

When Andrew Chamberlain was hired as the chief economist at the jobs website Glassdoor four years ago, the expectation was that he'd produce reports on the labor market using data from sources such as the U.S. Census Bureau and the Bureau of Labor Statistics, as he'd done previously as an academic at the University of California, San Diego.

But in a short period of time, his role at the company—and both the labor market insights he gleans from data and how he does so—has been completely transformed, thanks to the proliferation of artificial intelligence (AI) tools and techniques.

“Now my job is a combination of data scientist and research economist,” Chamberlain said. “I suddenly had to learn to program, to write Python and SQL code to get data from our databases, and teach myself to think differently about really big, really messy data sets.”

During the past few years, AI has enabled economists to build models using data sets that are more disparate, diverse, and exponentially larger than ever before, vastly increasing their predictive power. As recently as four years ago, Chamberlain said, he published a paper built on 400 survey results—but today, he never uses less than 100,000 and sometimes incorporates as many as a million.

As a result, chief economists at many technology companies and financial services firms have seen their roles reimagined, with new data science skills transforming them into chief analytics officers. The shift has been rewarding not only for economists but also for the companies they work for, leading to increased revenues and better products and services.

“We can make use of tools and capabilities that never existed in the past,” said Martin Fleming, IBM's chief economist and chief analytics officer—the latter title was added a few years ago. A decade ago, he said, an economist trying to predict retail trends at a specific location would have analyzed data from weather forecasts, the global economic

outlook, and socioeconomic statistics from the local census. The resulting predictions would be a “very unsatisfying” 30 to 40 percent accurate.

But now economists can analyze huge quantities of unstructured data scraped from the web—taking into account minute details like recent tweets and the fact that a hit movie is playing across the street from a retail location—to yield predictions with up to 90 percent accuracy.

Figuring out how to clean and model that data isn’t easy. “This information doesn’t exist in one site—you have to bring it together and create tools to understand it,” Fleming said. “And the complexity is further increased by the large volumes of data that are involved.”

Using constantly improving natural-language processing tools, analysts can convert unstructured data to structured data that can be fed into models created by economists like Fleming. Wesley Phoa, a fixed-income portfolio manager at Capital Group, an asset management firm, said that his company has used machine learning to analyze meeting minutes from the Federal Reserve.

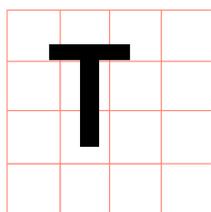
In the past, Phoa and his team would simply read the minutes—they still do—but now they also assign three quantitative scores to each topic covered in a meeting (amount of attention paid to the topic, level of sentiment, and level of uncertainty)—such as banking, inflation, nonfinancial services, and so on—and use that data to compare Federal Reserve meeting minutes going back months and years, providing context and insights.

“You always get a qualitative impression from reading, but it’s helpful to have this quantitative measure as well,” Phoa said. “You get a better understanding of whether

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making more: incoming information about inflation or wages? Then we can correlate that with information we're getting from the companies we cover."



his leap would not have been possible without cloud computing, which provides economists with access to huge quantities of data. "It's not only the natural-language processing tools but the computing infrastructure in the cloud environment that has made this shift possible," Fleming said.

The potential for productive innovation is great. At Glassdoor, Chamberlain launched monthly regional pay estimates for 10 metro regions. Called [Local Pay Reports](#), they are generated from a machine-learning model paired with data—such as salary information—that users provide to Glassdoor anonymously. This year he plans to tie that data to job availability so that someone using the site would, for example, be able to get a comprehensive picture of the open jobs and their accompanying salary range across different industries in Seattle.

"We're using information that was sitting in our database for years; it just took a bit of a push from economists to argue that we should open it up and connect it with the conversation about the labor market," Chamberlain said. "Now we see what it can tell us about the job market—things that you don't get from the Bureau of Labor Statistics or the Census."

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Of course, such tools require a talented data scientist who can make sure they're producing the right conclusions.

"One of the challenges with machine learning is that training can be very fiddly," Phoa said. "You can come up with lots of spurious relationships." A general lesson he's learned is that "it's hard to find algorithms that are, by themselves, good at predicting

things. But if you expand it to, ‘What are good ways of getting insights from the data?’ there’s a lot more you can do with machine learning.”

The changes are beneficial not only for clients and businesses but also for economists, who are encouraged to constantly reinvest in and improve their skills. As Chamberlain pointed out, AI has vastly expanded economists’ career opportunities.

“Previously, the only places that would hire economists would be banks or consulting companies,” he said. “Today, because economists are becoming more like data scientists, they are on staff at nearly every technology company.”

If anything, Phoa said, AI has made traditional economics training even more important. AI doesn’t overshadow the skills economists learned in school; instead, it augments them.

“There are now much more sophisticated ways to identify and tease out relationships in the data, but you still need the subject-matter foundation,” Phoa said. “It’s important to have folks with a strong economic background making the judgments, asking, ‘When does it make sense?’ ‘What pathways should I follow?’”

As Fleming noted, the transformation has been rapid—and fascinating. “I now find myself spending a great deal of time thinking about the future of work and all its implications,” he said. “It’s more challenging—and more rewarding.”

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