The Burtch Works Study
Salaries of Data Scientists
May 2018

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SECTION 1

Introduction
Defining Data Scientists

There are numerous definitions of data scientists, and we thought it appropriate to share our definition up front in order to provide clarity and transparency throughout this report.

For Burtch Works’ purposes data scientist is a specific type of predictive analytics professional who applies sophisticated quantitative and computer science skills to both structure and analyze massive amounts of unstructured data (such as streaming data or sensor data), including creating and managing machine learning algorithms with the intent to derive insights and prescribe action.

The depth and breadth of data scientists’ 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 and data infrastructures, data scientists can tackle problems that are made very difficult by the size and disorganization of the data.

For more information about how we distinguish data scientists, see Identifying Data Scientists on page 32.
2018 Data Science Salaries: Trends from This Year’s Data

With 2018 marking the year of our 5th-annual Burtch Works Study: Salaries of Data Scientists, we’ve been carefully watching as the increasing excitement for the field over the past half-decade has resulted in major shifts in the market.

The “Big Data” craze has inspired many people to jump into corporate data science roles, including students, professors and researchers, and career changers from other business fields. This has had a number of wide-ranging effects on the talent pool itself, including opening the door for more education options like bootcamps and MOOCs (Massive Open Online Courses), tiping the typical education background towards Master’s instead of PhD’s among junior professionals, and blurring the line between traditional predictive analytics fields and data science.

As the data science profession continues to mature and proliferate throughout industries and geographies, we’re seeing several compensation trends developing as well.

Moving into Management Not Necessarily Required for High Salaries

In many fields, it is common for there to be a salary stagnation point at which individual contributors must move into management roles in order to advance their careers and compensation. Although managers may earn more than individual contributors in data science, it is also not uncommon to see high-level, individual contributor roles that pay exceptionally well.

Becoming a subject matter expert data scientist can be a separate career track that doesn’t have to lead to people management. We’ve seen these data science roles exist throughout the organization, from research and development to marketing analytics. Many of these highly paid individual contributor roles will be specialists (e.g., NLP or image processing) but we do see some generalists within this category as well.

Coastal Salary Disparity Beginning to Close

Over the years of collecting data for these reports, there has been a salary gap between the West and Northeast coast with the West Coast commanding higher salaries. This year, we’ve noticed this gap beginning to close with the Northeast and West Coast having similar salaries across most job levels for the first time.

Data scientist salaries on the West Coast have typically been buoyed by tech firms in Silicon Valley, but as data science applications have been spreading, including to Wall Street and fintech firms in New York City, as well as growing tech hubs in Boston and Washington, D.C., salaries in the Northeast have been climbing to rival the West Coast.

Tech Salary Bumps Flattening Out

Additionally, the salary gap between technology companies and those in other industries is beginning to narrow. Although there is still a gap, the delta is smaller this year. There are two potential explanations here. First is the geographic spreading of firms that fall under the “tech” umbrella away from the coasts. The second is the broadening of the tech industry to include areas such as human resources tech, edtech, insurance tech, and healthtech. Both of these trends have flattened the ever-increasing tech salaries we’ve seen previously.

Whereas in previous years data science might have been concentrated at tech giants like Facebook, Apple, Netflix, and Google in Silicon Valley, today “tech” has grown into other areas and might include an education tech startup in Denver, an online deal marketplace in Chicago,
or a healthcare tech firm in Austin. Also, we’re seeing more legacy corporations in industries such as Retail, CPG, and Industrial competing for talent and getting more aggressive with compensation. As such, the significant difference between data science salaries in tech compared to other industries has been flattening.

Naturally, as the data science field has been evolving so quickly over the past few years, we are expecting more changes on the horizon. To learn more about our predictions for the future of data science, see Predictions for the Future of Data Science on page 7.

This Year’s Compensation and Demographic Insights

This annual update to our data science salary report series includes analysis of the complete compensation and demographic information of 399 data scientists. The new set of data for The Burtch Works Study: Salaries of Data Scientists May 2018 was collected by our recruiters during the 12 months ending March 2018.

This report contains salary information for data scientists, including how salaries have changed since the last study was published in April 2017. Salary data include the distribution of base salaries (quartiles, medians, and means). Demographic characteristics are also reported, which include education, region, industry, gender, residency status, years of experience, and job category – individual contributor or manager, and experience or management level – along with how data scientist base salaries vary by such characteristics.

For individual contributors, the median base salaries within data science range from $95,000 at level 1 to $165,000 at level 3 (see pp. 13).

The median base salaries of managers in data science range from $145,000 at level 1 to $250,000 at level 3 (see pp. 13).

Similar to last year’s figures, the median base salaries of data scientists have remained relatively steady. In every job category, salaries fluctuated by a single-digit percentage point. Individual contributors at level 1 saw no increase in median base salary. In 2015 and 2016, salary growth in this category was most pronounced, but this year has continued the trend of entry salaries leveling off. For individual contributors at levels 2 and 3, median base salaries ticked upward by 2% and 5% respectively. Among managers, salaries for those at level 3 remain unchanged, while salaries at levels 1 and 2 decreased slightly, a 3% change in both cases (see pp. 12-14).

When we compare the salaries of data scientists to those of others within predictive analytics (using data from our September 2017 report), it is clear that data scientists continue to out-earn other predictive analytics professionals. As the data on pages 16 and 17 exhibit, data scientists earn base salaries up to 36% higher than other predictive analytics professionals. In all job categories except the higher level managers, data scientists realize a double-digit percentage advantage in base salary compared to others in predictive analytics.

Educational level continues to play a major role in compensation with data scientists holding a PhD earning higher median base salaries than those holding a Master’s degree in every job category. This trend is most pronounced among individual contributors; at level 1, data scientists with a PhD earn a median base salary of $102,000 while those with a Master’s degree earn a median base salary of $92,500 (see pp.18-20).

For data scientists working on the coasts, median base salaries continue to be higher across most job categories when compared to salaries in the Middle U.S. region (comprised of the Midwest,
Mountain, and Southeast regions for this study). Additionally, the gap between salaries on the West Coast and the Northeast is beginning to close across job categories (pp. 21-22).

Compared to previous years, the proportion of data scientists holding an H-1B has risen significantly. After holding steady in 2015 and 2016 at 9% and in 2017 at 8%, this year’s data show 13% of data scientists with an H-1B residency status (see pp. 25-26).

Gender distribution remained steady when compared with previous years with men representing 85% of data scientists and women representing 15%. For managers and higher level individual contributors this gap is more pronounced (see pp. 27-28).

Predictions for the Future of Data Science

As the data science field continues to accelerate, proliferate, and evolve with changes in technology, we have several predictions on what trends will be integral to its development and expansion over the next few years.

The Push for ROI will Hound Both Legacy Organizations and Startups

Substantial investment has been poured into data science, both as traditional organizations start to collect massive amounts of unstructured data and as startups seek to use data in new ways to disrupt industries or introduce new products. In both cases, pressure has been high for data science teams to deliver returns on their significant promises.

Legacy organizations that are newly-adding data science technologies to their processes will want to see swift justifications for the investment, whereas startups that contain data science as an integral part of their DNA need to be able to show investors that they’re viable in the long-term – not just as an intriguing sales pitch.

Specialists Will Become the Norm, Not “Unicorns”

In years past, it was usually expected that a data scientist be able to oversee every aspect of the analytical lifecycle, from data wrangling to analysis to visualization and more. Now that many teams have grown, the need for generalist “unicorns” has given way to a higher demand for data science specialists that can work with other analytics professionals and data engineers on the team. For example, we now regularly receive requests for experts in specific areas such as NLP (natural language processing) or image processing using tools like TensorFlow.

That being said, generalists may still be in demand for firms hiring their first data scientist, or for those that have many, varied use cases for data science and therefore require a wide range of skills. Hiring “unicorns” with broad skillsets used to be the norm in data science, but now specialists, as well as generalists, are in high demand.

For the most part, as many firms have further developed their exact needs, hiring managers are searching for more specialized skills in areas of data science. Additionally, as the supply of data scientists and their education options increase, we’re beginning to see professionals segmenting into specialized areas of data science because they have more opportunities to do so.

The Hands-On Component Will Be Essential to Leadership
Burtch Works has always advocated for continuous learning to be at the center of a long-term career strategy, but, now more than ever, staying hands-on has become a key component, even for senior leadership positions.

In a field that evolves so quickly and where leaders are often expected to exhibit a “player coach” mentality, remaining hands-on with the data is the best way to stay current with new tools and technologies. In cases where a role doesn’t necessarily accommodate this strategy, some senior-level data science managers choose to spend a portion of their personal time taking part in quantitative competitions to stay sharp. Data scientists who find themselves straying too far away from technical work may quickly find their skills out of date and unmarketable in today’s climate.

In closing, for the past several years we’ve pointed to several growing trends that show how data science has begun to spread beyond its original borders. Predictive analytics professionals that have typically worked with structured data have begun to transition their skills into data science roles, data science is no longer limited to giant tech firms and startups on the coasts, and many industries outside the typical “digital native” profile are adding data science technologies to their repertoire.

These changes have not only had a flattening effect on some of the salary disparities we’ve seen in years past, but it has also led to increased opportunities, both for data scientists looking to live somewhere besides Silicon Valley and for firms in the Middle U.S. who have struggled to lure data scientists out of their coastal geographies. We expect to see more industry shifts as the use of data science continues to spread and mature, and look forward to sharing them in future reports.

About Burtch Works

Burtch Works Executive Recruiting is the leading resource for quantitative talent, job opportunities, and information about hiring and compensation trends in this industry. Our team has decades of experience in their quantitative specialties, which include data science, predictive analytics, quantitative business analytics, web analytics, credit/risk analytics, marketing research, and many more. Each recruiter is well-versed in the subtle nuances of their area of expertise, allowing them to closely follow the talent movement and hiring trends unique to each area, and find individuals perfectly suited to each role.

As data-driven practices have become a necessary strategy to remain competitive, the quantitative fields continue to experience incredible growth. Burtch Works has built a diverse network of tens of thousands of professionals to address the growing number of quantitative positions nationwide, and this network is the foundation of a business built on long-standing relationships with both candidates and clients.

Burtch Works’ Founder and Managing Director Linda Burtch emphasizes that the most rewarding aspect of her career is creating the perfect match, and she has established a dedicated team of recruiters who share this vision for Burtch Works. Over her 35+ years of recruiting in quantitative disciplines, Linda Burtch has developed an especially comprehensive understanding of the analytical fields. She often writes on topics of interest to the quantitative community and has maintained a blog on hiring trends for over 10 years, keeping her finger on the pulse of current trends.

Linda Burtch has been interviewed for her insights on the data science and analytics talent market by The New York Times, The Wall Street Journal, CNBC, Mashable, Forbes, The Chicago Tribune, All Analytics, Analytics Magazine, InformationWeek, Hunt Scanlon, and many more. This
year Burtch Works is proud to have been recognized by Forbes as one of America’s Best Recruiting Firms.

By maintaining such strong relationships with candidates and clients, Burtch Works has the unique opportunity to examine hiring and compensation trends over time, and publishes several highly-anticipated studies each year that investigate demographic and compensation data for data science, predictive analytics, and marketing research professionals. The Burtch Works Studies provide an exceptional vantage point on compensation for these professionals across the country, and contain critical information both for individuals mapping their career strategy, and for hiring managers hoping to recruit and retain outstanding personnel to their teams.
SECTION 2
Data Scientists: Compensation Changes
The Sample

This sample contains 399 of the approximately 4,000 data scientists with whom Burtch Works maintains contact. Burtch Works collected the data for this study during interviews conducted over the 12 months ending March 2018, which is the year immediately following the period of interviews for the 2017 study. Professionals were included in the sample only if (1) they satisfied Burtch Works’ criteria for data scientists, and (2) Burtch Works obtained complete information about that individual’s compensation, demographic, and job characteristics.

How Changes in Compensation Were Measured

While some of the 399 data scientists in this sample were also in the samples for our previous studies (published in 2014, 2015, 2016, and 2017), others were not. Therefore, changes in compensation were not measured by differencing current compensation and compensation reported for the previous study and then 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 last year’s study.

How We Define Data Scientists

Data scientists apply sophisticated quantitative and computer science skills to both structure and analyze massive stores or continuous streams of unstructured data, with the intent to derive insights and prescribe action.

The depth and breadth 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 and data infrastructures, data scientists can tackle problems that are made very difficult by the size and disorganization of the data.

For more information about how we distinguish data scientists, see Identifying Data Scientists on page 32.
Changes in Base Salaries

- Similar to last year’s results, this year’s data show that data science salaries continue to be holding steady. At all job levels, median base salaries changed by a single-digit percentage point or not at all.

- Across levels 2 and 3 for individual contributors, median salaries continue to grow though the change is in the single digits.

- Median salaries for level 1 individual contributors show no change. This is in contrast to 2015 and 2016 where growth was substantial for professionals at that level. This is the result of the continued influx of early career professionals with an interest in jumping into data science. We expect this trend to continue.

- Salaries of data science managers are flattening or holding steady across levels this year.

- As job level increases, the median base salaries of data scientists increase for individual contributors and managers. Individual contributors at level 1 earn a median base salary of $95,000, increasing to $165,000 for those at level 3. For data science managers, those at level 1 earn a median base salary of $145,000, while those at level 3 earn $250,000.
Figure 1 Comparison of Data Scientists’ Median Base Salaries by Job Category

*See page 34 for job category definitions.
### Figure 2 Change in Base Salaries of Data Science Individual Contributors by Job Level

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Year</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Contributor</td>
<td>2018</td>
<td>$80,000</td>
<td>$95,000</td>
<td>$94,987</td>
<td>$110,000</td>
<td>97</td>
</tr>
<tr>
<td>Level 1</td>
<td>2017</td>
<td>$80,000</td>
<td>$95,000</td>
<td>$93,216</td>
<td>$105,000</td>
<td>81</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>0%</td>
<td>0%</td>
<td>+2%</td>
<td>+5%</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>2018</td>
<td>$114,055</td>
<td>$128,750</td>
<td>$130,700</td>
<td>$144,500</td>
<td>107</td>
</tr>
<tr>
<td>Level 2</td>
<td>2017</td>
<td>$115,000</td>
<td>$126,000</td>
<td>$126,951</td>
<td>$140,000</td>
<td>102</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>-1%</td>
<td>+2%</td>
<td>+2%</td>
<td>+3%</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>2018</td>
<td>$150,000</td>
<td>$165,000</td>
<td>$168,170</td>
<td>$194,000</td>
<td>47</td>
</tr>
<tr>
<td>Level 3</td>
<td>2017</td>
<td>$148,000</td>
<td>$157,000</td>
<td>$164,868</td>
<td>$180,000</td>
<td>53</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>+1%</td>
<td>+5%</td>
<td>+2%</td>
<td>+8%</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Year</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager</td>
<td>2018</td>
<td>$132,000</td>
<td>$145,000</td>
<td>$146,133</td>
<td>$155,000</td>
<td>49</td>
</tr>
<tr>
<td>Level 1</td>
<td>2017</td>
<td>$130,000</td>
<td>$148,750</td>
<td>$145,371</td>
<td>$160,000</td>
<td>62</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>+2%</td>
<td>-3%</td>
<td>+1%</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td>Manager</td>
<td>2018</td>
<td>$170,000</td>
<td>$185,000</td>
<td>$190,565</td>
<td>$200,000</td>
<td>69</td>
</tr>
<tr>
<td>Level 2</td>
<td>2017</td>
<td>$170,000</td>
<td>$190,000</td>
<td>$192,484</td>
<td>$210,000</td>
<td>77</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>0%</td>
<td>-3%</td>
<td>-1%</td>
<td>-5%</td>
<td></td>
</tr>
<tr>
<td>Manager</td>
<td>2018</td>
<td>$238,500</td>
<td>$250,000</td>
<td>$247,633</td>
<td>$250,000</td>
<td>30</td>
</tr>
<tr>
<td>Level 3</td>
<td>2017</td>
<td>$235,000</td>
<td>$250,000</td>
<td>$271,919</td>
<td>$275,000</td>
<td>37</td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td>+1%</td>
<td>0%</td>
<td>-9%</td>
<td>-9%</td>
<td></td>
</tr>
</tbody>
</table>

*See page 35 for job category definitions.*
Figure 4 Median and Mean Base Salaries of Data Scientists by Job Category

*See page 35 for job category definitions.*
SECTION 3

Data Scientists: Demographic Profile & Current Compensation
Compensation | Data Science vs. Others in Predictive Analytics

Burtch Works differentiates data scientists from other predictive analytics professionals (see Identifying Data Scientists on p. 32), and reports their respective salaries in separate studies. In the data science report, however, we compare the salaries of the two groups, since, historically, data science salaries are quite different than those seen in predictive analytics. This trend continues this year.

- In every job category, higher median base salaries continue to be seen among data scientists when compared to other predictive analytics professionals.

- The difference in base salaries is largest among individual contributors, where data scientists earn from 22% to 36% more than other predictive analytics professionals. Level 1 individual contributors, for instance, earn a median base salary of $95,000 in data science and $78,000 in other predictive analytics roles.

- For managers, the difference in median base salaries is less pronounced. However, data science managers still earn more than those within predictive analytics. Depending on the job level, managers within data science have median base salaries that are 3% to 12% higher than those within predictive analytics.

- There are several factors which impact this pay difference:
  - Data scientists possess more specialized data skills that allow them to work with large, unstructured datasets (see Identifying Data Scientists on p. 32).
  - Triple the percentage of data scientists hold a PhD compared to those in predictive analytics: 48% vs. 16% (see Figure 8 on p. 20).
  - Although salaries have been leveling, there continues to be considerable attention on the data science profession and high demand for these professionals, leading increased competition and high salaries.

### How We Define Data Scientists vs. Others in Predictive Analytics

Burtch Works considers a data scientist to be a specific type of predictive analytics professional. Both groups analyze data to glean insights and prescribe action, but data scientists focus on cleaning and analyzing unstructured or streaming data, using sophisticated computer science and programming skills that are not typically seen in the profiles of other predictive analytics professionals. In short, the two groups’ skillsets and experience focus on the following:

<table>
<thead>
<tr>
<th>Data Scientists:</th>
<th>Other Predictive Analytics Professionals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative skills</td>
<td>Quantitative skills</td>
</tr>
<tr>
<td>Structured and unstructured, streaming data</td>
<td>Structured data</td>
</tr>
</tbody>
</table>

See page 33 for more information on how we identify data scientists.
Figure 5 Median Base Salaries of Data Scientists vs. Others in Predictive Analytics

*See page 35 for job category definitions.*
Demographics & Compensation | Education

- 91% of data scientists have an advanced degree: 43% hold a Master’s degree, and 48% hold a PhD.

- 25% of data scientists hold a degree in statistics or mathematics, while 20% have a computer science degree, an additional 20% hold a degree in the natural sciences, and 18% hold an engineering degree.

- In every job category, data scientists who have a PhD earn median base salaries higher than those with only a Master’s degree.

**Figure 6** Distribution of Data Scientists by Education
Figure 7 Distribution of Data Scientists by Area of Study

- Mathematics/Statistics: 25%
- Computer Science: 20%
- Natural Science: 20%
- Engineering: 18%
- Business: 8%
- Social Science: 5%
- Economics: 4%

Figure 8 Distribution of Data Scientists & Other Predictive Analytics Professionals by Education

- Bachelor's: 10%
- Master's: 40%
- PhD: 50%
### Figure 9 Distribution of Base Salaries of Individual Contributors by Job Level & Education

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Education</th>
<th>Base Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>Master's</td>
<td>$78,750</td>
</tr>
<tr>
<td>Level 1</td>
<td>PhD</td>
<td>$88,750</td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>Master's</td>
<td>$105,000</td>
</tr>
<tr>
<td>Level 2</td>
<td>PhD</td>
<td>$120,000</td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>Master's</td>
<td>$145,000</td>
</tr>
<tr>
<td>Level 3</td>
<td>PhD</td>
<td>$155,750</td>
</tr>
</tbody>
</table>

### Figure 10 Distribution of Base Salaries of Managers by Job Level & Education

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Education</th>
<th>Base Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>Manager</td>
<td>Master's</td>
<td>$129,000</td>
</tr>
<tr>
<td>Level 1</td>
<td>PhD</td>
<td>$135,000</td>
</tr>
<tr>
<td>Manager</td>
<td>Master's</td>
<td>$165,000</td>
</tr>
<tr>
<td>Level 2</td>
<td>PhD</td>
<td>$174,250</td>
</tr>
<tr>
<td>Manager</td>
<td>Master's</td>
<td>$228,750</td>
</tr>
<tr>
<td>Level 3</td>
<td>PhD</td>
<td>$239,500</td>
</tr>
</tbody>
</table>
Demographics & Compensation | Region

- Most data scientists continue to be employed on the West Coast, accounting for 40% of data scientists. Another 26% of data scientists are found in the Northeast.

- Across all job categories except the MG-3 level, data scientists earn higher median base salaries when working on the coasts, compared to the Middle U.S. region (which includes the Midwest, Mountain, and Southeast regions).

- Compared to previous years, the difference in median base salary between the West Coast and the Northeast regions is narrowing.

Figure 11  Distribution of Data Scientists by Region
### Figure 12 Distribution of Base Salaries of Individual Contributors by Job Level & Region

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Region</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Contributor</td>
<td>Northeast</td>
<td>$78,750</td>
<td>$97,500</td>
<td>$96,200</td>
<td>$111,250</td>
</tr>
<tr>
<td>Job Level 1</td>
<td>Middle U.S.</td>
<td>$80,000</td>
<td>$87,500</td>
<td>$91,185</td>
<td>$106,750</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$89,000</td>
<td>$100,000</td>
<td>$102,859</td>
<td>$118,500</td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>Northeast</td>
<td>$110,000</td>
<td>$132,500</td>
<td>$128,417</td>
<td>$144,250</td>
</tr>
<tr>
<td>Job Level 2</td>
<td>Middle U.S.</td>
<td>$110,000</td>
<td>$120,000</td>
<td>$122,439</td>
<td>$135,000</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$120,000</td>
<td>$136,500</td>
<td>$144,218</td>
<td>$152,000</td>
</tr>
<tr>
<td>Individual Contributor</td>
<td>Northeast</td>
<td>$150,000</td>
<td>$170,000</td>
<td>$174,600</td>
<td>$200,000</td>
</tr>
<tr>
<td>Job Level 3</td>
<td>Middle U.S.</td>
<td>$143,750</td>
<td>$156,250</td>
<td>$157,917</td>
<td>$171,250</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$159,500</td>
<td>$184,000</td>
<td>$180,056</td>
<td>$197,500</td>
</tr>
</tbody>
</table>

*Middle U.S. comprises the Midwest, Mountain, and Southeast regions.*

### Figure 13 Distribution of Base Salaries of Managers by Job Level & Region

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Region</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager Level 1</td>
<td>Northeast</td>
<td>$135,000</td>
<td>$150,000</td>
<td>$149,222</td>
<td>$165,000</td>
</tr>
<tr>
<td></td>
<td>Middle U.S.</td>
<td>$130,000</td>
<td>$143,000</td>
<td>$143,224</td>
<td>$155,000</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$135,000</td>
<td>$146,000</td>
<td>$151,273</td>
<td>$165,000</td>
</tr>
<tr>
<td>Manager Level 2</td>
<td>Northeast</td>
<td>$175,000</td>
<td>$190,000</td>
<td>$196,000</td>
<td>$212,500</td>
</tr>
<tr>
<td></td>
<td>Middle U.S.</td>
<td>$165,000</td>
<td>$180,000</td>
<td>$183,844</td>
<td>$200,000</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$178,500</td>
<td>$195,500</td>
<td>$196,636</td>
<td>$207,500</td>
</tr>
<tr>
<td>Manager Level 3</td>
<td>Northeast</td>
<td>$230,000</td>
<td>$245,000</td>
<td>$236,875</td>
<td>$250,000</td>
</tr>
<tr>
<td></td>
<td>Middle U.S.</td>
<td>$233,500</td>
<td>$250,000</td>
<td>$246,917</td>
<td>$250,000</td>
</tr>
<tr>
<td></td>
<td>West Coast</td>
<td>$242,500</td>
<td>$250,000</td>
<td>$257,100</td>
<td>$279,500</td>
</tr>
</tbody>
</table>
Demographics & Compensation | Industry

- By far, technology companies continue to be the largest employers of data scientists. This year, 44% of data scientists are employed in the tech industry.

- Financial services organizations employ the second largest number of data scientists at 14%.

- Across most job categories, data scientists employed by technology companies earn higher median base salaries than those employed in other industries. However, the gap between salaries in technology and other industries is beginning to close across levels among both individual contributors and managers. (For more information, see 2018 Data Science Salaries: Trends from This Year’s Data on p. 5 of this report.)

Figure 14 Distribution of Data Scientists by Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>44%</td>
</tr>
<tr>
<td>Financial Services</td>
<td>14%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
<tr>
<td>Advertising/Marketing Services</td>
<td>9%</td>
</tr>
<tr>
<td>Consulting</td>
<td>8%</td>
</tr>
<tr>
<td>Healthcare/Pharma</td>
<td>6%</td>
</tr>
<tr>
<td>Retail &amp; CPG</td>
<td>5%</td>
</tr>
<tr>
<td>Academia</td>
<td>2%</td>
</tr>
<tr>
<td>Gaming</td>
<td>1%</td>
</tr>
<tr>
<td>Government</td>
<td>1%</td>
</tr>
</tbody>
</table>

N = 2,212
### Individual Contributors

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Industry</th>
<th>Base Salary</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Contributor Level 1</td>
<td>Technology</td>
<td>$80,000</td>
<td>$95,000</td>
<td>$94.345</td>
<td>$107,000</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor Level 1</td>
<td>All Others</td>
<td>$80,000</td>
<td>$92,000</td>
<td>$95.261</td>
<td>$110,000</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor Level 2</td>
<td>Technology</td>
<td>$120,000</td>
<td>$130,000</td>
<td>$136.992</td>
<td>$140,000</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor Level 2</td>
<td>All Others</td>
<td>$110,000</td>
<td>$125,000</td>
<td>$128.134</td>
<td>$145,000</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor Level 3</td>
<td>Technology</td>
<td>$155,500</td>
<td>$170,000</td>
<td>$171.868</td>
<td>$188,000</td>
<td></td>
</tr>
<tr>
<td>Individual Contributor Level 3</td>
<td>All Others</td>
<td>$149,500</td>
<td>$160,000</td>
<td>$165.661</td>
<td>$200,000</td>
<td></td>
</tr>
</tbody>
</table>

### Managers

<table>
<thead>
<tr>
<th>Job Level</th>
<th>Industry</th>
<th>Base Salary</th>
<th>25%</th>
<th>Median</th>
<th>Mean</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager Level 1</td>
<td>Technology</td>
<td>$133,500</td>
<td>$152,000</td>
<td>$152.194</td>
<td>$168.750</td>
<td></td>
</tr>
<tr>
<td>Manager Level 1</td>
<td>All Others</td>
<td>$130,000</td>
<td>$145,000</td>
<td>$142.613</td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>Manager Level 2</td>
<td>Technology</td>
<td>$176,000</td>
<td>$190,000</td>
<td>$196.171</td>
<td>$212,500</td>
<td></td>
</tr>
<tr>
<td>Manager Level 2</td>
<td>All Others</td>
<td>$162,500</td>
<td>$180,000</td>
<td>$184.794</td>
<td>$200,000</td>
<td></td>
</tr>
<tr>
<td>Manager Level 3</td>
<td>Technology</td>
<td>$240,000</td>
<td>$250,000</td>
<td>$254.636</td>
<td>$280.500</td>
<td></td>
</tr>
<tr>
<td>Manager Level 3</td>
<td>All Others</td>
<td>$236,500</td>
<td>$250,000</td>
<td>$243.579</td>
<td>$250,000</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 15** Distribution of Base Salaries of Individual Contributors by Job Level & Industry

**Figure 16** Distribution of Base Salaries of Managers by Job Level & Industry
Demographics | **Residency Status**

- 38% of data scientists are non-U.S. citizens with a visa or permanent residency, which allows them to work in the U.S., reflecting an increase from 36% reported last year (commonly held visas include F-1/OPT and H-1B).

- The proportion of foreign-born data scientists is significantly higher among level 1 and level 2 individual contributors, where nearly half (45% and 49% respectively) of data scientists are not U.S. citizens.

- Previously, H-1B residency status held constant at 9% (2015 and 2016) and 8% (2017), but this year’s data shows a jump to 13% of data scientists holding an H-1B visa. This may be due to many companies realizing that it is important to employ an aggressive hiring strategy for data science and gain access to a wider talent pool by supporting the visa transfer process. Additionally, the lengthening green card process could be at play.

**Figure 17** Distribution of Data Scientists by Residency Status
Figure 18 Distribution of Data Scientists by Residency Status & Job Level
Demographics | Gender

- The large majority of data scientists (85%) are male.

- The highest proportion of women is seen among level 1 individual contributors, accounting for 22% of data scientists.

- As data science professionals advance in their careers, the percentage of women decreases significantly. Among the most advanced individual contributors at level 3, 6% of data scientists are female; 10% of executive (level 3) managers are female.

- Across all levels, this is below the proportion of women seen in predictive analytics (see The Burtch Works Study: Salaries of Predictive Analytics Professionals September 2017).

Figure 19 Distribution of Data Scientists by Gender

N = 2,212
Figure 20 Distribution of Data Scientists by Gender and Job Level

[Bar chart showing distribution of data scientists by gender and job level for Manager Level 3, Manager Level 2, Manager Level 1, Ind. Contributor Level 3, Ind. Contributor Level 2, Ind. Contributor Level 1. Male and female percentages are indicated by color: dark blue for male, light blue for female.]
The median years of experience among data scientists is six, indicating that the field continues to attract many young professionals.

45% of data scientists have 5 or fewer years of experience, and 72% have 10 or fewer years. The field as a whole continues to trend young as more professionals enter the data science field.

Note: 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 above 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 category.
SECTION 4

Appendix A: Study Objective & Design
Study Objective

This report is a follow-up to last year’s report, The Burtch Works Study: Salaries of Data Scientists, which was published in May 2017. Its goals are to show (1) current compensation of data scientists and how it varies, and (2) how their compensation has changed since last year’s report. By continuing to interview large numbers of data scientists annually, Burtch Works can show both short-term and long-term trends in the demographic attributes of data scientists and their compensation.

Why The Burtch Works Studies Are Unique

The Burtch Works Studies: Salaries of Data Scientists contain highly-anticipated salary and demographic data for data scientists, and are unique because:

- **Burtch Works’ studies focus solely on data scientists** – The study samples include only professionals who are data scientists, and exclude professions that other salary reports may include, such as business intelligence, operations research, information technology, consumer insights, and other predictive analytics professionals who primarily work with structured data, and therefore have different salaries.

- **Burtch Works obtains this data by interviewing data scientists** – Instead of relying on data provided by human resources departments or from a self-reported online survey, Burtch Works interviews every data scientist individually. An important advantage of the interview process is that Burtch Works recruiters are able to obtain information about data scientists that is not usually provided by human resources departments, but that may affect their compensation, such as education and residency status. Additionally, because of their nuanced understanding of the profession, Burtch Works recruiters are able to obtain corrections or clarifications when information provided does not seem credible.

- **Burtch Works’ salary studies show how compensation varies by job level, region, industry, and education** – The sample size is large enough to show compensation data, collected over the past year, at a granular level. Further long-term trends are illuminated with each consecutive report.

The Sample

This sample contains 399 of the approximately 4,000 data scientists with whom Burtch Works maintains contact. Burtch Works collected the data for this study during interviews conducted over the 12 months ending March 2018, which is the year immediately following the period of interviews for the 2017 study. Professionals were included in the sample only if (1) they satisfied Burtch Works’ criteria for data scientists, and (2) Burtch Works obtained complete information about that individual’s compensation, demographic, and job characteristics.
How Changes in Compensation Were Measured

While some of the 399 data scientists in this sample were also in the samples for our previous studies (published in 2014, 2015, 2016, and 2017), others were not. Therefore, changes in compensation were not measured by differencing current compensation and compensation reported for the previous study and then 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 last year’s study.

Identifying Data Scientists

Data scientists apply sophisticated quantitative and computer science skills to both structure and analyze massive stores or continuous streams of unstructured data, with the intent to derive insights and prescribe action.

The depth and breadth 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 and data infrastructures, data scientists can tackle problems that are made very difficult by the size and disorganization of the data.

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

- **Educational Background** – Data scientists typically have an advanced degree, such as a Master’s or PhD, in a quantitative discipline, such as Computer Science, Physics, Engineering, Applied Mathematics, Statistics, Economics, or Operations Research. New educational options include data science degree programs, MOOCs (massive open online courses), and bootcamps which continue to take hold in the quantitative community. Some professionals from related careers or fields of study have successfully pivoted into entry-level data science roles through premier bootcamps and mid-career Master’s programs.

- **Skills** – Data scientists have expert knowledge of statistical and machine learning methods using tools such as Python and R, with predictive analytics still at the core of the discipline. Data scientists are usually proficient users of relational databases such as SQL, Big Data infrastructures like Hadoop and Spark, related tools like Pig and Hive, and, frequently, AWS. Data scientists may use languages such as Python, Java, and Scala (among others) to write programs to wrangle and manage data, automate analysis, and, at times, build these functions into production level code for SaaS companies. Many also use other methods to derive useful information from data, including pattern recognition using TensorFlow and deep learning techniques, signal processing, and visualization.

- **Dataset Size** – Data scientists typically work with datasets that are measured in gigabytes or larger increments, usually too large to be housed in local memory, and may work with continuously streaming data.

- **Job Responsibilities** – Although they may specialize in a specific area, 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, building ETL pipelines, or 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 datasets that can be used in analytics and/or predictive modeling.

Analytics – This involves statistical and machine learning-based modeling in order to understand, describe, or predict patterns in the data.

Prescribing Actions – This involves interpreting analytical results through the lens of business priorities, and using data-driven insights to inform 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 were not classified as data scientists. This is because they either do not work with exceptionally large datasets or do not work with unstructured data. In the specific case of operations researchers, their function is to optimize well-described processes rather than predict and prescribe insights towards more nebulous problems like customer behavior. Predictive analytics professionals were the subject of their own study, The Burtch Works Study: Salaries of Predictive Analytics Professionals, released in September 2017.

Completeness & Age of Data

A data scientist is included in the sample only if Burtch Works has complete data about their compensation, and demographic and job characteristics.

All of the 399 data scientists in the sample were interviewed over the 12-month period ending March 2018, which is the year immediately following the period of interviews for the 2017 study. All were interviewed by Burtch Works recruiters while 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:

<table>
<thead>
<tr>
<th>Individual Contributors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td>Level 1</td>
</tr>
<tr>
<td>Level 2</td>
</tr>
<tr>
<td>Level 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
</tr>
<tr>
<td>Level 1</td>
</tr>
<tr>
<td>Level 2</td>
</tr>
<tr>
<td>Level 3</td>
</tr>
</tbody>
</table>
Burtch Works divided the U.S. into these five regions:
Northeast
Southeast
Midwest
Mountain
West Coast
*In Figures 12 & 13 on page 22, the “Middle U.S.” region refers to a combined area of the Mountain, Midwest, and Southeast regions below.

**Figure 22 U.S. Geographic Regions**

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
Other

Each data scientist was assigned to one of these five residency status categories:
U.S. Citizen
Permanent Resident
H-1B
F-1/OPT
Other

Finally, each data scientist was assigned to one of these three education categories:
Bachelor’s degree
Master’s degree
PhD
SECTION 5

Appendix B: Glossary
Glossary of Terms

This section provides definitions of terms used in this report.

**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.

**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 specialized predictive analytics professional who has both the programming proficiency 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 relevant 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 their 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 22 on page 36.

**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 their 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, using unstructured data; 0-3 years’ experience
- **Level 2:** Hands-on with unstructured data, working with more advanced problems and models; may help train entry-level data scientists/analysts; 4-8 years of experience
- **Level 3:** Considered a data science Subject Matter Expert; mentors and trains other data scientists/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, Technology 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 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.

Programming. The process of developing and implementing various sets of instructions to enable a computer to do a certain task. For the purposes of this study, programming refers to the use of general purpose programming/scripting languages such as Python, Java, C, C++, or others.

SaaS. Acronym for Software as a Service.

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 or through online surveys, 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.