Why choose a career in analytics?

Job security, a larger salary, a chance to do good and more
Why are analytics careers so hot? A few years ago, a Harvard Business Review article by Thomas Davenport, “Data Scientist: The Sexiest Job of the 21st Century,” offered a new definition of the data scientist and brought analytics as a career choice into the mainstream. Then there was a recent McKinsey study that predicts 3 million big data jobs will need to be filled in the US alone. And it doesn’t hurt that the average salary for data scientists is $113,000, according to Glassdoor.com.

And, of course, there’s Brad Pitt and the Moneyball effect. In the 2011 movie Moneyball (based on Michael Lewis’s book of the same name), Pitt played Billy Beane, general manager of the Oakland A’s. Beane famously used analytics to find inexpensive players with untraditional skills, taking the A’s to the playoffs, where they competed against, and sometimes beat, teams with three times their budget.

They may not make movies about it, but businesses, governments and nonprofits all use analytics every single day. To make decisions. Make a difference. And do more with less. Read on to see where a career in analytics could take you. Your dream job awaits.

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Analytics: The basics

What is analytics? And why should you care?
Every day, organizations have to make vital decisions: Which drugs to bring to market, which advertising campaign will work best, what product changes to make and more. When decisions affect people’s lives and can cost millions of dollars, guesses and gut feeling don’t cut it.

Smart companies base these decisions on data. They collect all the data they can and analyze it to help them answer questions like: What happened? How or why did it happen? What’s happening now? What’s likely to happen next?

Whether it’s developing life-saving medicines, preventing fraud, uncovering cyberthreats or retaining their most valuable customers, organizations all over the world are using analytics to help them make fact-based decisions.

3 main types of analytics and the questions they answer

Descriptive analytics.
Answers the question: What has happened?
Descriptive analytics has been around the longest and is still widely used – everything from how many clicks a page receives to how many units are produced vs. how many are sold.

Predictive analytics.
Answers the question: What could happen?
These models use past data to help determine the probability of what will happen next. For example, predicting tomorrow’s weather, or the demand for the newspaper next week, or what the price of a hotel room should be next season.

Prescriptive analytics.
Answers the question: What should we do?
Prescriptive analytics is the newest kid on the block and is not as widely used – yet. Companies can use it to determine the optimal investment policy to maximize profits. Cities can use it to decide things like where to put fire departments or how to assign police to cover all neighborhoods within a certain distance.
The Moneyball effect
You’ll find analytics in every industry and area

Phil Simon
author of Analytics: The Agile Way
Billy Beane attained fame in baseball and analytics circles long before Brad Pitt portrayed him in the 2011 film *Moneyball*. In fact, Beane was making quite the name for himself prior to Michael Lewis’s 2004 book of the same name.

It’s no overstatement to claim that, as general manager (GM) of the small-market Oakland A’s, Beane changed the game of baseball forever. Big-market powerhouses such as the New York Yankees, Boston Red Sox, and Los Angeles Dodgers could effectively print their own money. Not Beane. He had to compete with a relatively paltry annual budget of roughly $60 million. That meant that he couldn’t even dream of chasing other teams’ pricey free agents. In fact, he couldn’t even afford to keep many of his own stars. Case in point: Beane had no shot of re-signing all-star first baseman Jason Giambi in 2001. The slugger and later admitted steroid user upped with the Yankees for nearly $120 million over seven years. Beane couldn’t justify spending nearly 30 percent of his budget on a single player — no matter how prolific.

Instead, Beane proved necessity is the mother of invention. He famously plucked players with untraditional skills off the scrap heap. Can’t hit home runs? No problem. Can he frustrate opposing pitchers by being “a tough out”? Can he just get on base? He drafted players who “just didn’t look” like effective baseball players. His unorthodox methods angered many longtime Oakland scouts, men who had spent their careers watching players and developing a supposed eye for talent, not staring at spreadsheets.

You know how this story turns out. Michael Lewis doesn’t write a book about you that turns into a movie starring Brad Pitt if you failed miserably. Pretty soon, even big-market teams such as the Yankees and Red Sox were hiring their own analytics experts and, later, teams of experts. The Moneyball movement spread beyond baseball to all other major sports. In fact, analytics is starting to move from the back room to the field. In their 2016 book *The Only Rule Is It Has to Work: Our Wild Experiment Building a New Kind of Baseball Team*, Ben Lindbergh and Sam Miller note that:

The Denver Broncos of the National Football League announced that the team’s director of analytics, Mitch Tanney, will break the front-office fourth wall in their upcoming games, speaking on a headset to head coach Gary Kubiak to offer his input on which plays the probabilities and percentages support. As managers increasingly come from cohorts that tend to be more perceptive to sabermetrics, it seems inevitable that something similar will happen in baseball.

Today you’ll find examples of Moneyball in areas and industries without any ties to sports at all. Case in point: the US justice system. In 2007, Anne Milgram became the Attorney General of New Jersey. In her words, she “wanted to moneyball criminal justice.” Yes, moneyball is now a verb.
Why choose a career in analytics?

The US economy will be short **250,000** data scientists by 2024!

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1The Age of Analytics: Competing in a Data-Driven World, McKinsey Global Institute, December 2016. 2The 21 Most Valuable Career Skills, Money, May 2016. 3Best Big Data Certifications for 2017, Tom’s IT PRO, November 2016.
Answers to your questions about data scientists

Stephanie Robertson
SAS Insights Editor
Data scientists have been in the headlines (“Sexiest Job of the 21st Century”) and compared to unicorns because of their rarity or suppositional nonexistence. So it’s no surprise that they’re highly courted and well-paid by many organizations around the world. Here are just a few of the data scientist jobs we’ve seen listed on the Kaggle job board:

- L’Oréal wanted to anticipate consumers’ needs.
- The Philadelphia 76ers needed to forecast plays, players, teams and seasons.
- The Weather Channel was looking to optimize online ad placement.
- For publisher Simon & Schuster, it was optimizing e-book prices.
- A residential cleaning service in San Francisco wanted to find which scents work best for homes.
- An internet radio startup had tons of data and ideas but couldn’t provide relevant playlists.

Several themes seemed common: the ability to draw insights from big data (Hadoop was often mentioned), familiarity with a range of programming languages and good communication skills. We begin to wonder:

1. How are schools preparing students to become data scientists?
2. Who are real-life data scientists? What do they do? Did they always yearn to be one and how did they get there?
3. And finally, if you want to become a data scientist, what should you do?

Words of wisdom from a university leader

To answer question No. 1, we turned to Dr. Michael Rappa, founder of the Institute of Advanced Analytics at North Carolina State University. This was the first university in the US to offer a Master of Science in Analytics, and it’s evolved to offer specific training for students interested in becoming data scientists. (There are now there are more than 60 other similar programs in the US, as well as others around the world.)

Here, Rappa shares his ideas on the role of data scientists and explains how the NCSU program helps prepare students for exciting opportunities in the world of big data.

**How would you define a data scientist?**

**Rappa:** Data scientist, as it’s used today, is still an evolving job category. Though its popularity has skyrocketed with employers the last few years, I don’t think there’s a single definition that applies – and perhaps we shouldn’t expect there to be at this early stage. I define a data scientist broadly as someone with the technical knowledge and tool skills for extracting useful insights from the variety of data generated in today’s digital economy. Perhaps the single most important characteristic of a data scientist is the deep passion for grappling with the complexity of data analysis.

**How would you advise graduates to plan for success in a career as a data scientist?**

**Rappa:** I would start by advising them to narrow their time horizon to the initial three years after graduation. The first job is a stepping stone and getting it right will give you the maximum lift from your education. If you can, don’t focus too much on geographic location or the highest salary. I encourage students to think about their first position like a medical residency. You hope to go to a leading hospital where you can benefit from being around experienced surgeons and physicians and learn the profession. After three solid years of experience, then you can then consider moving on, if it makes sense, to a geographic location or industry that better suits your needs.

Never stop learning. Especially today – there are so many great opportunities to continue to learn while on the job. Keep adding to the toolbox. Always be professional. Think about how your work is connected to and adds value to the business. Build strong relationships with colleagues – learn from them and share your knowledge. Put faith in the power of teams. Be the consummate team player that everyone wants on their team.
If you were to give one bit of advice to a candidate who was interested in pursuing a future as a data scientist - what would that be?

Rappa: If you want a clear pathway into the profession, I would recommend university graduate programs like ours, which are specifically designed to help both new graduates and midcareer people become data scientists. Our approach is to provide an intense, immersive learning experience in the shortest time possible – 10 months – so candidates can get into (or back to) the workforce quickly. There are also part-time and online options. Since the time we launched the first Master of Science in Analytics degree in 2006, there are now more than 100 similar programs worldwide, so there are plenty to choose from. There are also a number of online options for self-learners, where one can brush-up on their knowledge of statistics and improve their programming skills.

I would caution a candidate not to get caught up in the hype. Data scientists have been given the tagline of the “sexy” new career, and truthfully it’s nothing of the sort. Valuable insights from data don’t come easily or quickly. It’s plain hard work, and it takes a serious person with intelligence, skill and determination to see a problem through to completion. If that person is you, it’s an amazing career opportunity, and you’ll find yourself with no shortage of work after graduation.

Real-life data scientists – yes, they do exist!

To answer question No. 2, we wanted to talk to some data scientists ourselves. We asked around to see if anyone would agree to interviews about their jobs and training. And we can say - without doubt - data scientists do exist because we interviewed almost a dozen from around the world. Check out the Q&As to the right. We asked the same questions, so see if you find familiar threads running through those conversations.
4 ways data scientists are changing the world
Poverty. Health. Human rights. Education. The environment. Interested in making a difference? Join the Data for Good movement. Around the globe, people are banding together and using data to help solve some of the world’s most challenging issues. Crowdsourcing analytical talent and data is offering a fresh perspective – and positive action – on pressing problems like these:

- Analytics tackles the scourge of human trafficking
- Analytic simulations: Using big data to protect the tiniest patients
- Can data sharing help cure cancer?
- Exploring the sun with big data

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TOC
Journalist Alan Schwarz crunches the numbers and breaks a scandal wide open
On his first day of kindergarten in 1973, when the teacher asked Alan Schwarz what he wanted to do when he grew up, Schwarz’s answer was: “I want to learn square roots because I don’t know all of them yet.”

Schwarz describes himself as “a proud, card-carrying math geek.” He was on the math team in high school, and his life’s ambition was to teach high school math. But when he found out he’d need a master’s degree, he changed course to something else he’d always loved: sports.

He became a sports journalist and brought his love of math into his writing, finding fertile ground in baseball’s numbers and statistics. He even wrote a book about the history of statistics in baseball. And then everything changed.

The story of a lifetime
Someone came to Schwarz with something big: A brain disease commonly associated with boxers (dementia pugilistica, commonly known as “punch-drunk syndrome”) had been found in deceased NFL football players Mike Webster, Terry Long, Andre Waters and Justin Strzelczyk. All of them had basically lost their minds between the ages of 30 and 52.

Why did these players have cognitive problems? Postmortem examinations found that they had chronic traumatic encephalopathy – a rare disease related to punch-drunk syndrome that’s not seen in the general population.

“Statistically, it doesn’t matter how many healthy players there are,” said Schwarz. “What matters is how many players have the disease and how it compares to the right proportion.”

When Schwarz pushed further, the NFL released another pseudo-statistical argument, saying: “Memory disorders affect many people who never played football or other sports.”

“Right. But, once again, it’s not how many people in the general population have the disease,” said Schwarz. “It’s how many guys in football have it, compared to how many should?”

Collecting the data
With more retired players reporting problems, the NFL came up with a plan to pay any ex-football player who had dementia $88,000 a year to help offset medical expenses – but the league wouldn’t admit that head trauma sustained from football was the cause.

“I knew this would be their downfall,” said Schwarz. “They were now collecting data and figuring out how many ex-football players had this disorder, and then we could take that data and compare it to the general population.”

Schwarz began collecting the names the NFL came up with, getting their birthdays, researching who they were. “I was obsessed with this for two years,” said Schwarz. “And when I found out that there were 95 players in January 2009, I ran the numbers in many different ways to try and conceptualize and show that what I knew in my bones was true. And I was so close.” But before he could finish his analysis, the NFL scooped him. They did their own study with the University of Michigan, and the numbers they found helped Schwarz make his case.
Crunching the numbers
The Michigan report stated that in the US population, for men ages 30-49, only one out of 1,000 suffered from dementia. For retired NFL players ages 30-49, one out of 50 suffered from dementia.

The numbers were even worse for retired NFL players 50 and above. When compared to the general US population, the retired players were six times as likely to suffer from dementia.

When Schwarz asked the NFL about this, the response was: “The numbers are still small.”

In response, Schwarz wrote his groundbreaking 2009 article, stating:

All rates appear small. But if they are accurate, they would have arresting real-life effects when applied across a population as large as living N.F.L. retirees. A normal rate of cognitive disease among N.F.L. retirees age 50 and above (of whom there are about 4,000) would result in 48 of them having the condition; the rate in the Michigan study would lead to 244. Among retirees ages 30 through 49 (of whom there are about 3,000), the normal rate cited by the Michigan researchers would yield about 3 men experiencing problems; the rate reported among N.F.L. retirees leads to an estimate of 57.

So the Michigan findings suggest that although 50 N.F.L. retirees would be expected to have dementia or memory-related disease, the actual number could be more like 300. This would not prove causation in any individual case, but it would support a connection between pro football careers and heightened prevalence of later-life cognitive decline that the league has long disputed.

Front page news
The New York Times put Schwarz’s article on the front page, and it caused an immediate sensation.

“People went bananas,” said Schwarz. “Congress held hearings. I proved that other data reinforced the Michigan study, and everything started changing. The NFL changed its rules and philosophy of how to handle a concussion. And they finally acknowledged that the data was out there to show the link.”

Alan Schwarz took his statistical background and used it to achieve what one Hall of Fame sports writer described as “the most remarkable feat in sports journalism history.” He’s been credited with saving lives and revolutionizing the protocol for head injuries in almost every youth and professional sport.

And it all goes back to the numbers. “I love finding the mathematical argument where I can say, ’No. 2 + 2 does not equal 5, and I’m not going to let you get away with that,’ ” said Schwarz.
Student lands dream job with help from SAS

From college to anti-money laundering analyst using machine learning
When Cameron Jagoe went back to school for his Master of Science in operations management and data analytics at the University of Alabama in 2015, he knew exactly what kind of job he was looking for. He wanted to use machine learning to solve problems and do research, either for a company or as a consultant.

With data analysts in high demand, Jagoe was already getting nibbles from potential employers, even though he wasn’t due to graduate until May 2017. The challenge was that his previous experience was in sourcing.

“People would approach me for sourcing or supply chain positions, but that didn’t line up with what I wanted to do,” Jagoe explains.

When a bank, familiar with the data analytics program at the University of Alabama, approached him with the type of machine learning research position that did pique his interest, he was ultimately turned down.

“The problem was my lack of banking experience,” says Jagoe.

A profitable partnership with SAS

Luckily, the University of Alabama has a strong partnership with SAS. Notes Jagoe, “Four of the first classes I took were SAS-based. And the school continually promotes SAS conferences. My professor, Dr. Denise McManus of the university’s Culverhouse College of Commerce, encouraged me to submit a proposal to present at SAS Global Forum. I also applied for a SAS student scholarship and to be a SAS Ambassador.”

The proposal Jagoe submitted expanded on a project he had completed several years earlier. Jagoe had been working at a startup bakery managing finances and ordering, but the bakery had no tools for forecasting.

Jagoe had completed his undergraduate degree in mathematics, so he wrote a short-term forecasting model using linear algebra and improved it over time. By reducing waste and increasing sales, the model helped contribute $100,000 to the bottom line. The bakery was at $750,000 in revenue at the time. Says Jagoe, “This was a game changer. It was the difference between running in the red or in the black.”

For this project, Jagoe decided to redo that effort. Instead of using trial and error to come up with the model, he wanted to see whether a novice to intermediate user could do that in a shorter time frame using SAS. He was able to use SAS’ Enterprise Guide to develop six models in just a few hours.

“That made the cost of purchasing SAS a no brainer,” explains Jagoe.

Jagoe’s proposal was accepted. He was not only invited to give a talk at SAS Global Forum, but also received a full scholarship to attend, and a student ambassadorship that granted him access to tremendous networking opportunities. Student ambassadors were given the opportunity to mingle before and after various conference sessions, and during breaks they could hang out at the University of Alabama booth to talk to people who wanted to learn more about the university.

Opportunity knocks

Early on in the program, David Black, Senior Director of Anti-Money Laundering and OFAC Analytics at US Bank, approached Cameron at the booth and started describing the department he ran and asking about Jagoe’s work, school and SAS experience. Jagoe invited Black to attend his presentation.

After the presentation, Black asked Jagoe to email his résumé to Nathan Banks, one of the managers who worked for him. In short order, he had a reply, an interview and a job offer.

And that offer was Jagoe’s dream job.

Jagoe is now an anti-money laundering modeling analyst on the advanced
analytics and statistics team for enterprise financial crimes compliance at US Bank. The team does research and development for all of the programs that alert the bank when someone launders money or does anything else that would violate US or international money laundering regulations.

“This opportunity put me on a career track I’d wanted for several years,” Jagoe notes. “If I hadn’t met Dave Black at the conference, I wouldn’t have this job. My presentation allowed me to demonstrate real skills that weren’t on my résumé. And that helped me solve the old puzzle, ‘How do you get the job if you don’t already have the job?’”

Quiz

Is a career in analytics for you?

What are the telltale signs of a good analyst? How do you know if you’d enjoy a career in analytics? Ask yourself these questions to see if you have what it takes:

- Are you a problem solver?
- Do you like puzzles and other games involving logical thinking?
- Are you generally curious?
- Do you like working with people and helping them solve their problems?
- Are you driven to make an impact through your work?

If you answered “yes” to most of these questions, you’ve got the traits of a good analyst.

Get the analytical skills you need for free with SAS® University Edition
4 tips for a successful analytics career

It doesn’t always start with a math degree, says this chief analytics officer.
MGM Resorts Chief Analytics Officer Elisa Gois knows from personal experience that you don’t need a math degree to be successful in analytics. She has a master’s degree in clinical social work. “I used to analyze people, and now I analyze businesses,” says Gois. “If you have an analytical mindset and have an aptitude for it, you can translate that into any business, any industry.”

“It’s not just a bunch of numbers on a piece of paper. Your mindset needs to be: ‘Wow, this is a really cool business. How can I transform it?’” Here are her top four tips for anyone interested in an analytics career.

1. Apply communication skills
“Too often, IT develops systems for the business, but because they aren’t the users, they don’t develop it in the way the business needs it. Likewise, the business doesn’t know the potential of the technology, so they don’t know what to ask for,” says Gois.

“Focus first on communication,” Gois says. “You have to be able to translate technology to business, business to technology, and as a result, help develop working solutions.”

2. Find the right mentor
“It’s imperative to have someone who doesn’t want to do business as usual,” says Gois. “You want someone who says, ‘How can we flip this operating model around? Or how can we leverage things that we’re not leveraging?’ I needed a mentor who was a creative and strategic thinker – having someone I could bounce ideas off of was imperative.”

3. Understand the people and processes you’re analyzing
“You can’t just sit at a computer looking at numbers,” says Gois.

“I don’t want any of my food and beverage analysts doing an analysis on banquets until they’ve been in that kitchen and they’ve helped plate a 2,000 meal group dinner,” says Gois. “They have to, because otherwise, they won’t understand how it works.

“And don’t expect the organization to proactively teach you everything you need to learn,” says Gois. “Get out there and learn different parts of the business, all the different aspects of it. If you do that, you’ll earn credibility and you’ll have the business knowledge you need to drive insight and value with analytics.”

4. Build a diverse team
At MGM Resorts, Gois is building a team of analysts from a variety of industries and backgrounds. “When I’m looking for an analyst, I look for someone who has an inquisitive nature, who’s going to take initiative to learn the business, and thinks outside the box about how to approach the business in a different way,” says Gois. “We’re here to transform the way we look at our business – not just do it the way it’s always been done.”
New study confirms: SAS® most valuable career skill
If you’re looking for higher pay and better opportunities, what career skills should you seek to acquire? You might think leadership or communication skills would top the list, but a recent study says otherwise.

According to a massive study from Money and Payscale.com, SAS Analytics skills are the most valuable skills to have in today’s job market.

The study “analyzed 54 million employee profiles, across 350 industries, with 15,000 job titles – from entry-level workers to top execs.”

The result is a list of top 21 skills considered to be the most valuable by employers, with SAS skills topping the list. The study attributes this to the rise of big data, adding, “…companies can use this information to do things like target new customers, improve service, and offer more personalized products – as long as they employ folks who understand how to organize, analyze, and apply it.”

Career opportunities abound as demand for SAS talent soars at more than 83,000 customer sites around the world.

The study isolated “the specific skills (from a universe of about 2,300) correlated with higher pay, advancement, and career opportunity.” With an average pay boost of 6.1 percent, SAS was most valuable. Data mining and data modeling were also highly valuable skills, both of which are done with SAS.

The good news? If you’re not already a SAS user, you can learn SAS for free. There are options for adult learners, college students and professors – even high schoolers. In addition, colleges and universities around the world offer more than 150 degree or certificate programs with SAS. And SAS offers a slew of training options. All these can lead to SAS certifications that are like catnip to employers.

So, what path will you choose to the most valuable career skill?

Resources for learning SAS®

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