



## Exploring the Impact of Artificial Intelligence on the Accounting Profession

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### Abstract

Artificial intelligence is no longer the robots and computers of science fiction from Hollywood movies. The ideas of developing machines that can “learn” are centuries old. The capacities of the computers and software of today create and exhibit intelligence, but also bring with it concerns along with much promise. In the accounting field artificial intelligence has been taking on more and more tasks. Already, there is software that has automated many accounting, tax, bookkeeping, and auditing processes. If machines are assuming a greater role, where do we, the professionals strike a balance? What does the future of the accounting profession look like with the growth of artificial intelligence?

**Keywords:** Accounting; auditing; artificial intelligence; expert systems; machine learning; knowledge based systems; cognitive systems.

### Introduction

Accountants and auditors are responsible for preparing and examining the financial records of companies. They ensure that the records are accurate, that taxes are paid in a timely manner and for the proper amount. They also analyze financial operations and try to help the organizations to run in a more efficient manner. The field of accounting has a long history of artificial intelligence (AI) applications dating back more than 25 years mainly in the areas of financial reporting and auditing tasks. According to research done by the University of Oxford in 2015, accountants have a 95 percent change of losing their jobs as machines take over the role of data analytics and number crunching. However, this same report found that as technology progresses, some jobs are eliminated while others are created.<sup>1</sup>

### History of AI

The concept of intellectual machines can be traced as far back as Greek mythology. Greek myths contain stories of Hephaestus, a blacksmith who contrived mechanical robots. Other myths include mechanical toys and human-like androids. Intelligent relics begin appearing in literature since that time. In the 4<sup>th</sup> century B.C. Aristotle created the first formal deductive reasoning system (syllogistic logic). In 1206 A.D. an Arab inventor built what is believed to be the first programmable humanoid robot. By the 17<sup>th</sup> century Pascal was creating the first calculator (1642). The first “computer” game based on the game of chess came along in the early 20<sup>th</sup> century (1912). It was in 1936 Alan Turing first suggested the idea of the Touring Machine. This machine was the basis for theories about computers and computing.<sup>2</sup>

With the development of stored-program computers in the mid-20<sup>th</sup> century the realistic concept of artificial intelligence really begins. In 1956 at the first conference devoted to the subject of “artificial intelligence”. In 1961 UNIMATE, the first mass-produced industrial robot started working at General Motors beginning the revolution of factory automation. This robot did the work that was deemed harmful to humans. By 1969 GM was producing 110 cars per hour, which was more than double the rate of any other automotive facility in existence at that time.

<sup>1</sup> Griffin, O. (October, 2016). How artificial intelligence will impact accounting. *Economia*.

<sup>2</sup> AI Topics. (2016). Brief History of Artificial Intelligence. <http://aitopics.org/topic/brief-histories-timelines>.

Many blame the automation revolution for the reduction in manufacturing jobs. Some say that the growth of production came at the cost of manufacturing jobs. Graetz and Michaels did a study in 2014 that showed the United States had increased the use of automation per hour worked by 237 percent between 1993 and 2007. During the same time frame there were 2.2 million manufacturing jobs lost. Their study showed that there was essentially no relationship between the number of jobs lost and the amount of automation. It showed that if there was a correlation between the two the U.S. should have lost an additional one-third than was really lost.<sup>3</sup>

## **AI Technology in Accounting**

The job description of today's accountant looks very different than that of the accountant of 20 years ago. In another 20 years, accountants will again, play a different role. Their roles will change substantially over the next decade. More emphasis will be placed on consulting, business development, advisory services and risk management. Accountants will need to embrace specialization and the use of technology.<sup>4</sup>

Artificial intelligence is being designed to think, feel, and react like a living, breathing creature. According to a study done by Deloitte, AI could emerge with a whole new class of products and services specifically applicable in the areas of accounting. These include: customer service, research and development, logistics, sales, marketing and informational analysis. For those professions that require following specific methodologies, information analysis, report preparation, and many cumbersome processes (i.e. bookkeeping, transaction coding, etc.), AI has the potential to completely alter the profession. According to a study done by the Association of Chartered Certified Accountants, there is the possibility that automation will relieve many burdensome tasks that would enable accountants to focus on consulting services and other higher-value work.<sup>5</sup>

In the very near future, AI may be completely involved in the monitoring and evaluating of compliance with regulations, organizational policy, employee evaluations and even hiring and firing. Obviously, accounting software is not new to the profession. Tax filing software has not put accountants out of business, it has, in fact, made them more efficient and made it possible to file many more returns than they could before. However, the new incoming software could likely empower some users to the point when they will not need their accountant any longer. The latest evolution of products are more "cloud" based, such as the QuickBooks Online, which seems to compel some to take on some of the bookkeeping tasks of their business.

There are differing opinions on how the role of an accountant will change. Some are of the opinion that there will be a major modification as was the case in the taxi/transportation industry when Uber and Lyft were introduced. Others believe that software will simply shift some of the less complicated tasks to the businesses themselves, but that they will still be in need of credentialed experts to conduct audits and sort through the highly complex regulations.<sup>6</sup>

## **AI in Auditing**

Cognitive technologies actually further the power of information technology to those tasks that traditionally are performed by humans, they enable users to shatter what was once a tradeoff between speed, cost, and quality. These AI technologies can facilitate auditors to automate those tasks that have been conducted manually by humans for decades. As a result, auditors can be freed in order to focus on improving quality by evaluating advanced analytics, spending additional time providing insight and applying better professional judgement. One particular area that AI has been extremely useful is that of document review. Reading through pages and pages of contracts in order to mine key terms has, in the past, been a time intensive, manual process. Using artificial intelligence this concept has now become automated. The "learning technology" that is possible with this type of processing is making it feasible to train the system on a set of sample documents so that the system then learns how to identify and extract key terms.<sup>7</sup>

In 2016 KPMG released plans to begin using artificial intelligence on their audit engagements in Australia. Their proposal is to use IBM's cognitive computing technology called "Watson". Executives from KPMG maintain that by using Watson they can extend the data and analytics. Where sample sizes were once limited by time and man-power, there is now no limitation to the sampling that can be done. Rather than simply analyzing a sampling of total data, KPMG will be able to scrutinize all of the numbers. More data being analyzed means better comprehension for the

<sup>3</sup> Graetz, G and Michaels, G. (2015). Estimating the impact of robots on productivity and employment. Center for Economic Performance. <http://cep.lse.ac.uk/pubs/download/dp1335.pdf>.

<sup>4</sup> McCabe, S. (2014). CPA.com study gauges firms' preparedness for the future. Accounting Tomorrow. <http://www.accountingtoday.com/blogs/accounting-tomorrow/cpa-com-study-gauges-firms-readiness-for-the-future-73011-1.html>

<sup>5</sup> Jariwala, B. (2015). Exploring Artificial Intelligence & the Accountancy Profession: Opportunity, Threat, Both, Neither? International Federation of Accountants.

<sup>6</sup> Poston, J. (2014). Can Software Really Replace Accountants? AccountingWeb.com

<sup>7</sup> Raphael, J. (2015). How Artificial Intelligence Can Boost Audit Quality. CFO.com

clients and (more than likely) bigger audit fees. KPMG, which ranks fourth among accounting firms in almost all areas (revenue, number of employees, salaries and assets). Of course KPMG is not alone in using this type of technology. Deloitte, Ernst & Young and PriceWaterhouseCooper (PwC) are employing similar technologies, only on a smaller scale.<sup>8</sup>

### **Job Growth (Number of Accountants)**

It is difficult to find an exact number of accountants in the United States because many are not registered. However, in 2016 there were 664,532 CPAs (Certified Public Accountants) in the US.<sup>9</sup> According to the United States Department of Labor, Bureau of Labor Statistics there are 1,226,910 individuals employed in the accounting profession in the United States. Many fear that with the advances in technology, specifically in artificial intelligence, there will be a loss of jobs. The fear is that computers will take over for humans, offering free labor, better accuracy and no personality conflicts. If those fears were being realized we'd expect to see a decline in the number of professional accountants. However, the exact opposite is true. The Bureau of Labor and Statistics reports that the accounting profession is projected to grow at a rate of 11 percent over the next 10 years, an increase of over 142,000 new accounting and auditing jobs.<sup>10</sup> Some of this may be due to the openings left by the Boomer generation retiring, but not all of it can be attributed to that one factor. According to the Accounting and Financial Women's Alliance, businesses are modifying their business models to take advantage of big data and taking a more analytical view. Chief Financial Officers (CFOs) are looking to hire finance and accounting individuals who are experienced in data analytics, modeling techniques, proficient with accounting software and advanced in Microsoft Excel. In other words, they are looking for people who can work with the new technology. They want people with the skills necessary to work in a global company and that can keep up with the quickly changing demands of technology.<sup>11</sup>

### **Conclusion**

Artificial Intelligence is critical to the future of the accounting and auditing professions. AI is a vital tool that will provide these professionals with the needed tools to increase the efficiency and effectiveness of their occupations.<sup>12</sup> The repetitive tasks of bookkeeping or process-driven assignments are more likely to be replaced with an automated technology than the higher value specialties that involve professional judgement. Many believe that the younger generation of accountants need to understand and be prepared to work alongside artificial intelligence.

So, are we finally at the point of machines taking over our world? Online education taking over for professors, investing websites taking over for personal financial advisors, legal software taking over for lawyers, the list goes on. The accounting profession is not immune to this phenomenon of new technologies disrupting the workforce. The use of tax filing software hasn't put accountants out of business, it simply changed the number of tax returns an accountant was able to prepare. Quick Books has not reduced the income of accountants, it simply changed the focus from paper and pencil entry, to computer and software entry. AI in the accounting world will not replace accountants, it will simply change the focus.

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<sup>10</sup> Best Jobs. (2016). *US News and World Report*. <http://money.usnews.com/careers/best-jobs/rankings/bestbusiness-jobs>.

<sup>11</sup> A Salary Guide Foresees a Cheery Future for Accounting and Finance Professionals. (2014). *Accounting & Financial Women's Alliance*.

<sup>12</sup> Baldwin, A., Brown, C., & Trinkle, B. (2006). Opportunities for Artificial Intelligence Development in the Accounting Domain: The Case for Auditing.

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