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WHAT IS DATA SCIENCE? 5 APPLICATIONS IN BUSINESS

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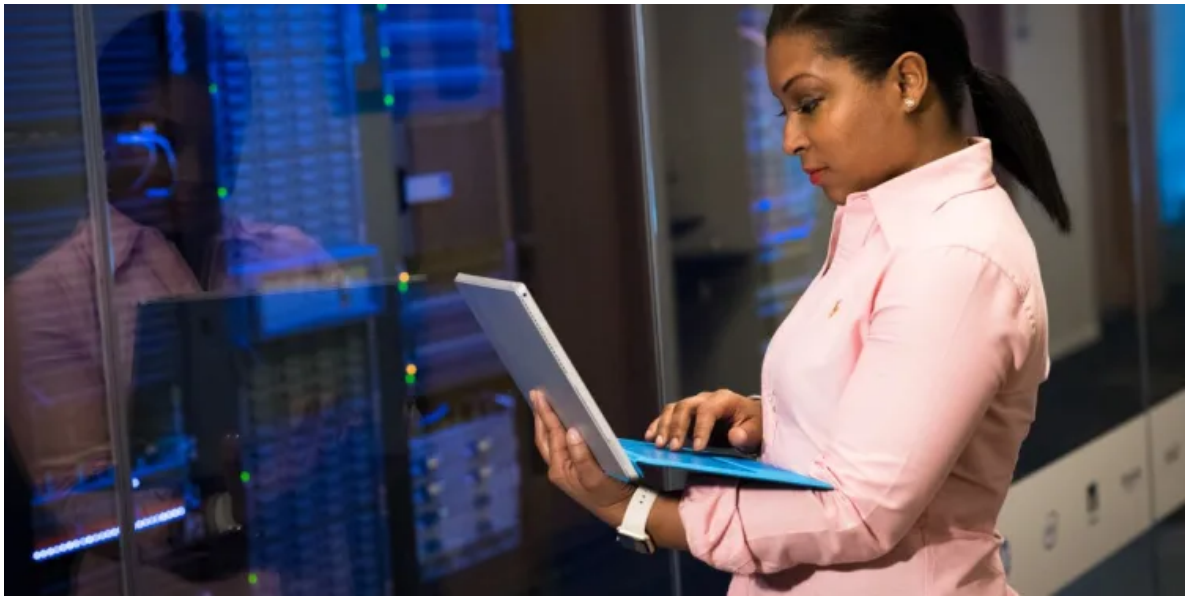

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Analytics

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At a time when 1.7 megabytes of data are generated every second for every person on Earth, it's crucial to know how to wade through information, and structure, interpret, and present it in a meaningful way.

This enormous volume of data, known as **big data**, has prompted greater demand for skilled data science professionals. According to the US Bureau of Labor Statistics, employment of data scientists is expected to rise 15 percent by 2029—far faster than the four percent average for all occupations. Yet, to harness the power of big data, it isn't necessary to be a data scientist.

Anyone with access to data can reap its benefits. Data science can be used to gain knowledge about behaviors and processes, write algorithms that process large amounts of information quickly and efficiently, increase security and privacy of sensitive data, and guide data-driven decision-making.

In a business world with no shortage of data, knowing how to make sense of it, the terminology used to navigate it, and ways to leverage it to make a positive impact can be invaluable tools in your career. Here's a primer on what data science is and how you can use it in business.

WHAT IS DATA SCIENCE?

Data science is the process of building, cleaning, and structuring datasets to analyze and extract meaning. It's not to be confused with **data analytics**, which is the act of analyzing and interpreting data. These processes share many similarities and are both valuable in the workplace.

Data science requires you to:

- Form hypotheses
- Run experiments to gather data
- Assess data's quality
- Clean and streamline datasets
- Organize and structure data for analysis

Data scientists often write algorithms—in coding languages like SQL and R—to collect and analyze big data. When designed correctly and tested thoroughly, algorithms can catch information or trends that humans miss. They can also significantly speed up the processes of gathering and analyzing data.

For example, an algorithm created by researchers at the Massachusetts Institute of Technology can be used to detect differences between 3D medical images—such as MRI scans—more than one thousand times faster than a human. Because of this time saved, doctors can respond to urgent issues revealed in the scans and potentially save patients' lives.

In the Harvard Online course Data Science Principles, Professor Dustin Tingley stresses the importance of both the human and machine aspects of data science.

"With this new world of possibility, there also comes a greater need for critical thinking," Tingley says. "Without human thought and guidance throughout the entire process, none of these seemingly fantastical machine-learning applications would be possible."

If you want to make sense of big data and leverage it to make an impact, here are five applications for data science to harness at your organization.

5 BUSINESS APPLICATIONS FOR DATA SCIENCE

1. Gain Customer Insights

Data about your customers can reveal details about their habits, demographic characteristics, preferences, aspirations, and more. With so many potential sources of customer data, a foundational understanding of data science can help make sense of it.

For instance, you may gather data about a customer each time they visit your website or brick-and-mortar store, add an item to their cart, complete a purchase, open an email, or engage with a social media post. After ensuring the data from each source is accurate, you need to combine it in a process called **data wrangling**. This might involve matching a customer's email address to their credit card information, social media handles, and purchase identifications. By aggregating the data, you can draw conclusions and identify trends in their behaviors.

Understanding who your customers are and what motivates them can help ensure your product meets their job to be done and your marketing and sales efforts are working. Having and understanding reliable customer data can also inform retargeting efforts, personalized experiences for specific users, and improvements to your website and product's user experience.

2. Increase Security

You can also use data science to increase the security of your business and protect sensitive information. For example, banks use complex machine-learning algorithms to detect fraud based on deviations from a user's typical financial activities. These algorithms can catch fraud faster and with greater accuracy than humans, simply because of the sheer volume of data generated every day.

Even if you don't work at a bank, algorithms can be used to protect sensitive information through the process of **encryption**. Learning about **data privacy** can ensure your company doesn't misuse or share customers' sensitive information, including credit card details, medical information, Social Security numbers, and contact information.

"As organizations become more and more data-centric, the need for ethical treatment of individual data becomes equally urgent," Tingley says in Data Science Principles.

It's the combination of algorithms and human judgment that can move businesses closer to a higher level of security and ethical use of data.

Related: 9 Fundamental Data Science Skills for Business Professionals

3. Inform Internal Finances

Your organization's financial team can utilize data science to create reports, generate forecasts, and analyze financial trends. Data on a company's cash flows, assets, and debts are constantly gathered, which financial analysts can use to manually or algorithmically detect trends in financial growth or decline.

For example, if you're a financial analyst tasked with forecasting revenue, you can use predictive analysis to do so. This would require calculating the predicted average selling price per unit for future periods and multiplying it by the number of units expected to be sold during those periods. You can estimate both the average selling price and number of expected units sold by finding trends in historic company and industry data, which must be qualified, cleaned, and structured. This is data science at work.

Additionally, risk management analysis can be used to calculate whether certain business decisions are worth the potential downsides. Each of these financial analyses can offer valuable insights and drive business decisions.

4. Streamline Manufacturing

Another way you can use data science in business is to identify inefficiencies in manufacturing processes. Manufacturing machines gather data from production processes at high volumes. In cases where the volume of data collected is too high for a human to manually analyze it, an algorithm can be written to clean, sort, and interpret it quickly and accurately to gather insights.

For example, industrial automation company Oden Technologies created a machine-learning tool called Golden Run, which collects manufacturing data, identifies times of highest efficiency, and provides recommendations for replicating that high-efficiency state. As the algorithm gathers more data, it provides better recommendations for improvement.

By using data science to become more efficient, companies can cut costs and produce more goods.

5. Predict Future Market Trends

Collecting and analyzing data on a larger scale can enable you to identify emerging trends in your market. Tracking purchase data, celebrities and influencers, and search engine queries can reveal what products people are interested in.

For instance, clothing upcycling has been on the rise as an environmentally conscious way to refresh a wardrobe. According to research by Nielson, 81 percent of consumers feel strongly that companies should help improve the environment. Clothing retailer Patagonia, which has been using recycled plastic polyester since 1993, leaned into this emerging trend by launching Worn Wear, a site that's specifically designed to help customers upcycle used Patagonia products.

By staying up-to-date on the behaviors of your target market, you can make business decisions that allow you to get ahead of the curve.

USING DATA SCIENCE AT YOUR ORGANIZATION

When critical thinking meets machine-learning algorithms, data can offer insights, guide efficiency efforts, and inform predictions.

Even if you aren't a data scientist, understanding how to qualify data sources, clean and structure information, and extrapolate conclusions can be valuable skills in your career.

Are you interested in furthering your data literacy? Download our Beginner's Guide to Data & Analytics to learn how you can leverage the power of data for professional and organizational success.

About the Author

Catherine Cote is a marketing coordinator at Harvard Business School Online. Prior to joining HBS Online, she worked at an early-stage SaaS startup where she found her passion for writing content, and at a digital consulting agency, where she specialized in SEO. Catherine holds a B.A. from Holy Cross, where she studied psychology, education, and Mandarin Chinese. When not at

work, you can find her hiking, performing or watching theatre, or hunting for the best burger in Boston.

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