The Evolution of Accounting: The True Impact of Artificial Intelligence on Future Accountants

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Abstract: The Evolution of Accounting: The True Impact of Artificial Intelligence on Future Accountants

This thesis serves to investigate the ways in which artificial intelligence (AI) is changing the accounting industry. The major research questions are: How is AI impacting the field of accounting? What are the potential impacts of AI on employment in the accounting field?

To answer these questions, various AI methodologies were found. These methodologies do not have the same level of intelligence; therefore, they were organized under a framework of intelligence for better understanding. Similarly, the most practiced accounting processes were identified and arranged based upon the intelligent framework. After this process was completed, we arrived at the relationship between accounting processes, the applicable AI methodologies, and the associated levels of intelligence. This mapping enables us to see more clearly that the implementation of AI will impact accounting processes differently. Some processes are poised for an imminent take-over by AI. Other processes seem unlikely to be taken over by AI. These conclusions may be used to assist future accountants and prepare them for the evolving industry that is requiring technological skills. These conclusions provide a more realistic assessment for future accountants.

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Introduction

In the era of rapid technological advancements, the landscape of industries worldwide is undergoing a profound transformation. One sector that has been significantly impacted is accounting, where the integration of artificial intelligence (AI) is reshaping traditional practices and redefining the way financial information is processed, analyzed, and reported. As businesses strive for greater efficiency, accuracy, and adaptability in an increasingly complex global economy, the synergy between artificial intelligence and accounting has started emerging, in recent years, as the new technological force that is driving innovation in the world of business accounting.

Accounting serves as the language of business. It provides essential information for decision-making, financial analysis, and stakeholder communication. It is an industry that is heavily reliant on human expertise and time-consuming data analysis. However, the implementation of AI technologies has ushered in a new era of efficiency, accuracy, and decision support that is independent of human expertise. The accounting discipline has always stood at the frontier of technological adoption. The profession, once synonymous with number-crunching and ledger entries, is now inextricably linked with digital transformation.

There are several pieces of evidence that demonstrate the accounting profession's strong connection with digital transformation including the adoption of accounting software. The widespread adoption of accounting software platforms, such as QuickBooks, Xero, and Sage, among businesses of all sizes, indicates a significant shift towards digitalization in accounting processes (PricewaterhouseCoopers, 2022). Similarly, the emergence of blockchain technology and cryptocurrencies also provide significant evidence for the digital transformation within accounting. Accountants are increasingly involved in auditing blockchain-based transactions,

implementing internal controls for cryptocurrency transactions, and advising clients on regulatory compliance and tax implications related to digital assets (Hayes, 2023). Regulatory bodies and standard-setting organizations, such as the Financial Accounting Standards Board (FASB), have recognized the impact of digital transformation on accounting practices. They have issued guidance and updates to accounting standards to address emerging issues related to digital assets, revenue recognition, cybersecurity, data privacy, and other digital-related concerns (FASB, 2022).

Given the current wave of Artificial Intelligence (AI) methodologies within the accounting practice, this study seeks to provide a comprehensive analysis of the transformation of accounting practices in the age of artificial intelligence. The aim of this research is to provide a more informed insight into what the current direction and trends may look like for accounting processes and come up with ideas regarding how accountants can adapt to this change. As AI continues to shape the field of accounting, it is essential to understand the full extent of its influence, its potential benefits, and the challenges it presents.

We will identifying the commonly accepted accounting processes. We will then use an intelligence framework to map the various accounting processes and arrive at more probabilistic scenario of to what extant can AI completely automate the field of accounting. To being we will first discuss the discipline of accounting terms of the past, the present including the various common accounting processes, and the emerging future. Followed by a discussion of what methodologies make up the field of AI. We will them discuss and map the accounting processes with the level of intelligence (capabilities of artificial intelligence) to find the possible intersections between AI and the accounting practice. Finally, we will make a more informed analysis as the extant of the impact of AI on replacing human talent and skills.

Historical Evolution of Accounting

The roots of accounting can be traced back to ancient civilizations, where rudimentary forms of record-keeping emerged as societies engaged in commerce and trade. In Mesopotamia, clay tablets dating back to 2000 BCE reveal early accounting practices, recording transactions involving goods and commodities (Cook, 2022). The evolution continued through various civilizations, including Ancient Egypt and Rome, where accountants played crucial roles in managing financial affairs. The first Roman Emperor, Caesar Augustus, established imperial account books to keep track of taxes and to publicize his personal spending. Romans employed abaci, counting boards or calculators, to perform arithmetic calculations. These tools facilitated the management of financial transactions and accounts (Stephenson, 2014). The double-entry system, a cornerstone of modern accounting, finds its origins in the works of Italian mathematician and Franciscan friar Luca Pacioli in the late 15th century. His work introduced the concept of double-entry bookkeeping, providing a systematic method for recording financial transactions. This innovation marked a significant shift toward more accurate and standardized accounting practices (Smith, 2018).

The 20th century witnessed further advancements, with the advent of computer technology in the latter half revolutionizing accounting processes. The emergence of joint-stock companies and the expansion of global trade necessitated more sophisticated financial reporting. Accounting principles and standards began to take shape, with professional accountancy associations forming to establish guidelines. Electronic data processing systems enabled faster calculations, increased data storage capacity, and the automation of routine tasks. This era saw the establishment of *Generally Accepted Accounting Principles* (*GAAP*) in the United States and *International Financial Reporting Standards* (IFRS) globally, promoting consistency and transparency in financial reporting (Miller, 2023). The rise of the internet and digital technologies has accelerated

the pace of change. Cloud computing, big data analytics, and artificial intelligence have become integral components of accounting systems. Automation of repetitive tasks, real-time data analysis, and predictive modeling are transforming the profession, allowing accountants to focus more on strategic decision-making (Layadi, 2023).

The historical evolution of accounting reflects a continuous adaptation to the changing needs of businesses and economies. From simple record-keeping on clay tablets to the integration of advanced technologies, accounting has evolved into a dynamic discipline that plays a vital role in the global economic landscape. It is this historical evolution of accounting that is responsible for shaping the current state of the industry.

Current State of Accounting

Accounting continues to serve as the backbone of financial information management within organizations. It is a dynamic and integral part of business operations, playing a crucial role in decision-making, financial reporting, and ensuring compliance with regulatory standards. Within accounting, there are many different roles and job titles that one can pursue (Iwuozor, 2023). An individual with a bachelor's degree in business who specializes in accounting, is usually considered capable of operating in an accounting environment. They can provide financial advice, perform tax planning, and complete bookkeeping services. A certified public accountant (CPA) is a type of professional accountant with more training and experience than a typical accountant. While all CPAs are accountants, not all accountants are CPAs. To become a CPA, an individual must pass a specialized exam. This CPA exam is administered by the American Institute of Certified Public Accountants (AICPA), which is considered the apex body for determining the accounting practice and processes. The AICPA has broken down the CPA exam into four sections: three core sections and one disciplinary section. The three core sections include auditing and

attestation (AUD), financial accounting and reporting (FAR), and taxation and regulation (REG). The 2024 CPA exam has introduced a new discipline section in which individuals can choose from one of three options: business analysis and reporting (BAR), information systems and controls (ISC), and tax compliance and planning (TCP). This new discipline section has been created to reflect the accounting profession of today and the future. New content has been added throughout the exam to test on relevant topics such as emerging technology. These emerging technologies are shaping the industry and will play a vital role in understanding the future of accounting.

Future of Accounting

As we look to the future of accounting, the industry is on the cusp of a new era-one defined by rapid technological advancements and the rise of artificial intelligence (AI). The integration of AI technologies into accounting areas: auditing and attestation, financial accounting and reporting, taxation and regulation, business analysis and reporting, information systems and controls, and tax compliance and planning, represents a shift that promises to transform the profession in many ways. AI powered algorithms enhance decision-making capabilities and unlock valuable insights from financial data.

The evolution of technology and regulatory frameworks is reshaping the role of accountants within organizations. Beyond traditional compliance and reporting functions, accountants are increasingly being called upon to provide strategic insights, drive business performance, and mitigate risks in a rapidly changing landscape (Mujiono, 2021). The proliferation of data analytics tools and the availability of vast amounts of data are also transforming the accounting landscape. Accountants are leveraging big data analytics to gain deeper insights into financial performance, detect patterns, and trends, and identify potential risks and opportunities for their clients or organizations (Kaya & Akbulut, 2018).

As the accounting profession navigates towards it future, one cannot overlook the transformative influence of emerging technologies. Among these, artificial intelligence (AI) stands out poised to revolutionize accounting practices. AI's integration into accounting processes holds immense promise, offering unprecedented opportunities for efficiency gains, data-driven insights, and strategic decision-making. To comprehend the full spectrum of possibilities that lie ahead, it is imperative to delve deeper into how AI intersects with the evolving landscape of accounting, reshaping roles, redefining methodologies, and reimagining the profession. Before this intersection can be identified, it is imperative to define what is meant by the term "Artificial Intelligence" and its constituent parts.

Artificial Intelligence

The term "Artificial Intelligence" was coined by John McCarthy in 1956 at the Dartmouth Conference, which is widely regarded as the birth of AI as a field of study. Artificial intelligence (AI) has emerged with the potential to transform professions and elevate different industries. The definition of AI varies among different sources as it is still a new concept that is currently being explored and researched. IBM (2024) defines AI as a technology that can stimulate human intelligence and cognitive capabilities. Wikipedia (2024) defines artificial intelligence as a field in computer science that deals with machines or software. Russell and Norvig (2020) consider AI as an approach that involves thinking and acting like humans. However, for the sake of simplicity, at its core, AI refers to the simulation of human intelligence in machines, enabling them to perform tasks that typically require human cognition (Raschke, 2021). It is the ability of machines to respond to stimulation consistent with traditional responses from humans (Dormehl, 2017).

AI is made up of many different approaches or methodologies and is constantly evolving. This evolution is driven by advancements in technology, increased computational power, improved

algorithms, and a growing wealth of data. The methodologies that broadly make-up the discipline of AI include: Machine Learning, Natural language Processing (NPL), Expert systems, RPA, Computer vision, and Robotics (machine and software "Bots"). Within these broad "methodologies" are various models, technology, and tools that may not be necessarily confined to a particular methodology. For example, neural networks are a foundational structure that is applicable across various AI methodologies such as machine learning, expert systems, and robotic process automation. These neural networks are computational models that are inspired by the structure and function of biological neural networks in the human brain (Hardesty, 2017). Their ability to learn from diverse sources of information and adapt to different problem domains makes them applicable across a wide range of AI methodologies.

Machine learning focuses on developing algorithms and models that enable computers to learn from data and make predictions or decisions without being explicitly programmed. In essence, machine learning algorithms allow computers to identify patterns, learn from experience, and improve their performance over time (Brown, 2021). This methodology uses a variety of mathematical techniques to make predictions or decisions. There are also different categories in which machine learning can fall into. The three main categories include supervised learning, unsupervised learning, and reinforcement learning (Delua, 2021). Supervised learning is an algorithm trained on a labeled dataset. The model makes predictions based on input data and is corrected when its predictions are wrong. In unsupervised learning, an algorithm is given data without explicit instructions on what to do with it. The model tries to learn the patterns and structures from the data without the help of labels. Reinforcement learning is a technique that trains software to make decisions to achieve the most optimal results. Reinforcement learning is a

specialized type of unsupervised learning. Machine learning is the most dominant form of AI due to its ability to automatically improve given more data.

Natural language processing (NLP) focuses on enabling computers to understand, interpret, and generate human language in a way that is both meaningful and contextually relevant. NLP techniques allow computers to interact with humans using natural language, facilitating communication, information retrieval, and data analysis (Russel & Norvig, 2020). The goal of NLP includes bridging the gap between human communication and computer understanding. There are two main groups within the realm of NLP. The first group focuses on supporting human decision making through simple tasks such as extracting valuable information from text. These tasks do not exhibit deep understanding or learning capabilities. The second group of NLP tasks demonstrate a higher level of contextual awareness and learning capabilities. These tasks enable more intelligent interactions between humans and machines by generating human-like responses and adapting to different scenarios. GPT is a large-scale language model that has demonstrated the ability to understand and generate human-like text. NLP coincides with machine learning as machine learning plays a crucial role in advancing NLP techniques and applications.

Similar to supervised machine learning, expert systems are rule based systems that are programmed based on learning. They are designed to solve complex problems by reasoning through a knowledge base, which contains a set of rules and facts, and applying specialized inference mechanisms (Giarratano & Riley, 2004). Expert systems consist of two main components. These components include knowledge base and inference engine. The knowledge base component consists of a collection of specialized knowledge about a particular area of expertise. The inference engine component is the processing component that applies logical rules to the knowledge base to derive conclusions or make decisions. Expert systems are used to support

decision-making processes in situations where the complexity or volume of data is beyond the capability of a human expert.

Robotic process automation (RPA) is a methodology that uses software robots to automate repetitive, rule-based tasks previously performed by humans (Lacity & Willcocks, 2016). These tasks typically involve interacting with digital systems and applications in the same way that a human user would, such as entering data into forms, copying, and pasting information between applications, extracting data from documents, and performing calculations. RPA software mimics human actions by interacting with digital systems and applications through user interfaces. RPA automates manual, repetitive tasks across various applications, such as entering data. This methodology operates in structured environments in which there are logical steps to complete rule-based processes. RPA is ideal for tasks that involve a high level of human data processing. If a task can be completed using RPA, four basic criteria must be met: the process must be rule-based, the process must be repeated at regular intervals or have a pre-defined trigger, the process must have defined inputs and outputs, and the task should have sufficient volume (Casey, 2020).

Computer vision is a methodology of artificial intelligence that focuses on enabling computers to interpret and understand visual information from the real world. It encompasses methods and techniques for acquiring, processing, analyzing, and interpreting digital images and videos. Through computer vision, machines can recognize patterns, objects, faces, scenes, and activities in images and videos. Applications of computer vision include image recognition, facial recognition, medical imaging, autonomous vehicles, and surveillance (Ullman et al., 2016). The development of computer vision involves techniques from machine learning. These algorithms are trained on large datasets of labeled images to learn patterns and relationships, enabling them to recognize and interpret visual data accurately.

Robots include machines engineered to perform tasks autonomously or semi-autonomously, ranging from physical machines to software-based "bots." Physical robots are machines with a physical body or structure that interact with the physical world to perform tasks. These robots can range from simple, single-purpose machines to complex, multi-functional systems. These bots interact with software systems, online platforms, or digital interfaces to execute predefined actions or workflows (Nabila et al., 2021). Although there are a wide range of AI methodologies, computer vision and robots will not be included within this study as they are not relevant in the context of accounting processes.

The implementation and development of these AI methodology has caused concern and distress for many people regarding how they will be implemented within society. For example, there is fear surrounding the implementation of AI technologies within the workforce. Let's discuss the possibility of job displacement due to the implementation of AI technologies.

Job Displacement

AI is currently being used in multiple ways within today's workplaces, often focusing on the integration of human thought and innovation. However, according to a report by the American Psychological Association nearly 4 out of 10 U.S. workers (38%) are worried that AI make may make some, or all, of their job duties obsolete in the future (Lerner, 2023). The jobs that are most at risk due to the evolution of AI include jobs that heavily rely on automation. AI may automate, personalize, and fine-tune thousands of processes in industries as widespread as healthcare, education, infrastructure, and professional services (Bannon, 2023). The field of accounting is not immune to this. Accounting is an industry that is currently being impacted by the implementation of AI, impacting the way in which accountants approach their roles (Ovaska-Few, 2017). For example, auditors at Deloitte are currently using natural language processing capabilities to

interpret thousands of contacts or deeds. Accounting has many different processes and should not be viewed under one blanket term. The variety in these processes allow for different AI methodologies to be implemented throughout the field. As more research is published about the full capabilities of AI technology, questions regarding how AI will impact accounting can be answered.

The range of questions being raised in the domain of accounting consist of whether AI will replace accountants and if AI can become a good assistant for better accounting practices. In other words, there is a spectrum of speculation around the utility of AI with accounting (Holmes & Douglass, 2022). There is a need to have a more coherent understanding of the extent of AI's impact on accounting. To begin this analysis, we will adapt the framework of intelligence levels as proposed by Davenport (2016), then map the accounting processes that were adapted from the AICPA.

AI in Terms of Accounting

Intelligence Framework

The transformative potential of data-driven insights enables organizations to gain a competitive advantage and achieve strategic objectives (Davenport, 2006). This research identified and mapped out the capabilities of AI based technologies, calling them "cognitive technologies". Within the intelligence framework, various "tasks" (requiring human cognition) are identified as well as the various levels of intelligence needed to complete them. The different task types are as follows: analyze numbers, analyze words and images, perform digital tasks, and perform physical tasks. These tasks are based on whether they can analyze numbers, text, images, or whether they know enough to take informed actions in the digital or physical world. The levels of intelligence

that are espoused in the framework are: support for humans, repetitive task automation, context awareness and learning, and self-awareness. This is presented in Table. 1.

Accounting does not fall under the task types that are associated with analyzing words and images, performing digital tasks, or performing physical tasks. As opposed to dealing with words and images, accounting is associated with numerical data from financial transactions. This financial data is analyzed using some physical and digital tasks. However, the field of accounting encompasses a broader range of activities beyond digital or physical tasks.

Accounting is generally considered an analytical field due to its emphasis on collecting, interpreting, and analyzing financial information to support decision-making, financial reporting, and strategic planning within organizations (Iwuozor, 2023). Analytics are used within this field to help businesses uncover valuable insights within their financials, identify process improvements that can increase efficiency, and better manage risk (Chu & Yong, 2021). Therefore, the task as per the framework in which the various accounting processes would fit under is "analyzing numbers."

TABLE 1:
TABLE 1: Levels of Intelligence by Task Type in Accounting

Task Type	Support for Humans	Repetitive Task Automation	Context Awareness and Learning	Self-Awareness
Analyze Numbers	Providing guidance on analysis techniques	Automating routine analysis tasks	Analysis with contextual understanding	Learning from analysis outcomes

In terms of analyzing numbers, "support for humans" refers to providing guidance on analysis techniques aimed to empower human professionals with the knowledge, skills, and resources needed to conduct their analysis efficiently and accurately. It helps ensure that the analysis process is conducted effectively and produces meaningful insights to support decision-

making in the field of accounting. It emphasizes the collaborative relationship between AI technology and human users, with the goal of providing valuable assistance, improving efficiency, and enhancing overall performance. The concept of "support for humans" acknowledges that AI is a tool meant to enhance human capabilities. It also emphasizes the importance of maintaining human control, accountability, and ethical considerations in the deployment of AI systems.

Repetitive task automation in terms of analyzing numbers refers to the use of technology to automate routine and repetitive tasks involved in numerical analysis within the field of accounting. This automation aims to streaming processes, improve efficiency, and reduce the time and effort required to perform these tasks. Repetitive task automation is a fundamental application of AI, often involving the use of robotic process automation.

Context awareness in terms of analyzing numbers refers to the ability of AI systems to understand and interpret numerical data within the broader context of the business environment, industry norms, organizational goals, and specific circumstances surrounding the data. Context-aware analysis goes beyond basic numerical calculations and takes into accounting relevant contextual factors that may influence the interpretation and decision-making process. It involves the capacity of AI to gather, interpret, and use information about the environment, user behavior, and relevant factors to enhance the effectiveness of its actions or recommendations. Context-aware AI systems aim to adapt to changing conditions and provide more personalized and relevant responses. Context awareness is particularly relevant in applications where user interactions are dynamic and can be influenced by a variety of factors. It enhances the adaptability, responsiveness, and user-centric nature of AI systems, contributing to more intelligent and effective solutions in diverse domains.

Self-awareness in terms of analyzing numbers refers to the ability of AI systems to assess their own performance, recognize their limitations, and continuously improve their analytical capabilities based on feedback and experience. This level of intelligence goes beyond context awareness and involves self-monitoring, self-assessment, and self-awareness in analyzing numbers. Self-aware AI systems understand their own existence, capabilities, and internal states. Achieving self-awareness in AI is a complex and evolving area of research, and it raises ethical and philosophical considerations.

The analysis of the different accounting disciplines: auditing & attestation (AUD), financial accounting and reporting (FAR), taxation & regulation (REG), business analysis & reporting (BAR), tax compliance & planning (TCP), and information systems & controls (ISC) through the lens of the various levels of intelligence can serve as a better predictor of the likelihood of an AI takeover. Each accounting discipline contains various accounting processes. The U.S. Bureau of Labor Statistics identifies these accounting processes. These processes are identified in Table 2 and will be used to predict the likelihood of an AI takeover.

For the purpose of this study, information systems & controls (ISC) was excluded because it focuses on technological components rather than accounting practices and is not relevant in the context of this study.

Table 2: Accounting Disciplines and Related Processes

Accounting Discipline	**Accounting Process**
Auditing & Attestation (AUD)	Risk Assessment and Planning
	Consulting
Financial Accounting & Reporting (FAR)	Invoice Processing
	Financial Reporting
Taxation & Regulation (REG)	Tax Preparation
	Tax Advisory

Business Analysis & Reporting (BAR)	Financial Analysis
	Management Communication
Tax Compliance & Planning (TCP)	Personal Financial Planning
	Entity Planning

Auditing & Attestation (AUD)

Auditing and attestation is an essential accounting discipline that involves examining financial records, transactions, and systems to provide assurance about their accuracy, reliability, and compliance with applicable laws and regulations (Francis, 2023). Two main processes within auditing and attestation include risk assessment and planning and consulting.

1. **Risk Assessment and Planning**

   The process of auditing and attestation begins with risk assessment and planning. Auditors evaluate the internal control environment, identify potential risks, and assess the likelihood and impact of material misstatements in the financial statements (Tysiak, 2022). Planning involves determining the audit approach, scope, and procedures to address identified risks effectively.

2. **Consulting**

   Consulting refers to the provision of advisory services by auditors to their clients beyond the scope of the traditional audit engagement (Gallagher, 2024). While the primary role of auditors is to express an opinion on the fairness of an organization's financial statements, auditing firms often offer consulting services to provide additional value to their clients and address specific needs or challenges they may face.

Financial Accounting & Reporting (FAR)

Financial accounting and reporting is a critical discipline in business that involves the preparation, presentation, and analysis of financial information to facilitate decision-making by internal and external stakeholders (Russo, 2022). It encompasses the process of recording, summarizing, and communicating financial transactions and events of an organization in accordance with generally accepted accounting principles (GAAP) or international financial reporting standards (IFRS). Invoice processing and financial reporting are two main processes of financial accounting and reporting.

1. **Invoice Processing**

   Invoice processing refers to the workflow and procedures involves in handling and managing invoices within an organization (Schwarz, 2020). It encompasses the entire lifecycle of an invoice, from receipt to payment, and includes various steps such as validation, approval, coding, and recording in the accounting system.

2. **Financial Reporting**

   Financial reporting refers to the process of communicating financial information about a business entity to external stakeholders, such as investors, creditors, regulators, and the public (Treece, 2023). Financial reporting typically involves the preparation of various financial statements and disclosures in accordance with established accounting standards and regulatory requirements.

Taxation & Regulation (REG)

Taxation and regulation are two interconnected disciplines of government oversight that play a significant role in shaping economic activity, public policy, and social welfare. Taxation refers to the process of imposing levies or charges on individuals, businesses, and other entities by government authorities to finance public expenditures and services (Kagan, 2024). Regulation

refers to the establishment, enforcement, and monitoring rules, standards, and laws by government authorities to govern various aspects of economic and social activities. Taxation and regulation consist of tax preparation and tax advisory.

1. **Tax Preparation**

   Tax preparation is the process of gathering, organizing, and filing tax returns to comply with tax laws and regulations imposed by government authorities (TurboTax, 2023). It involves the preparation and submission of various tax forms, schedules, and documents that report an individual's or entity's income, deductions, credits, and tax liabilities for a specific tax year.

2. **Tax Advisory**

   Tax advisory refers to the provision of expert advice, guidance, and strategic planning services to individuals, businesses, organizations, or governments to help them navigate complex tax laws and regulations, minimize tax liabilities, and optimize tax efficiency (Deloitte, 2023).

Business Analysis & Reporting (BAR)

Business analysis and reporting refer to the process of examining and interpreting data to gain insights into business performance, trends, opportunities, and challenges (Gavin, 2019). It involves collecting, analyzing, and presenting information to support decision-making, strategic planning, and performance management within an organization. Financial analysis and management communication and two main processes associated with business analysis and reporting.

1. **Financial Analysis**

   Financial analysis consists of using financial date to access the performance and financial health of an organization (Romani, 2022). Accountants conduct financial analysis, ratio

analysis, and trend analysis to evaluate profitability, liquidity, solvency, and efficiency metrics, providing insights to stakeholders for decision-making.

2. **Management Communication**

   Accountants play a crucial role in communicating financial information to internal stakeholders, such as management, board of directors, and shareholders (Lalwani, 2023). Effective communication is the foundation of successful business analysis. This involves presenting finding in a clear and concise manner to facilitate informed decision-making.

Tax Compliance & Planning (TCP)

Tax compliance and planning refers to navigating complex tax laws and regulations, providing comprehensive personal financial planning services, and advising businesses on entity structure and tax planning strategies (Dunlap & Jorgenson, 2023). Tax planning revolves around several types of transactions and deals with minimizing what is owed under a wider umbrella.

1. **Personal Financial Planning**

   Personal financial planning refers to the process of managing an individual's financial affairs in a tax-efficient manner to achieve their personal financial goals while complying with tax laws and regulations (Bhasin, 2024). It involves assessing an individual's financial situation, identifying tax-saving opportunities, and developing strategies to minimize tax liabilities while maximizing wealth accumulation and preservation.

2. **Entity Planning**

   Entity planning refers to the process of selecting and establishing the most suitable legal structure or entity type for a business or investment venture (Amoruso, 2023). The goal of entity planning is to optimize various factors such as taxation, liability protection, management flexibility, and operational efficiency.

The different AI methodologies will be used to distinguish these accounting processes based upon the levels of intelligence that are needed to complete them. Before this can be accomplished, let's discuss the relationship between different AI methodologies and levels of intelligence.

Intelligence Levels and AI Applications

As previously described, the different levels of intelligence are labeled as "support for humans," "repetitive task automation," "context awareness and learning," and "self-awareness." Different AI methodologies fall under these categories. Let's discuss how different AI methodologies relate to different levels of intelligence.

In the case of support for humans, the most applicable AI methodologies include expert systems, machine learning, and natural language processing. Expert systems provide support for humans by assisting users though a structured problem-solving process. ML algorithms can analyze user preferences, behaviors, and past interactions to generate personalized recommendations (Alpaydin, 2020). It can also help humans make better decisions by providing insights and predictions based on data. This problem-solving process provides decision support by offering recommendations or suggestions to humans based on their input and knowledge base (Buchanan et al., 2018). NLP can also be applied in many ways with regards to providing support for humans. The information extraction process that is associated with NLP enables humans to identify key entities, relationships, and events mentioned in the text. NLP techniques can also enable humans to translate text from one language to another as well as retrieve relevant answers from large collections of text data, such as knowledge bases or online resources.

In the case of repetitive task automation, the applicable AI methodology includes robotic process automation. Many business processes involve routine, repetitive tasks that are often time-consuming and prone to errors when performed manually. RPA is well-suited for automating such tasks because it can execute them quickly, accurately, and consistently without requiring human intervention. RPA is an AI methodlogy known for automating repetitive tasks in various industries and domains, offering organizations the ability to streamline operations, improve efficiency, and focus human resources on higher-value activities (Perez, 2023).

In the case of context awareness and learning, the applicable AI methodology includes machine learning. As previously explained, machine learning can be broken down into three main categories: supervised learning, unsupervised learning, and reinforcement learning. Supervised and unsupervised machine learning is best suited for providing support for humans. However, reinforcement learning is best suited for context awareness and learning. Reinforcement learning involves interacting with an environment to achieve a specific goal through trial and error (Sutton & Barto, 1998). This is a context-aware system that is involved in making sequential decisions based on the current context or environment. Reinforcement learning models can adapt and learn optimal behaviors by interacting with the environment and receiving feedback. These systems can adjust their actions based on changing contexts to achieve desired outcomes.

There are currently no AI technologies capable of being applied to the intelligent level known as self-awareness.

We have already mapped intelligent levels with AI methodologies. Now, we will map levels of intelligence with the various accounting processes. We should then be able to arrive at the relationship between accounting processes, applicable AI methodologies, and associated intelligent levels.

AI Applications in Terms of Accounting

The accounting processes associated with each discipline of accounting will be discussed in terms of which AI methodology can be used to complete them.

Risk assessment and planning is associated with support for humans because it involves complex decision-making processes that require human judgement, expertise, and experience. Risk assessment often involves subjective judgements about the likelihood and impact of various risks on an organization's objectives. As a result, supervised machine learning (ML), expert systems, and basic natural language processing (NLP) technologies can be used for risk assessment (Haq et al., 2020). Supervised machine learning and expert systems can analyze large volumes of data to identify patterns, correlations, and anomalies that may indicate potential risks. Supervised ML models can also be trained to predict future risks based on historical trends and data inputs. Basic NLP algorithms can extract relevant information, sentiment, and context from unstructured text data to assess regulatory compliance, reputational risks, and emerging threats.

Consulting is considered support for humans because it involves providing expert advice, guidance, and recommendations to individuals, businesses, or organizations to help them solve problems. Consulting falls under the category of support for humans because it leverages the expertise, experience, and interpersonal skills of consultants to provide customized solutions, drive change, and empower clients to achieve their objectives. As a result, Supervised ML, expert systems, and Basic NLP technologies can be leveraged in consulting to enhance decision-making (Fallatah, 2021). Basic NLP can be used for tasks such as analyzing client communications, extracting insights from unstructured text data, and generating written responses or recommendations. Supervised ML and expert systems can be applied to various tasks, including market research, customer segmentation, predictive modeling, risk analysis, and optimization.

Consultants may use supervised ML models to predict outcomes, assess risks, and recommend optimal strategies for clients.

Invoice processing falls under repetitive task automation due to the nature of the tasks involved and the potential for automation to streamline and optimize the process. Invoice processing typically involves repetitive and standardized tasks, such as data entry, matching invoices to purchase orders or contracts, coding expenses to the correct accounts, and initiating payment approvals. As a result, robotic process automation (RPA) can be highly beneficial for invoice processing tasks, streamlining workflows, reducing errors, and improving efficiency. RPA bots can automatically extract relevant data from invoices and validate and verify the invoice data against predefined rules, databases, or reference documents to ensure accuracy and efficiency (Desai et al, 2021). By leveraging RPA for invoice processing, organizations can enhance operational efficiency, reduce costs, and enhance the overall quality of their accounts payable processes.

Financial reporting falls under repetitive task automation due to several factors inherent in the financial reporting process. Financial reporting typically involves recurring tasks such as gathering financial data, preparing financial statements, and generating various reports. These tasks follow standardized processes and formats, making them suitable for automation. As a result, RPA technologies can automatically extract financial data from various sources, such as accounting systems, spreadsheets, databases, and external reports. RPA bots can validate and cleanse financial data to ensure accuracy, consistency, and compliance with accounting standards and regulatory requirements (Ashraf, 2024). They can also aggregate and organize financial data into the required formats, apply appropriate accounting principles and standards, and generate draft financial statements for review by finance professionals.

Tax preparation is considered repetitive task automation because it typically involves a series of standardized and repetitive tasks that can be automated to streamline the tax filing process. Tax preparation involves gathering financial information, completing tax forms, and calculating tax liabilities based on standardized tax rules and regulations. RPA technology can automatically collect and extract relevant financial data from various sources. They can assist in the preparation of tax returns, such as individual income tax returns (Mezzio et al., 2019). RPA bots can populate tax forms with the relevant financial data, apply tax rules and calculations, and generate draft tax returns for review by tax professionals. They can also facilitate tax compliance and reporting by automating the collections, aggregations, and validation of data required for tax filings and disclosures. These technologies can ensure that tax returns adhere to tax laws, regulations, and filing deadlines.

Tax advisory is considered support for humans because it involves providing personalized and expert guidance, advice, and recommendations to individuals, businesses, or organizations on various tax-related matters. Supervised ML and expert systems can analyze vast amounts of tax data, historical filings, case law, and regulatory changes to identify patterns, trends, and anomalies. Supervised ML models can predict potential tax implications, optimize tax strategies, and provide personalized recommendations based on individual client profiles and circumstances. In tax advisory, Basic NLP can be used to analyze tax documents, legal texts, and client communications to extract relevant information, identify key tax issues, and provide contextual insights (Zhou, 2017).

Financial analysis is considered context awareness and learning because it involves interpreting financial data within the broader context of an organization’s operations, industry dynamics, economic conditions, and strategic objectives. As a result, unsupervised machine

learning can be applied to financial analysis in various ways, enabling organizations to gain deeper insights, make more informed decisions, and optimize their financial performance. Unsupervised machine learning algorithms can ingest and integrate large volumes of financial data from multiple sources (Mukerji & Arjunwadkar, 2017). These systems can analyze structured and unstructured data sets to identify patterns, trends, and correlations that may not be apparent to human analysts.

Management communication is considered support for humans because it relies on human interaction, interpretation, and decision-making to convey information, facilitate understanding, and drive action within organizations. As a result, basic NLP can used to assist on facilitating communication between managers and employees by answering questions, providing information, and guiding users through workflows (Ranta et al., 2023). Basic NLP-powered systems can also transcribe spoken conversations into text, summarizing meeting discussions, and extract key insights from textual data.

Personal financial planning is considered support for humans because it involves providing customized and personalized guidance, advice, and recommendations to individuals to help them achieve their financial goals and improve their financial well-being. Supervised ML and expert systems can significantly enhance personal financial planning by providing individuals with personalized recommendations, insights, and strategies tailored to their unique financial circumstances and goals (Wasserbacher, 2022). Supervised ML algorithms can analyze individuals' financial data, including income, expenses, assets, debt, and investment holdings, to assess their risk tolerance and risk profile. They can also optimize individual's investment portfolios based on their financial goals.

Entity planning falls under support for humans. Human professionals leverage their knowledge of legal, tax, and business considerations to assist stakeholders in selecting the most

appropriate entity structure for their needs. As a result, unsupervised ML, expert systems, and basic NLP technologies can be used to assist in entity planning. Unsupervised ML models can assess the risk profiles of various entity types and recommend risk mitigation strategies. Unsupervised ML models can recommend tax-efficient entity structures and tax planning strategies (Ogden, 2023). Basic NLP can assist in interpreting tax regulations and extracting relevant information from tax documents, enabling supervised ML models to provide accurate tax advice and compliance guidance. ML and NLP technologies can facilitate collaborative decision-making processes among stakeholders involved in entity planning.

This discussion is summarized in table 3:

Table 3: Accounting Processes, Intelligence Levels, and Applicable AI Methodologies

Accounting Process	Level of Intelligence	Applicable AI Methodology
Auditing & Attestation (AUD)		
Risk Assessment and Planning	Support for Humans	Expert Systems Supervised Machine Learning Basic Natural Language Processing
Consulting	Support For Humans	Expert Systems Supervised Machine Learning Basic Natural Language Processing
Financial Accounting & Reporting (FAR)		
Invoice Processing	Repetitive Task Automation	Robotic Process Automation
Financial Reporting	Repetitive Task Automation	Robotic Process Automation

Taxation and Regulation (REG)		
Tax Preparation	Repetitive Task Automation	Robotic Process Automation
Tax Advisory	Support for Humans	Expert Systems Supervised Machine Learning Basic Natural Language Processing
Business Analysis & Reporting (BAR)		
Financial Analysis	Context Awareness and Learning	Unsupervised Machine Learning Advanced Natural Language Processing
Management Communication	Support for Humans	Basic Natural Language Processing
Tax Compliance & Planning (TCP)		
Personal Financial Planning	Support for Humans	Expert Systems Unsupervised Machine Learning Basic Natural Language Processing
Entity Planning	Support for Humans	Expert Systems Unsupervised Machine Learning Basic Natural Language Processing

The various accounting processes have been defined and paired with various levels of intelligence. The representative AI methodology was then identified to describe the various ways in which AI can be implemented in the field of accounting. Table 3 illustrates how various accounting processes are impacted by AI differently.

The accounting discipline known as auditing & attestation (AUD) consists of two processes known as risk assessment and planning and consulting. The level of intelligence that is applicable to these processes is support for humans. AI methodologies such as expert systems, supervised machine learning, and basic natural language processing can assist in completing these processes.

Although these AI methodologies can assist in completing these processes, there are still limitations that prevent them from completely taking them over. The complexity of human judgement and domain expertise are still required for risk assessment and planning and consulting.

The accounting discipline known as financial accounting and reporting (FAR) consists of two processes known as invoice processing and financial reporting. The level of intelligence that is applicable to these processes is repetitive task automation. Robotic process automation can completely automate these tasks as they consist of repetitive, rule-based tasks. Invoice processing and financial reporting are two processes that are at stake for becoming completely automated.

The accounting discipline known as taxation and regulation (REG) consists of two processes known as tax preparation and tax advisory. The level of intelligence that is applicable to tax preparation is repetitive task automation. Robotic process automation can completely automate this task, making it at stake of being completely automated. However, the level of intelligence that is applicable to tax advisory includes support for humans. Expert systems, supervised machine learning, and basic natural language processing can assist with tax advisory. This process is not at risk of being overtaken by AI as it requires human interaction and communication.

The accounting discipline known as business analysis and reporting (BAR) consists of two processes known as financial analysis and management communication. The level of intelligence that is applicable to financial analysis includes context awareness and learning. This involves understanding the broader context in which financial data operates and continuously learns from past data and patterns. To achieve this, unsupervised machine learning techniques and advanced natural language processing can be employed. This process faces a potential risk of becoming automated by AI. The level of intelligence that is applicable to management communication includes support for humans. Basic natural language processing can be used to assist with

management communication. These algorithms can automatically summarize large volumes of texts, allowing managers to quickly grasp key points and insights. However, this process is not at risk of being completely automated by AI as human interaction and communication remains an essential aspect of this accounting discipline.

The accounting discipline known as tax compliance and planning (TCP) consists of two processes known as personal financial planning and entity planning. The level of intelligence that is applicable to personal financial planning and entity planning includes support for humans. Expert systems, unsupervised machine learning, and basic natural language processing can be used to assist with these processes. These processes are not at risk of becoming automated due to the need for human interaction and the complexity of human judgement.

While AI is increasingly being integrated into accounting processes, there are several limitations and challenges that may prevent a complete takeover of AI in this field. Accounting involves adherence to complex standards and regulations. This includes the Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS). AI systems may struggle to interpret and apply these standards accurately, especially in ambiguous situations that require human judgement. Similar to human error, these AI methodologies are also susceptible to errors, biases, and inaccuracies. Human oversight will always be necessary to identify and correct errors. There is also an essential need for client relationships amongst the field of accounting. While AI systems can automate certain processes, human accountants play a crucial role in client interaction, negotiation, and communication. This requires empathy, intuition, and interpersonal skills; those of which have yet to be replicated by AI.

Therefore, one should not be fearful of a possible job displacement within the field of accounting. Although some accounting processes may become automated due to the

implementation of AI, the accounting industry as a whole is not at a risk. The automation of routine tasks allows accountants to focus on other tasks that require higher levels of strategic thinking and decision-making. These are processes that cannot be taken over by AI due to the limitation in technology that has not progressed enough to allow for higher level decision making. As a result, job displacement within the field of accounting should be discussed based upon the different accounting disciplines. Certain disciplines such as financial accounting and reporting are more likely to be overtaken by AI due to the repetitive nature of their accompanying processes.

Conclusion

In conclusion, the impact of artificial intelligence (AI) on the accounting industry is transformative, revolutionizing traditional practices and ushering in a new era of efficiency, accuracy, and innovation. AI powered solutions such as robotic process automation (RPA), machine learning (ML), natural language processing (NLP), and expert systems have already begun to reshape various aspects of accounting. These technologies enable accountants to automate repetitive tasks, extract insights from vast datasets, and perform complex analysis with unprecedented speed and accuracy. As a result, AI holds the potential to augment human capabilities, enabling accountants to focus on higher-value activities such as strategic planning, advisory services, and decision support. By leveraging AI technologies, accounting professionals can elevate their role as trusted advisors, providing strategic insights and guidance to clients and organizations navigating a rapidly evolving business landscape.

Future research on the topic of AI within the accounting industry should investigate the ethical and legal implications of AI adoption in accounting. This includes issued related to data privacy, security, bias, fairness, and accountability. Research should aim to develop frameworks, guidelines, and standards for responsible AI usage in accounting practices. Future research should

also investigate adaptive and continual learning approaches for AI systems in accounting, enabling them to learn from new data and experiences over time. Future accountants could also benefit from research that pertains to skill-building and professional development opportunities to ensure that accountants are equipped with the knowledge and expertise needed to leverage AI effectively.

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