

Building a Better Accounting World with Artificial Intelligence

Submitted by

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## **Abstract**

This thesis's purpose is to explore how the emergence of artificial intelligence in accounting shifts the focus and daily tasks and responsibilities of accountants. The project will also explore the impact that these new advancements in artificial intelligence will have in the accounting world in areas such as document management and bookkeeping. From artificial intelligence implications, the immediate and future impacts of these shifts in technologies will become present and utilized to enhance the field in the right direction. Through the implementation of artificial intelligence, new knowledge is uncovered that will enhance the everyday tasks of an accountant such as bookkeeping and journalizing entries. This enhancement will allow the focus of accountants to shift to more advisory services and other high-value tasks. The methodology used will be exploratory content from individuals from accounting firms and scholarly peer-reviewed journals through the Oakland University Libraries database. This methodology will be obtained through primary sources and secondary research. The results of this research will aim to provide knowledge to those currently in the field or those becoming part of the field, so they stay ahead of the game and competition to stay employed. Current accountants or people who plan on graduating soon as accountants will benefit from this thesis to stay an asset to their current or future company by being technologically advanced and advancing the company technologically for the evolving future.

## Introduction

Accounting is a profession that is currently in the works of trying to hire young new staff to take over once the older people start retiring in the next few years. This statistic is supported by the Bureau of Labor Statistics (2022) which states, “About 136,400 openings for accountants and auditors are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire”. Therefore, young graduates with either a Bachelor’s Degree of Science in Accounting or a Master’s Degree will have the opportunity to join the profession young and work their way up the hierarchical structure rapidly due to these positions opening up. Accounting firms mainly have the same hierarchal structure of intern, staff, senior, manager, senior manager, principal, and partner. With these openings, students can start their basic accountant skills and enhancements at such a young age. In addition, the Bureau of Labor Statistics states, “Employment of accountants and auditors is projected to grow 6 percent from 2021 to 2031” (U.S. Bureau of Labor Statistics, 2022). Although this average is growing as fast as other occupations, this still shows that the profession is advancing, and more opportunities will rise than decline.

With an increase in jobs comes an increase in brains and an increase in systems to enhance the work of an everyday accountant. More research is being implemented on the accounting profession as a whole and how Artificial Intelligence is going to progress this statistically increasing profession to the next level. At this time, the basic tasks of an accountant include examining financial statements to ensure that they are accurate and comply with laws and regulations, computing taxes and ensuring taxes are paid on time and accounting for in the correct periods, inspecting account books and accounting systems for efficiency, identify

potential risks for fraud, organize and analyze financial records, assess financial operations, identify risks and challenges, make recommendations to management, and suggest ways to enhance currently implemented systems to improve profits (U.S. Bureau of Labor Statistics, 2022). With some of these basic tasks, accounting may use technology including artificial intelligence to increase their productivity on the job. Accountants also work with clients and establish relationships. Through the COVID-19 pandemic, many things turned into a virtual environment. With virtual environments becoming the new norm and adaptation to continuing working, artificial intelligence and accounting information systems had to enhance at a more rapid pace to keep up with this current evolution. Basic tasks that were performed on paper with clients had to turn paperless for some companies. This made the profession turn those basic tasks more electronic. Those tasks of looking at bank reconciliations and performing tie-outs for cash accounted for within auditing a file had to be submitted on an online portal for some companies through the virtual environment shift. For the tax side of accounting, people could still send in their work papers including their W-2 forms, property taxes, charitable contributions, Medicare papers, license plate tabs, etc., although they typically are then scanned in on a technological platform that the company uses (varies within companies based on size, objective, and cost implementation). These tasks of scanning documentation and work papers became tedious tasks that needed better systems electronically to take that time from this task to more accounting knowledge-based work. Having to do bookkeeping and journal entries for a company to reclassify entries by hand, now has software that can do these entries on the computer which will change the financial statements trial balances immediately and adjust for the change. An example of a normal bookkeeping journal entry in compliance with GAAP standards would be separating short-term and long-term debt. When a company supplies their debt all as one entry, an

accountant would need to journalize how to make that separate in the financials. With new software and technologies change can be implemented and adjust that current task.

Diving into this concept of bookkeeping and the implications of technological advances and artificial intelligence, artificial intelligence is in the works of replacing basic financial work as mentioned. Traditionally, the financial work of an account has to do with the financial statements revolving around bookkeeping and journal entries. These entries revolve around balancing out the trial balance which leads to these financial statements. Classification and adjusting entries need to be made throughout the year to reflect activity recorded before year-end. Some of this work can be tedious and very repetitive. To be more efficient, the accounting profession is looking toward these future advancements through artificial intelligence. Currently, the basic accountant task work has to follow certain programs and rules such as GAAP standards. Having this type of work done by artificially intelligent robots will free up the time accountants have to work on more beneficial programs. This low repetitive work if automated can move the audit profession in the right direction. This process has been established in the past, is currently being worked on, and has future implementations and goals to move this profession positively. One article states how, “Artificial Intelligence is said to help eliminate the human error during primary entries booking and, as a result, reliability of accounting information increases” (Zemankova, 2019). This is the direction AI is taking yet it had to start from somewhere to advance to these levels of intelligence and efficiency.

## **Literature Review**

### **Past Artificial Intelligence**

To start, in the past artificial intelligence systems have begun to take their course in the accounting profession in the 1950s. At first, AI was criticized but now it has become the

evolution of the profession. An article mentions how an AI implementation ended up reducing hours and saving costs through an accounting AI system implementation. This article states, “The emergence of the Sharing Service Center solves the problem of accounting staff redundancy. The average amount of reworking that the accounting department can avoid account for up to 30% of the total time of full-time employees. For an organization with 40 full-time accountants, this is equivalent to saving 25,000 hours annually, and the cost saved is \$878,000” (Li et al., 2020). These costs being saved through technology can correlate with the impact of the increase in jobs in the profession. More people can be hired by companies if better AI systems are implemented. Saved costs through the AI systems can go towards paying more employees to do more work which can lead to a higher clientele. With technology only increasing as the years go on and new programs being researched, implemented, and discovered, we can only predict a positive rapid increase in potential savings. Through a study by Scott Maddend in the 2010s, it is visible how AI started impacting in more recent years to date. Specifically, the article states, “In the study of ScottMaddend, new financial Sharing Service Centers (SSCs) in Europe and North America have seen significant growth: in the survey of 2014, it found that 50% of organizations said they have SSC in North America, and by 2018, this number has reached 67%. In Europe, the growth is explosive, almost doubling. It can be seen that the use of financial robots and the establishment of Sharing Service Centers will become trends and replace the existing positions of basic financial personnel” (Li et al., 2020). This data shows how past implementations are already moving the accounting profession in the direction of trying to eliminate the basic financial work of an accountant to move their knowledge and expertise to other sectors. AI has a global impact on the profession which is essential due to companies having offices not only in

the U.S. but all over the world. With the whole globe having people working on implementing AI programs, it is expected for great future advancements to be made.

### **Current Artificial Intelligence**

Currently, artificial intelligence is being implemented in the accounting profession. An article revolving around artificial intelligence states, “Global spending on artificial intelligence in 2019 will be 37.5 billion and is expected to reach 97.9 billion in 2023” (Zemankova, 2019). With this increase being applicable this year, it is expected many advances are being made to the accounting profession at this time. Accounting has various sectors and types of companies that apply to the name. The branch can go from small companies of about 30 people to organizations as large as the big four. Each company can contribute to this artificial intelligence breakthrough if they put money towards research and development. Some accounting firms that are currently using Artificial Intelligence Software would include KPMG, Deloitte, EY, and Garbelman Winslow CPAs.

To start with current implementations in place for artificial intelligence, KPMG is a global network of professional firms that provides services such as audit, tax, and advisory. Within a presentation I obtained from KPMG’s employee Adam C. Schubatis (Audit Senior Manager) from an OASIS (Oakland Accounting Student Information Society Member) meeting at Oakland University, I learned how KPMG is specifically implementing artificial intelligence in their firm. The presentation states that currently, KPMG has journal entry analysis, Microsoft Power BI, Alteryx, Smart Glasses, Automated Vouching Tool, and Data Analytical Procedures (Schubatis et al., 2021). The journal entry analysis automates the preparation of work paper templates. These templates take time for the auditor to create, so this automated preparation can allocate time for the auditor to instead work on understanding the lead sheets and planning

analytics and checking them for errors or issues from an already made sheet. This software also has implemented visualizations to allow the user a quick understanding of the flow of the transaction. Knowing the flow of a transaction can potentially answer questions on where a calculation is flowing from and why an amount can potentially be off by a material amount (unless if a material misstatement). The Microsoft Power BI software is a visualization tool compatible with a large variety of data formats and is commonly used to build dashboards for project management and risk assessment. This visualization tool can help visualize a potential big jump in revenue that you may have to ask the client what this impact is coming from. Graphs are a great visualization tool to see differences that can be missed when your brain is looking at solely numbers all day. The Alteryx is a drag-and-drop tool used to design repeatable data workflows. These workflows can be designed without knowledge of how to code which is where more artificial intelligence is needed to produce these outputs through the codes used in the program. Smart glasses are used for processes like observing inventory. Processes need to be observed and these smart glasses can be used to show either the auditor what is going on from either the auditor's perspective or the client's perspective. Either way, this artificial intelligence gadget would stay valid and applicable as the years progress (Schubatis et al., 2021). Another tool that KPMG is using is an automated vouching tool. This tool obtains invoices in PDF and GL data in Excel and uploads them to AVT. This tool also produces the work papers for engagement teams to review any exceptions, flagged matches, or missing data. This tool will limit the task that accountants have to move the invoices themselves to their software and instead this tool does the process for them so they can put their knowledge towards a different task (Schubatis et al., 2021). Lastly, KPMG uses data analytical procedures which highlight vendors which meet expectations as well as significant unexpected differences for follow-ups. This



artificial intelligence software with the highlights lets an auditor quickly know which expectations are met through certain vendors and which ones may need to be looked into more with further testing or questions to the client (Schubatis et al., 2021). Overall, KPMG has various systems currently implemented which are enhancing their accountant's work from tedious tasks which don't take much knowledge and are allowing the knowledge to flow through the actual financial statements instead. Artificial intelligence for this company is moving them in the right direction which can increase their clientele due to now having more of their auditor's time to help the company stay in compliance with GAAP with little to no material weaknesses.

Also, current implementations are in place for artificial intelligence at Deloitte, one of the top four accounting firm providers of audit, consulting, tax, and advisory services.

Deloitte is currently using an AI robot. This AI robot is a technological advancement by the company to enhance the quality and efficiency of answers. The robot was launched in the past but has been upgraded several times and now has become an industry-leading AI robot. A video on the Deloitte website states that the focus was on conducting massive repetitive, tedious, and mechanical operations and avoiding manual errors (Deloitte, 2020). Then the AI robot was upgraded to automate information identification and review which improves document processing efficiency (Deloitte, 2020). The next upgrade to the robot was to help the auditors reduce errors and enhance efficiency in stock-taking, field investigation, and other procedures (2020). With all these updates currently, this AI robot can read natural language processing, see advanced optical character recognition, connect automatic interface matching, speak intelligent voice recognition, write natural language generation, and learn machine learning (Deloitte, 2020). Taking a look at the audit side of accounting, this AI robot does a mixture of things including data extraction, risk query, document review, accounting knowledge inquiry,

stocktaking, and most importantly reducing manual work. For data extraction, this robot automates financial data extraction which ends up reducing working time by over 90% in data extraction and working paper generation (Deloitte, 2020). AI robots are moving the accounting profession in a positive direction taking out the time of easier tasks and being able to allocate that time to other, more beneficial tasks. For enterprise-related risk queries, the AI robot automatically searches through a third-party database (based on a list of suppliers and agents) to obtain a relationship map of related enterprises (Deloitte, 2020). For document review and analysis, this AI technology is currently saving labor costs by 80% and time costs by up to 50% for the review and analysis of documentation (Deloitte, 2020). This document analysis for Deloitte applies to numerous documents such as loan agreements and leasing contracts. One very useful part of the AI robot is knowledge inquiry. With accounting, there are lots of new standards added year by year and it can be difficult to be always up to date when performing an audit. With this specific AI robot, you can ask the chat box questions revolving around accounting concepts such as processes, standards, tax knowledge, abbreviations, and terminology (Deloitte, 2020). This will help save the time of searching multiple websites trying to figure out more information on a standard that was just implemented like the lease standard that is applicable in the 2022 audit. This specific robot will help accountants have a better understanding of new audit terms and be able to perform an audit efficiently and effectively year by year. This Deloitte AI robot also has a 1STOP smart stocktaking tool embedded within it that “combines the features of stocktaking task creation, stocktaking, process management, and result aggregation and analysis to realize remote physical counts, real-time data synchronization and intelligent aggregation of results in a highly automated precise process” (Deloitte, 2020). This specific implication will help with inventory analysis within an audit. Enhancing one section of an audit will allow the

whole process of the audit to go by faster, making it more efficient. The most important part of this AI robot is reducing manual work. The manual work that has to be done, takes up too much time with tedious tasks rather than using the knowledge of accountants elsewhere in the profession. Therefore, with this most up-to-date version of the Deloitte AI Robot 3.0, manual work takes a decrease. This robot is “embedded in smart devices, automates audit confirmation and invoice check procedures through mechanical arms and sorting systems to completing tasks including filling addresses, sorting and checking” (Deloitte, 2020). Having to fill in the addresses which are typically the same year for year of people on tax returns or for companies’ headquarters takes no brain power yet takes time to perform. With this robot being able to enter this information in and the accountant just having to check with a glance over having to type it will save a minute here and a minute there which adds up. This limits tedious tasks with a faster process through automated integration. Gradually, Deloitte will see manual work being replaced with the robot’s abilities which will in turn improve financial work efficiency. Overall, with Deloitte being a world leader in audit, tax, advisory, and other businesses, these integrations are currently moving their company to a more efficient and stronger big four dominant leader. Deloitte now has time to take on more clients as tedious work tasks start to go down which moves the workflow process at a better pace. If Deloitte keeps implementing updates to its AI robot, it is projected that it will stay powerful in the accounting profession.

Moving on to another big four accounting firm, EY is an international accounting firm with hundreds of offices worldwide. EY provides services including assurance, consulting strategy, and tax services. EY currently has some artificial intelligence incorporations they have added within the past two years to enhance their firm. EY is using artificial intelligence to release auditors’ time and move that time to more value-adding tasks. For example, EY

developed advanced analytics tools for analyzing larger populations of data in less time. With this, smart automation and robotic process automation technologies are used, automating the most time-consuming, repetitive, standardized, and rule-based tasks, leaving artificial intelligence to execute tasks that are much more complex (Zemankova, 2019). If artificial intelligence is currently processed to do these repetitive tasks, accountants at the firm can shift their focus to other knowledge-based activities over tedious tasks. The reason the RPA (robotic process automation) was integrated in the first place was to get rid of the repetitive, simple tasks that are still done by auditors. AI implementation is there to do these tasks which can include data preparation, file organization, data file integration, and data performance of basic audit tests in Excel. With this idea of being more efficient, EY adopted NLP technology in multiple different business sectors that the company provides. An example of this NLP technology in the workforce would be if the IRS (Internal Revenue Services) issues a new lease regulation, this software would extract the information and a human-in-the-loop would be there to validate the results. Therefore, humans would not have to re-examine all pre-existing lease contracts, rather the NLP technology would do that instead (Zhang et al., 2020). It is also said that this AI system is three times more consistent and that this system is twice as effective as traditional human teams (Zhang et al., 2020). With this enhancement, an accountant's time can go toward more efficient tasks rather than reading all the lease standards. Now an accountant can see the important information that is pulled from the technology and use that information when making calculations for certain standards. Another technology that EY evaluates would be the Blockchain Analyzer which is supposed to increase transparency on blockchain transactions. The blockchain analyzer is used to reconcile data from the client books and records to perform these advanced analytics including trend analysis (Zemankova, 2019). This artificial intelligence is

used to detect fraud. The specific tool that EY developed was Helix GL Anomaly Detector. The algorithm within this detector is used to uncover fraudulent journal entries and provide reasons for why these journal entries were flagged and detected as fraudulent (Zemankova, 2019). With this detection through artificial intelligence, journal entries can be analyzed at a faster pace and give the accountant an idea of what needs to be looked at. This doesn't mean that the auditor can't look at other entries or that they shouldn't look at everything overall but at least with this artificial intelligence detector, EY now knows what journal entries to shift their focus and efforts on revolving around the concept of fraud.

Lastly, for current implications of Artificial Intelligence in accounting, Garbelman Winslow CPAs in Upper Marlboro, Md has implemented AI which has helped the firm perform better audits for their clients. Samantha Bowling, CPA, is a partner at the firm and works mostly on not-for-profits. The AI technology at their firm is used to help identify areas of risk if material misstatements. With these areas pointed out immediately, the auditor can put their time into these areas to determine actual risks to the audit itself. The technology itself "is a total game changer in the audit world" (AICPA). This small firm of only 20 people is implementing this AI technology so not only the big four firms are advancing. These smaller firms with the technology are making advancements. The area with the biggest pay for this AI technology would be the risk assessment as mentioned. With the AI software making these judgments about risk, an auditor can spend more time in those areas. Not only in the audit process itself, but even before taking on the client, this software is being used to see the risk of the audit itself and how much is a reasonable charge amount to perform. Not only does this AI software perform risk assessment but the software analyzes complete groups of data rather than depending on sampling, automates tasks that were once performed manually, and converges financial statements auditing with

forensic auditing in circumstances where fraud is discovered (AICPA). Automating tasks that were once done manually saves an auditor time to put their knowledge towards more important tasks relevant to the audit.

### **Future Artificial Intelligence**

After analyzing the current advancements put in place with artificial intelligence, the future seems so bright with the advancements to come. The world is evolving technologically, therefore, the artificial intelligence movement in accounting can only go up from here. A journal stated, “In the future, ‘accounting robots’ using accounting information systems bookkeeping will become a beacon of fire” (Liu, 2021). Artificial intelligence plans to reduce the workload of accountants. In March-May 2022, a sample survey questionnaire was performed regarding the future of the accounting profession in the digital economy with 55 accounting professionals responding from Hunedoara County (Mita & Man, 2022). Within this questionnaire, a better look at the future of accounting comes to light. With the evolving technology, accountants are going to have to stay up to date with the evolving world, to stay ahead of the curve. With accountants knowing they have to start adapting to technology, it will keep the field progressing in a positive direction. The survey states that more than 60% of people believe that the future of accounting will be confined to the field of consulting and accounting engineering (people who can adapt to technological developments and use these developments in their profession) (Mita & Man, 2022). This piggybacks off a quote stated by one of the people in the questionnaire which reads, “The accountant who adapts to the change will stay, while the accountant who does not keep up will leave the market” (Mita & Man, 2022). Artificial intelligence is on the way in the future and will only go up, so accountants need to start adapting to these changes. These changes won’t get rid of accountants and their jobs. Computers aren’t perfect. People still will need to go through

and check these calculations for errors, although they do not have to take hours getting the calculations themselves. It is a faster process to go through something pre-done and check it rather than starting from scratch. As a profession, it is essential to have acceptance of digitalization to be successful. Another person in the questionnaire stated, “Digitalization is the new reality...Digitalization should be seen as a method of simplifying certain accounting operations” (Mita & Man, 2022). This can be looked at in comparison to numbers. It is harder to go through the process of long division by hand when calculating a number. This process takes more time. An accountant still should have an idea of how to perform the task and have a big-picture understanding. Although, having a computer generate this amount and just having to check it instead of having to do the tedious task, allows the accountant more time in the future on more efficient tasks.

With tasks being more efficient, accountants can hold true to deadlines that are usually set in planning, and to the dates that need to be met for the tax return or audit. With future implementations of artificial intelligence, it can be said that these dates shouldn't have issues with being reached since less of an accountant's time is spent on tedious tasks and more time is spent on the overall audit or tax return itself. It is said that artificial intelligence is making its way into accounting due to deadlines and time constraints. Research by Krájnik and Demeter (2021) states, “This process is also driven by the ever-increasing volume and deadlines for the provision of office data. There is a growing need to monitor processes, support their planning and business decisions”. The process of needing to do tasks at a faster rate is why accounting offices are striving to use modern IT solutions and implement digital accountancy offices. With this idea of timeliness and reduced workload, artificial intelligence makes us aware of these factors and works to enhance them. One article states, “The online management technology

realizes the real-time transmission of accounting data, which enhances the accuracy and timeliness of financial information and prevents the emergence of financial crises due to time lag in data information, which frees a large number of staff from the tedious accounting process and gives them enough energy to think about how to optimize the company's financial system” (Liu, 2021). With this recognition of time, the system can enhance the accuracy of the information that comes in. This application frees an accountant’s times from tedious tasks to be utilized on more efficient matters.

For the future artificial intelligence within the audit field of accounting, moves have already been made that have improved the overall quality work of an audit, yet there are still more steps to go. An article states how, “When AI is incorporated into the audit work, it should replace every single step in the traditional audit work and provide proper decision-making suggestions in order to profoundly enhance the overall financial work. Thus, whether in terms of its breadth or depth, application of AI in the audit industry is still in embryo” (Al-Alround, 2020). This shows how the audit industry is just opening up to all the capabilities and potential it can get to. With the future and the evolution of Artificial Intelligence, the audit world will start to break out of the embryo and flourish. With new changes and implications being made, people in the profession have to adapt and learn from them. A great application can be made, but unless the auditor understands how to use this new advancement, it won’t be as efficient as its potential. Even if an accountant learns one new application of artificial intelligence, that doesn’t mean they will know how to use the next which is why accountants need to stay ahead of the advancement curve to stay a good asset to the company they are part of.

All these advancements are seen as positives for artificial intelligence but the fear of artificial intelligence taking over the field is always a back burner thought to some. It is nice to



have the computer do your work, but some people may believe if the computer is doing the work, where is that putting me along the curve? The thing about artificial intelligence in accounting is that machines aren't perfect. Errors can and do occur. Human error is more probable rather than a generated computer response, but errors do happen. Artificial intelligence can only be as good as it is programmed. This artificial intelligence is evolving and will move the field, although that doesn't mean that accountants are going to disappear. An article actually states that the integration of artificial intelligence with the accounting world creates heightened demand for accountants (Al-Around, 2020). Accountants need to still know knowledge of accounting and have that professional knowledge within the field. As mentioned, accountants will just have to learn the artificial intelligence that is implemented and try to master it in order for the implemented change to have positive results in the future.

For the profession and its future, it is important to implement these systems now of artificial intelligence to not fall behind. It is stated in an article that, "Considering the high investment costs and slow returns, many firms may concentrate on short-run profits rather than making strategic modifications. Hence, they may stop at the early stage of introduction of the AI technology" (Al-Around, 2020). The initial return may seem slow, and the costs may be heavy to implement these new systems into firms especially firms that may be smaller in size, although a futuristic mindset is needed. This application may start with more money, but the result is a higher payout due to the more returns or audits that can be accomplished with this software. Companies need to think logically and start implementing AI that they can afford and that would make sense for them to start this advancement. Results come with time and by making projections and estimates, it can be seen the real future benefits that can come with these future implementations.

With these future implementations and money being spent to advance the profession, in the years to come AI will be crucial. An article states how a Delphi study was made with the Delphi method being used to collect information on the financial sector in 2030 which came from a group of participants acting as expert panels (Leitner-Hanetseder et al., 2021). Table 1 below shows the roles and tasks in connection with artificial intelligence in 2021 compared to the predicted 2030. This Delphi study shows how artificial intelligence will pave the way in replacing employees' needs to do routine tasks of collecting data because these robots will perform the tasks themselves. Artificial intelligence is just a means of help although it will not end up replacing all the work that is done by humans in the profession.

**Table 1**

*Literature Synthesized for Review*

Roles, related tasks, human and AI-based actors in accounting			
Roles: tasks	Actor	Current actors	Actors in the year 2030
1. Transaction recorder:recording transactions, posting to account and reconciling and balancing accounts		<i>Humans</i> screen documents, post them to the correct account and manually reconcile and balance accounts supported by software tools (for example, booking software)	<i>AI-based technology</i> (for example, a smart software robot) which extracts information from machine-readable digital data formats as a self-learning system, posts it to the correct account; <i>humans</i> will supervise the results and take care of exceptional cases the AI-based technology is not able to solve
2. Data and information manager:collecting and selecting data for information gain		Due to their expertise, <i>humans collect and select</i> the data used for valuation, forecasting, risk mitigating ..., they use mainly internal data from historical transactions and/or selected external structured data	Free data exchange standards enable <i>AI-based technology</i> such as automated feature tools to collect and suggest internal/external and unstructured/structured data relevant for the task; <i>humans</i> decide about the usage and/or <i>supervise</i> the selection of data
3. Data miner:data mining (analysing) to optimise costs, generate sales, forecast, mitigate risk or detect fraud and guarantee compliance		<i>Humans</i> fulfil this role by analysing mainly historical internal structured data using spreadsheets and descriptive analytics	<i>AI-based technology</i> (such as business intelligence tools) uses predictive analytics tools to analyse and recognises anomalies, interrelations, trends and patterns within big data; <i>humans</i> can <i>focus on major incidents</i>
4. Dashboard designer:reporting and visualisation of data		<i>Humans</i> use software tools (such as Excel, PowerPoint) and standardised formats to report and visualise the data on a regular basis	<i>Humans</i> design interactive dashboards with AI-based tools, which meet the needs of the user in an iterative way in nearby real time
5. Advisor:interpret the data and decide or advise/communicate to stakeholders		<i>Humans</i> interpret the data due to their individual experience in the field	<i>AI-based technology</i> suggests data-driven decision options based on prescriptive analytics, <i>humans</i> interpret the AI outcome and understand the overall engagement process and have to weigh up options and decide or communicate to stakeholders and advise due to their expert knowledge and experience
6. AI technology expert:training and supervising AI-based digital technologies		<i>Not necessary right now</i>	<i>Humans</i> train and supervise AI-based technologies, such as a trainee, in a specific task and how to interact with humans to provide human and AI-based technology collaboration
7. Process manager:selecting processes for automation and the corresponding AI-based technology or components		<i>Not necessary right now</i>	<i>Humans</i> using AI-based process mining tools identify processes for automation, select the relevant AI technology or component and make sure that the collaboration of AI-based technology and humans work
8. Legal and ethical supervisor:guiding and monitoring legal and ethical requirements		<i>Not necessary right now</i>	<i>Humans</i> are responsible to guide AI-based technology and monitor whether the data-driven decisions made by humans meet legal and ethical requirements

As a result of this information in the table above, it is stated in the article that, “In AI-based accounting in 2030, humans will train AI-based technology and use their expert knowledge and experience to monitor AI-based technology. In the end, the core roles of humans are to ensure and be responsible for an effective and efficient collaboration of AI-based technology and humans to fulfill the roles of accounting” (Leitner-Hanetseder et al., 2021). This can be seen by taking a look at the data within the table. Role 1 mentions how currently recording transactions and data is done by humans by looking through the documents, posting the entries, and manually reconciling those balances but in the future, it is projected that AI-based technology will extract this information and post the correct amounts itself but humans will still have to do the work that artificial intelligence may not be able to calculate (Leitner-Hanetseder et al., 2021). By going through the table and each role’s current actions compared to the future 2030 actions, it can be seen that the future of artificial intelligence is bright. Artificial intelligence’s goal is not to wipe out accountants of their jobs, the goal of artificial intelligence is to build a better world of accounting that lowers human’s tedious accounting tasks to the software allowing an accountant’s knowledge to be used elsewhere within the field.

## **Conclusion**

Overall, the main benefits of artificial intelligence would be to reduce the risk of human error, lower the risk of fraud, save costs by increasing efficiency and decreasing errors, increase reliability in financial reports, and reduce workflow (Gonçalves et al., 2022). Artificial intelligence is currently moving the accounting field and with future implications on its way, we only see positive growth. As time goes on, our technology intelligence and capabilities increase, and we evolve to rapid technological advancements. Therefore, our occupations must adapt and evolve to stay efficient and above the curve. Having these simple tasks such as bookkeeping and

journalizing entries become more automated allows accountants time to go towards more knowledge-based tasks and allows firms to take on more clients since some of the work has become automated through these machines. As the days and years go on, we are building our foundation for a better accounting world with artificial intelligence. As of right now, the progression from the past, current, to the future shows prevalent adjustments to the field. In the past, it was seen how artificial intelligence had just begun and more jobs were being implemented due to costs being saved through technology. Currently, it is seen how top accounting firms are implementing artificial intelligence such as robot generators that state accounting principles by GAAP and information that can be helpful to the tasks at hand. It was stated that we are only at the embryo of artificial intelligence in the profession, which means it can only go up from here. In the future, with the evolving world, it is stated that digitalization is the new reality. An article states, “Some tasks that have been bogged down by the ability of CPAs to add true value will be taken over by smart machines. Efficiency and accuracy will be improved...The CPAs of the not-so-distant future will be able to focus on true value-adding services. Much less focus on compliance” (Bolinger, 2017). CPAs will be able to add true service in the future and use their certified licenses for more meaningful work. The overall advancement of this career is great and with time and the evolution of technology, a better world of accounting will be formed with artificial intelligence.

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