



The accounting profession: on the cusp of a technological revolution

Accounting professionals need lifelong learning to keep pace with evolving business needs. Data and analytics will be the critical skills for practitioners to stay ahead of the curve. BY RICHARD CROWLEY AND JIWEI WANG

ACCOUNTING is experiencing more disruption than ever before. Manual or repetitive tasks will be replaced by automation, robotics and machine learning in the near future. However, this does not mean that the accounting profession is a sunset industry. In fact, with the rise of the technological applications in the workplace, there is an increase in demand for talent who are adept at bridging data technology and the accounting function.

THROUGH THE LENS OF HISTORY

When it comes to technological revolutions in the accounting profession, the earliest and most notable is the double-entry bookkeeping method. Double-entry bookkeeping is believed to be pioneered by the Jewish community of the early-medieval Middle East in the 11th century and has been in use for more than 1,000 years.

The second accounting revolution occurred when computers and the Internet proliferated, which brought about electronic worksheets in the 1970s.

The third accounting revolution is happening now – technologies such as artificial intelligence (AI), blockchain, and cloud computing have a direct impact on the methods of accounting and the tools used in the accounting industry.

Accounting has always been undergoing revolutionary changes. Since the 1970s and 1980s, we have been using computers and electronic worksheets to handle accounting practices. Due to the emergence of computers, the demand for manual work such as bookkeeping has been declining for decades, and will likely disappear in the near future.

In 2019, many organisations do not require anyone to do manual accounting work, because computers and robots can automatically generate accounting entries. Alongside this, we also see a growing demand in other accounting functions, mainly in the areas of data processing, management analysis and financial analysis. The function of accounting work has changed extensively over the years – old jobs disappear and give rise to

new jobs. The number of people who work in the accounting profession is actually increasing.

ACCOUNTING WORK REIMAGINED

There is no doubt that many repetitive tasks will be replaced by computers and robots in the future. At the same time, new prospects will also emerge with future economic development.

Take, for instance, Europe's new legislation on data protection called General Data Protection Regulation (GDPR). So, what is the relationship between GDPR and accounting work?

A lot of work is now done by computers. The computer relies on algorithms to make certain judgments or classifications. For example, when a customer applies for a credit card or opens an account, the computer may automatically classify you as a type of customer, determining whether you can open an account, for instance. There is a concern of "Algorithmic Fairness" – whether the system is discriminatory.

How can we ensure fairness of data processing? The GDPR necessitates that if an algorithm is used to classify people, the organisations must be able to explain their algorithmic decisions. This means that there is a demand to engage with an independent service provider to confirm or prove that the algorithm used does not discriminate anyone on the basis of race, age or gender, and that it must be inclusive for all people.

This kind of work did not exist before, but does now. Traditional auditors never had to audit algorithms, nor did they have to audit the fairness of an algorithm. Now, practitioners need to understand algorithms and develop the relevant knowledge in order to ensure systems remain fair and robust. The Big Four accounting firms have already started to provide algorithms assurance services.

So, what type of professionals are the most sought-after in the market now? Based on our research and industry consultation, we have found that in the same organisation, colleagues in business domains

and the technology and analytics departments find difficulty in communicating with each other, because they do not understand each other's domain.

In the current market, there is a demand for domain experts who understand finance and accounting and who must, at the same time, understand data and technologies and how these systems work.

Most importantly, they must be able to communicate effectively with the data and IT departments. In fact, this is how the accounting talent landscape will transform in the future.

THE GAME CHANGER

The biggest impact of the technological revolution on the financial community is the new "ABC" – artificial intelligence, blockchain, and cloud computing. And data makes the "ABC" work. Especially for large companies, there are huge amounts of data to be processed. AI catalyses data collection and analysis. Blockchain ensures data security. Cloud computing makes data sharing possible. Therefore, accounting and finance practitioners should focus on developing applications in data technology in the future.

Transformation has been afoot ever since machine learning (which is part of AI) was introduced to the accounting industry. Machine-learning techniques can open up whole new sets of data for analysis. It can also derive new and more useful features from existing data. For instance, machine learning makes it much easier for professionals to analyse unstructured data such as the text of documents, including contracts, legal documents, accounting filings, press releases, news articles, emails, etc.

While there were ways of analysing such documents in the past, these methodologies were rather brittle – if the vocabulary or format changes, you need to completely revamp the algorithm. With machine learning, we can produce algorithms that are robust to word choice (for example, through vector encoding methodologies) and we can automate the retraining of al-

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gorithms to adjust for major shifts in the data. We would hence be able to achieve a more efficient workflow and better results with less time invested.

One challenge faced by accountants is the sheer quantity of data that businesses produce. This is perhaps the most salient issue for audit practitioners – getting more details on the activities of their client can help them to better execute their audit and more quickly hone in on any issues that may exist. By using machine learning, it is much easier to get a sense of the big picture and notice the smaller parts that don't quite fit (that is, anomalies).

JOB AUGMENTATION

If the problem can be tackled with machine learning, it is almost assuredly more efficient. However, the question is more on effectiveness or the accuracy of the system. If the system can do it right 95 per cent of the time, it may be besting the employees themselves. And this could be worth building.

With machine learning, there will be job augmentation. Instead of having the machine do the entire job, both the machine and the employee can perform the task at the same time. He or she can have oversight of the operations and achieve greater efficiency at work. Sometimes what we find is that machine-learning algorithms can be great at picking up pervasive but subtle patterns that many people, even experts, gloss over.

However, technologies will not do "the" job for us. They will do the manual, routine and tedious part of the job, leaving the accountants to focus on the rest. Particularly anything requiring judgment is presently much, much harder to automate than something that requires routine application or data querying. Thus, AI technology is leaving the more interesting parts of the job for accountants of the future.

KEEPING UP TO SPEED

Learning is necessary so long as there is innovation. However, this does not mean that the jobs are getting more difficult; it's simply that what what is needed is changing. For those who want to be on the cutting edge, it is necessary to pick up programming languages for statistical analysis, such as R or Python, SQL for data query, and Spark and Hadoop for big data analytics.

Python is a great language to start with for more general-purpose uses, while R is great for learning analytics (both traditional and machine learning). Once you know a programming language, you can begin to unlock more of the value hidden inside your data, and you can begin to more efficiently automate workflows.

For instance, if you find yourself preparing a weekly report where you collect data from the same sources and combine the data in the same way each time, you can certainly automate this in Python or R, such that you just run one command and all the data work is done. These tools also provide nicer ways to visualise data than the tools provided in traditional business software like Excel, helping you better understand the data you are looking at.

"Data and analytics" is the heart of any technological application. Accounting practitioners must understand the data, and know how to analyse them. They need to know which data is good, which kinds of data to choose, and how to get more useful information from these data. Therefore, they need to learn descriptive analysis, predictive analysis, and decision-making optimisation analysis in order to solve critical problems.

A BETTER GRASP OF THE BUSINESS

The accounting profession is on the cusp of a technological revolution, and accounting professionals need lifelong learning to keep pace with evolving business needs. With data and analytics skills, accounting practitioners will be able to have a better grasp of the business and contribute to the growth of their organisations. By hiring and investing in the right talent, organisations will also benefit from their expertise. Data and analytics will be the critical skills for accounting practitioners to stay ahead of the curve.

■ The writers are from Singapore Management University. Richard Crowley is an assistant professor and Jiwei Wang is an associate professor. The duo are teaching a new course incorporating machine-learning algorithms to solve financial forecasting and forensic accounting issues.