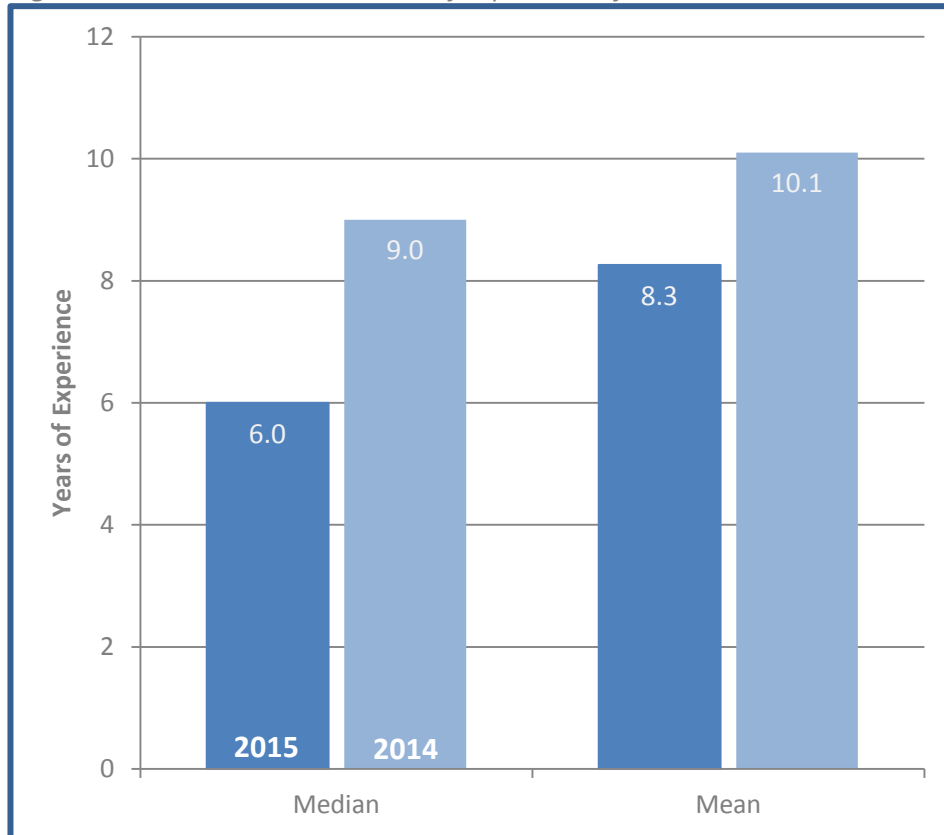


Figure 26. Median and Mean Years of Experience of Data Scientists



Section 4

APPENDIX A/Study Objective & Design

Study Objective

This report is a follow-up to the original report, *The Burtch Works Study: Salaries of Data Scientists*, which was published in April 2014. The study objective is to show the current compensation of data scientists, how compensation varies with certain demographic characteristics, and how compensation has changed since last year's study. Burtch Works will be interviewing data scientists every year to show both short-term and long-term trends in their compensation and demographic characteristics.

Why the Burtch Works Studies Are Unprecedented

The Burtch Works studies provide unprecedented salary and demographic data for data scientists, and are distinct from other salary reports because:

- **They focus only on data scientists** – This sample only includes professionals that Burtch Works has identified as data scientists (see the **Identifying Data Scientists** section on page 35). Other professionals such as IT specialists, business analysts, and other predictive analytics professionals are excluded.
- **Burtch Works collects the data by interviewing data scientists** – Instead of using data supplied by human resources departments or from a self-reported survey, Burtch Works interviews data scientists individually. A key benefit to using the interview process over surveys and HR data is that Burtch Works recruiters can obtain information about data scientists that is not usually provided by human resource departments, such as education level. Due to their extensive knowledge of the profession, recruiters are also able to obtain corrections or clarifications during interviews, and discern when information provided by the data scientists is not credible.
- **Burtch Works shows how compensation varies by region, job level, industry, and education** – The sample is big enough to show salary data, collected within the last year, at a granular level, shedding even more light on trends in the industry.

The Sample

This sample consists of 371 of nearly 1,500 data scientists with whom Burtch Works has relationships. The interviews to obtain the data cited in this report were conducted over the 12 months ending March 2015, which is the 12 month period immediately following the data collection period for the 2014 study. A professional was included in the sample only if (1) he or she satisfies Burtch Works' data scientist classification criteria (see: **Identifying Data Scientists** section page 35) and (2) the interview yielded complete information about all of the compensation, demographic, and job characteristics used in this study.

Although some of the 371 data scientists in the sample were also interviewed in the data collection period for the study published in 2014, many were not, so changes in compensation were not measured by differencing current compensation and compensation reported for the last study and taking medians (and other percentiles) of the differences. Instead, changes were measured by

comparing medians (and other percentiles) of current compensation to those reported in the 2014 study.

Identifying Data Scientists

Data scientists apply sophisticated quantitative and computer science skills to both structure and analyze massive unstructured data sets or continuously streaming data, with the intent to derive insights and prescribe action. The depth of their coding skills distinguishes them from other predictive analytics professionals and allows them to exploit data regardless of its source, size, or format. Through the use of one or more general-purpose coding languages, data scientists can tackle problems made very difficult by the size and disorganization of the data.

To identify data scientists, Burtch Works used the following criteria:

1. **Educational Background** – Data scientists typically have an advanced degree, such as a Master’s or Ph.D., in a quantitative discipline, such as Applied Mathematics, Statistics, Computer Science, Engineering, Economics, or Operations Research. As new data science degree programs, massive open online courses (MOOCs), and boot camps continue to take hold in the quantitative community, it is possible that data scientists’ educational backgrounds may diversify.
2. **Skills** – Data scientists are usually proficient users of tools in the Hadoop/MapReduce ecosystem such as Pig and Hive, as well as AWS. Apache Spark is also becoming a vital tool in the data science toolbox. Data Scientists may use languages such as Python and Java to write programs to automate data parsing, transformation, and analysis, and typically have expert knowledge of statistical and machine learning methods using tools such as R and SAS. Many also use other methods to derive useful information from data, including pattern recognition, signal processing, and visualization.
3. **Dataset Size** – Data scientists typically work with datasets measured in gigabytes up to petabytes, and often work with continuously streaming data.
4. **Job Responsibilities** – Data scientists are equipped to work on every stage of the analytics life cycle which includes:
 - **Data Acquisition** – This may involve scraping data, interfacing with APIs, querying relational and non-relational databases, or even defining strategy in relation to what data to pursue.
 - **Data Cleaning/Transformation** – This may involve parsing and aggregating messy, incomplete, and unstructured data sources to produce data sets that can be used in analytics/predictive modeling.
 - **Analytics** – This involves statistical and machine learning-based modeling in order to describe or predict patterns in the data.

- **Prescribing Actions** – This involves interpreting analytical results, and using data-driven insights to inform business strategy.
- **Programming/Automation** – In many cases, data scientists are also responsible for creating libraries and utilities to operationalize or simplify various stages of this process. Often, they will contribute production-level code for a firm’s data products.

Professionals whose jobs are described as predictive analytics, analytics management, business intelligence, and operations research are not considered data scientists, because they either do not work with large datasets, do not work with unstructured data, or because, in the case of operations researchers, their function is to optimize well-described processes rather than search for patterns in data. Predictive analytics professionals were the subject of their own study, *The Burtch Works Study: Salaries of Predictive Analytics Professionals*, released in September 2014.

Completeness & Age of Data

A data scientist was included in the sample only if Burtch Works has complete data about all of the compensation, demographic, and job characteristics used in this study.

All of the 371 data scientists in the sample were interviewed over the past year ending March 2015, which is the year immediately following the period of interviews for the 2014 study. All were interviewed by Burtch Works recruiters executing searches for clients.

Segmentations of Data Scientists

To examine how the compensation of data scientists varies, Burtch Works used characteristics of their jobs (level, location of employer, industry) and demographic characteristics (gender, years of experience, residency status) to segment data scientists. Burtch Works developed the following job categories for the first series of Burtch Works Studies, and the definitions remain the same for the 2015 report:

Figure 27. Definition of Individual Contributor Job Levels

Individual Contributors		
Level	Responsibility	Typical Years of Experience
Level 1	Learning the job, hands-on analytics and modeling	0-3 years
Level 2	Hands-on with unstructured data, working with more advanced problems and models, may help train Analysts	4-8 years
Level 3	Considered an analytics Subject Matter Expert, mentors and trains analysts	9+ years

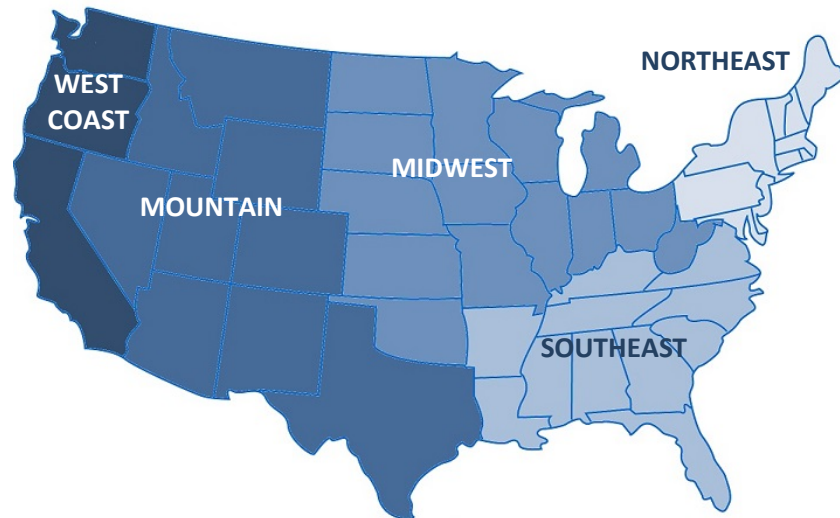
Figure 28. Definition of Manager Job Levels

Managers		
Level	Responsibility	Typical Number of Reports
Level 1	Tactical manager who leads a small group within a function, responsible for executing limited projects or tasks within a project	1-3 reports (direct or matrix)
Level 2	Manager who leads a function and manages a moderately sized team, responsible for executing strategy	4-9 reports (direct or matrix)
Level 3	Member of senior management who determines strategy and leads large teams, manages at the executive level	10+ reports (direct or matrix)

Burtch Works divided the U.S. into these five categories:

- Northeast
- Southeast
- Midwest
- Mountain
- West Coast

Figure 29. U.S. Geographic Regions



Note: The Northeast included areas of Virginia within 50 miles of Washington, DC, and the Midwest included areas of Pennsylvania within 75 miles of Pittsburgh.

The firms for which data scientists work were divided into these ten industries:

- Academia
- Advertising/Marketing Services
- Consulting
- Financial Services
- Gaming
- Government
- Healthcare/Pharmaceuticals
- Retail & CPG
- Technology/Telecom
- Other

Each data scientist was assigned to one of these five residency status categories:

- U.S. Citizen
- F-1/OPT
- H-1B
- Permanent Resident
- Other

Finally, each data scientist was assigned to one of these four education categories:

- No college degree
- Bachelor's degree
- Master's degree
- Ph.D.

Section 5

APPENDIX B/Glossary

Glossary of Terms

This section provides definitions of terms used in this report.

ABD (All-but-dissertation). ABD is a level of education. A person whose level of education level is ABD has completed all coursework for a Ph.D. but not a dissertation.

Base Salary. An individual's gross annual wages, excluding variable or one-time compensation such as relocation assistance, sign-on bonuses, bonuses, and long-term incentive plan compensation.

Big Data Professionals. See Predictive Analytics Professionals.

Bonus. Short-term variable compensation usually awarded annually, such as individual or company performance-based bonuses. This does not include long-term incentive plan compensation or awards of stock or stock options.

Data Scientist. A predictive analytics professional who has both the proficiency for data management required to make enormous sets of unstructured data accessible and also the analytical skills for deriving useful information from those data.

Entry-level job. A job available to individuals who have no prior work experience, but usually have just earned an undergraduate or graduate degree.

Equity. See Stock.

F-1/OPT. A residency status that allows a foreign undergraduate or graduate student who has a non-immigrant F-1 student visa to work in the U.S. without obtaining an H-1B visa. The student is required to have either completed his degree or pursued it for at least nine months.

Geographic Region. One of five groups of states that together comprise the entire United States. These five groups of states – Northeast, Southeast, Midwest, Mountain and West Coast – are shown in Figure 29 on page 38.

H-1B. A non-immigrant visa that allows a U.S. firm to temporarily employ a foreign worker in a specialty occupation for a period of three years, which is extendable to six and beyond. If a foreign worker with an H-1B visa quits or loses his job with the sponsoring firm, the worker must either find a new employer to sponsor an H-1B visa, be granted a new non-immigrant status, or leave the United States.

Individual Contributor. An employee who does not manage other employees. Individual contributors among the data scientists in the Burtch Works sample have all been assigned to one of three levels:

Level 1: Responsible for learning the job; hands-on with analytics and modeling; 0-3 years' experience

Level 2: Hands-on with unstructured data, working with more advanced problems and models; may help train Analysts; 4-8 years of experience

Level 3: Considered an analytics Subject Matter Expert; mentors and trains Analysts; 9+ years' experience

Industry. One of ten groups of firms employing most data professionals. These ten industries are Academia, Advertising/Marketing Services, Consulting, Financial Services, Gaming, Government, Healthcare/Pharmaceuticals, Retail & CPG, Retail, Technology/Telecom and Other.

Academia: Institutions whose purpose is the pursuit of education or academic research such as public universities, private colleges, and for-profit education companies.

Advertising/Marketing Services: An industry consisting of firms that provide services to other firms that include advertising, market research, media planning and buying, and marketing analysis.

Consulting: Industry that includes both large corporations and small "boutique" firms that provide professional advice to the managers of other firms.

Financial Services: Firms that provide money management, lending, or risk management services, including banks, insurance companies, and credit card organizations.

Gaming: Industry that includes companies involved with the development, marketing, and sales of video games (defined as interactive electronic entertainment).

Government: Organizations that are a part of the governmental system, such as the Department of Defense and national research laboratories.

Healthcare/Pharmaceuticals: Firms that provide healthcare services, such as hospitals, and firms that manufacture medicinal drugs.

Retail & CPG: Organizations that purchase goods from a manufacturer to be sold for profit to the end-consumer (retail) and firms whose products are sold quickly and at relatively low cost (CPG or consumer packaged goods).

Technology/Telecom: Firms that create or distribute technology products or services, such as computer manufacturers and software publishers, and firms that provide telecommunications services.

Other: Companies whose industry falls outside of the categories described above, such as airline companies, distribution firms, media, and entertainment.

Manager. An employee who manages the work of other employees. Managers among the data scientists in the Burtch Works sample have all been assigned to one of three levels:

Level 1: Tactical manager who leads a small group within a function, responsible for executing limited-scale projects or tasks within a project; typically responsible for 1-3 direct reports or matrix individuals.

Level 2: Manager who leads a function and manages a moderately sized team; responsible for executing strategy; typically responsible for 4-9 direct reports or matrix individuals.

Level 3: Member of senior management who determines strategy and leads large teams; manages at the executive level; typically responsible for 10+ direct reports or matrix individuals.

Mean. Also known as the average, it is the sum of a set of values divided by the number of values. For example, the mean of N salaries is the sum of the salaries divided by N.

Median. The value obtained by ordering a set of numbers from smallest to largest and then taking the value in middle, or, if there are an even number of values, by taking the mean of the two values in the middle. For example, the median of N salaries is the salary for which there are as many salaries that are smaller as there are salaries that are larger.

N. The number of observations in a sample, sub-sample or table cell.

OPT. See F-1/OPT.

Permanent Resident. A residency status that allows a foreign national to permanently live and work in the United States. Those with this status have a United States Permanent Residence Card, which is known informally as a green card.

Predictive Analytics Professionals. Individuals who can apply sophisticated quantitative skills to data describing transactions, interactions, or other behaviors of people to derive insights and prescribe actions. They are distinguished from the “quants” of the past by the sheer quantity of data on which they operate, an abundance made possible by new opportunities for measuring behaviors and advances in technologies for the storage and retrieval of data.

Salary Study. A study conducted to measure the salary distributions of those in specific occupations. Traditionally, these studies have been executed by obtaining salary data from the human resources departments of firms employing professionals in those occupations rather than by interviewing those employees themselves.

STEM. Acronym for the fields of Science, Technology, Engineering, and Mathematics.

Stock. Shares of a particular company as held by an individual or group as an investment.



ABOUT BURTCH WORKS

Burtch Works is a highly targeted recruiting firm that specializes in placing quantitative professionals in analytics and data science roles nationwide. Our recruiters have decades of experience recruiting in their quantitative specialties, and have built strong relationships with hiring managers and HR professionals at a wide variety of organizations in every industry – ranging from growing startups, to Fortune 50 global corporations, to Wall Street hedge funds.

We've been closely following hiring trends and talent movement, and have developed the Burtch Works Studies as comprehensive industry reports on compensation and demographic trends within our specialties: Predictive Analytics, Marketing Research, and Data Science. Burtch Works' Founder and Managing Director, Linda Burtch, has over 30 years' experience recruiting quantitative talent, and has been interviewed for her insights on the analytics hiring market by The Wall Street Journal, CNBC, Mashable, The Chicago Tribune, Fox News, All Analytics, Analytics Magazine, and InformationWeek.

Whether you're eyeing your next career move or looking to hire data scientists for your team, let's chat about what we can do for you!

CONTACT US

Looking to hire data science or analytic talent for your firm? Email clients@burtchworks.com to see what Burtch Works can do for your organization. Planning your next career move and want to see if we have positions that match your experience? Email your resume to candidates@burtchworks.com to start the process. For general inquiries, please call 847-440-8555, or email info@burtchworks.com.