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AI and Automated Systems for Information Technology Operations

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Abstract: Over the last several years, the research community devoted to information technology (IT) has paid more attention to artificial intelligence. However, there is a growing fear that AI research would not experience the same kind of cumulative buildup of knowledge as IT research has in the past. This study addresses this topic, which conducts a thorough literature analysis of artificial intelligence research in IT between the years 2008 and 2022. As a result of this, the study makes a number of significant contributions, including (i) a tabulation of the benefits of AI to IT enterprises, (ii) consequences for future study and actual use of AI, and (iii) potential avenues for further study in the field of artificial intelligence.

Keywords: *Automated Systems, Artificial intelligence, Systematic literature review, Machine learning.*

1. Introduction

Every year, the digital landscape becomes more intricate. Scientists and researchers have developed new technological advancements. Artificial Intelligence is a significant advancement in computer technology (AI). Many different aspects of IT may be defined by the term "artificial intelligence," including computation, software development, and data communications. Nevertheless, AI has arrived at a time when cyberattacks are on the increase. Concerns about online safety and intrusion are often the first things that come to mind when people consider AI (Surya, 2017). Artificial intelligence provides definitions for several concepts fundamental to the study of computers. The long-term objective of artificial intelligence study is to programme a computer to think like a human brain (Valli, 2022). Robots are being developed by engineers to help in manufacturing, assembly, and commerce (Valli, 2023). The robots provide information and assemble goods using principles of artificial intelligence. The idea of programming has a major application in Artificial Intelligence as well, given that AI robots depend on such programmes to relay information and carry out a range of activities (Jaki and Marin, 2019). The more time passes, the more complicated Artificial Intelligence becomes. While AI offers many potential future benefits, it also has several potential drawbacks that might have an impact on people all over the globe. Discussing the positive contributions AI has made to society, the challenges it faces, and the effect its growing popularity will have on the future of humanity is essential (Valli, 2023). Therefore, the purpose of this article is to investigate how AI and automated systems might be useful in the field of IT operations.

1.1 Background

The market for AI is expected to reach $190 billion by 2025, according to estimates. An estimated $57.2 billion would be spent on cognitive and AI technologies throughout the globe in 2021, with 75% of corporate applications using AI by that year. By 2030, it is predicted that AI would raise China's GDP by 26.1% and the US GDP by 14.5%. Locally, 83% of firms have made AI a top priority, and 31% of specialists in innovation, marketing, and information technology are considering investing in AI technology within the next year (Benbya, Pachadi and Jarvenpaa, 2021). Similarly, 61 percent of business owners say AI is their company's most important data initiative. In addition, almost all big data-savvy managers have already started using AI.

2. Literature Reviews

Research by Nirmala et al., (2022). shows how to properly apply the principles of the Internet of Things to the challenges of industrial automation. The suggested logic, which incorporates AI capabilities, is called the Artificial Intelligence Assisted Network Paradigm (AIANP). When it comes to controlling and monitoring the industrial environment, the proposed AIAP is a big help since it incorporates AI logic without sacrificing security or adding unnecessary time delays. To do this, businesses may connect to internet-enabled services and then use those services to control their machinery. With

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the help of the suggested Artificial Intelligence Assisted Network Paradigm, this paper gives users powerful capabilities for industrial automation, allowing them to better manage and keep tabs on their respective sectors of industry. Also, the ensuing part graphically demonstrates the efficiency and efficacy of the recommended strategy with regards to security.

Intelligent automation is discussed in this paper by Tyagi et al. (2021), which delves into its composition, history, and current and potential roles in a wide variety of fields (for Industry 4.0). Finally, the potential impact of Intelligent Automation Systems on the healthcare industry and the lives of its patients was outlined in the context of e-healthcare applications.

According to a recent study by Mohammad and Surya, (2018), many businesses have struggled with security automation as they try to combat the growing number of cyber risks made possible by assaults on cloud networks and the proliferation of IoT. Automation in cyber security is a relatively new concept in IT. As malevolent targets increase and automation increases the complexity of information technology systems, thus cybersecurity efforts must be ready to deploy automated cybersecurity solutions. Cybersecurity initiatives must ensure the continued privacy, validity, and accessibility of their data for as long as it is in use. Transition is being driven mostly by automation in most manufacturing sectors. Data security approaches have evolved throughout time, but the level of sophistication necessary to effectively implement such approaches has not. With no security automation in place, analysts must manually address risks. With millions of signals and frequently inadequate information, this requires studying the issue and comparing it to information from the firm to establish its legitimacy, agree on a plan of action, and then personally solve the problem. And a lot of them are just restatements of earlier points. The analyst's time is wasted on mundane duties that prevent them from seeing more serious issues. The IT staff has found security automation to be quite helpful. When an alert is received, the system can decide in an instant whether it needs to take any action, based on how it has handled similar situations in the past, and if so, it can fix the issue without any human intervention. Meanwhile, security analysts are better able to contribute to the company's success by spending more time on strategic planning, threat assessment, and in-depth investigation.

2.1 Research Gap

The introduction of AI and automated systems has undoubtedly improved IT operations, however there are still significant knowledge gaps about this topic. Thus this research paper aims to fill that research gap.

2.2 Research Question

- What impact does artificial intelligence have on the field of information technology operations?
- What is the present status of artificial intelligence in the information technology industry?
- How are artificial intelligence and automated systems implemented in IT environments?

2.3 Importance of the Study

The government sees AI as crucial to achieving its goals of global leadership in terms of military might and technological innovation. There is a real opportunity for these nations to forge alliances with other world powers in the realm of technology and military via the use of AI. That's why it's crucial to talk about the advantages of AI, the difficulties it presents, and the ways in which it will shape the future of human civilization.

2.4 Research Objectives

- To explore the impacts of AI and Automated systems in IT operations.
- To identify the current AI and Automated systems used in IT operations.
- To identify the connection between operational excellence and artificial intelligence.

3. Research Methodology

In this part, we'll go through how we conducted our systematic review for this article. A systematic literature review aims to "find, evaluate, and interpret all available research related to a certain research question, subject area, or phenomena of interest." This methodical strategy was used because it provides credible, open, and repeatable evaluations. It is also beneficial for summarising vast research studies and for investigations with well-defined research issues. Therefore, the Systematic Literature Review was selected because of the following factors: We plan to systematically extract relevant AI references from the studies in a transparent manner, (ii) the research paper will garner a large body of literature, (iii) the thoroughness and consistency it presents gives rise to an unbiased scientific paper, and (iv) the research sought to solve a particular research question.

3.1 A systematic strategy to developing literature reviews

Finding solutions to research issues is the primary purpose of the systematic literature review. The thoroughness of a literature review's research method directly affects the report's quality. Therefore, the research topic and the search method should be created

together. The primary objective is finding as many relevant studies to address the research issue. Researchers first consult electronic sources and literary databases to find relevant studies before doing a keyword string search.

There was a need for a comprehensive approach because of the complexity of Artificial Intelligence and the many names given to it by academics, as well as the many diverse kinds, subtypes, and methodologies that are in use. Boolean logic was applied to the usage of the search string. Basically, the "OR" operator was employed to combine several keyword combinations. To ensure that all possible spellings of a word were taken into account during the search, the "*" was added to the end of words. Quotation marks ("") around some keywords restricted the search to only those words.

Three databases were utilised to guarantee that all relevant studies were retrieved: I AIS eLibrary, (ii) Scopus, and (iii) the ISI Web of Science. Among the resources we consulted, AIS eLibrary stood out due to its ability to provide papers presented at the most prestigious IT conferences. Scopus was used because of its status as the biggest abstract and citation database (Mohammad, 2020). The biggest citation database, ISI Web of Science, was utilised since it contains references to more than 800 million articles. Articles published in proper IT journals were retrieved using these databases.

3.2 Inclusion and Exclusion Criteria

To be included in the systematic review, a researcher had to provide either empirical data on AI or ML in IT, or examples of AI and ML being applied in the IT literature, or demonstrate clear evidence of academic rigour in a study that did not give actual data. Specific criteria for admission were:

- Studies must be published in English.
- Each study has to appear in print somewhere between 2005 and 2020.
- The papers address one or more of the study's research questions.
- The importance of AI/ML to the study's approach should be made explicit. Publications, for instance, that base significant portions of their technique or research on a machine learning approach.
- The most up-to-date versions of the research are included if they have appeared in more than one publication or conference.
- We considered included research that offered opinions or perspectives, on the grounds that their publication in the appropriate journals would provide useful information on the current status of artificial intelligence in information security.

The criterion used for exclusion was:

- In a language other than English.
- An abundance of similar content.
- Research by use of computer simulation.
- Analyses that don't concentrate on artificial intelligence.

After identifying a search string, we ran some test queries against our source databases. Each database required a unique search string to be developed. While database searches varied in specifics, the phrases utilised were consistent. The first author conducted the statistical analysis on all 1877 studies included in the primary search. To guard against any possible bias, a second reviewer was requested to go through these findings. For a research to remain a primary study, both reviewers have to give it a positive verdict. After eliminating 91 research for being duplicates or were not scientific or written in English, we were left with 1786. Studies published in 1786 were analysed further by title. The study's title made it obvious whether the person was included or omitted from it. A research was considered for further assessment if its title, keywords, and abstract did not clearly identify the applicability area of the study. A total of 1786 papers were first culled down to 187 using title, abstract, and keyword filters. For those studies where questions remained after reading the abstract, we moved on to evaluate the whole report. The reviewers conducted a thorough evaluation of the remaining 187 papers, resulting in the exclusion of an additional 90. As a consequence, 98 primary research papers were used to form the foundation of this Systematic Literature Review. Here, we share the research results and discussions from 98 main investigations.

4. Findings and analysis

Here, we give the findings from the main study that answer the issues posed in the introduction. This represents the current status of artificial intelligence (AI) and automated systems (AS) in information technology, and it is based on the following. (i) what is meant by the term "artificial intelligence," (ii) techniques of research used, (iii) contribution category, (iv) categories of AI, (v) market value of artificial intelligence. As shown in Fig. 3, out of the 69 main research, the vast majority use ML as their AI method of choice. Fig. 1 depicts the study selection procedure that was used for this analysis. The procedure for selecting studies is shown in Fig. 2.

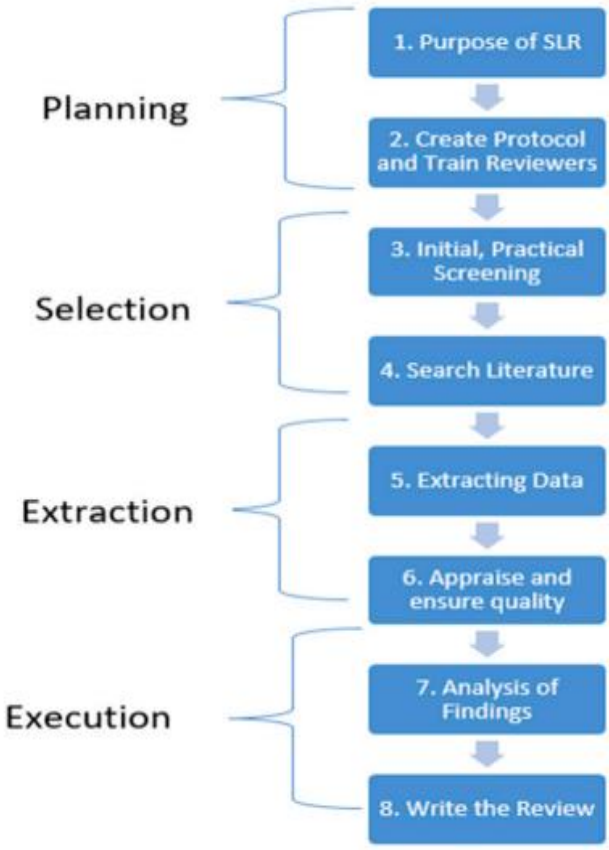

Fig. 1. A methodical approach for the construction of literature reviews

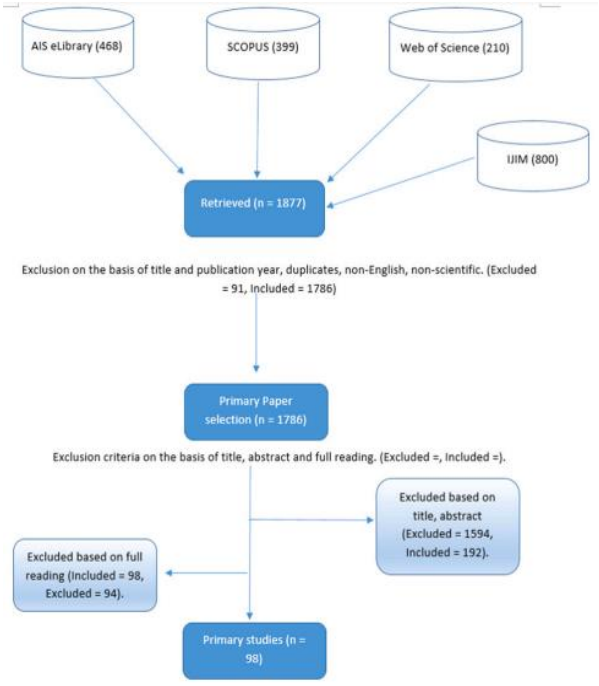

Fig. 2. Methodology for Study Selection.

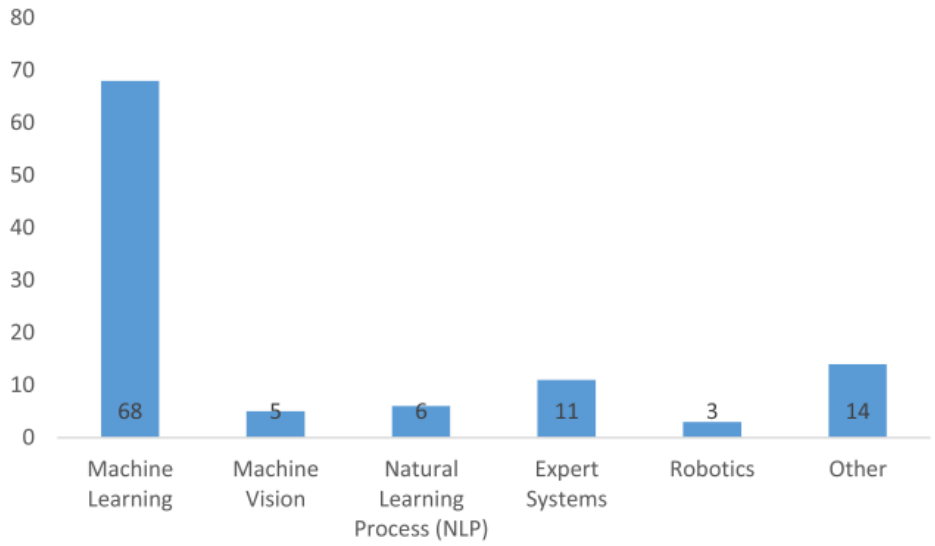

Fig. 3. Types of AI.

4.1 What exactly is AI according to the IT operations industry?

Finding and comparing the many AI-related terms used in the IT sector is the goal of this investigation. The procedure for selecting studies was shown in Section 2's Fig. 2. This research topic aims to examine how IT has responded to challenge 2.1, the issues the area of AI encountered with definitions. However, several of the main publications either did not offer a definition or utilised uncited definitions, despite the fact that AI and Machine Learning constituted a significant portion of the research focus. Fifty-four out of the 98 original papers did not clearly describe the AI relevant to the investigation. In addition, only 44 of the papers providing definitions specified a source for that term. Both the criteria and the referenced sources for AI employed in the main investigations were inconsistent. Putting aside the seven unsourced papers that established AI's definition.

4.2 What is the present status of artificial intelligence in the information technology industry?

This topic aims to use a cluster of related questions to investigate the present landscape of artificial intelligence (AI) in the area of IT. This study's overarching research question is to quantify the quantity of research conducted in the area of Information Technology on the topics of Artificial Intelligence and Machine Learning between the years of 2008 and 2022. During this time span, the number of AI research remained low, with just 11 published between 2008 and 2015. From 2019 to 2022, there will be a dramatic increase in IT research devoted to artificial intelligence, indicating a growing interest in the topic. None of the research conducted in 2008, 2010, or 2012 on artificial intelligence in IT met this study's inclusion and exclusion criteria. The strategies for primary data collection were identified via an in-depth examination of research approaches. Table 9 details these items. Some references in the table below are duplicated since many of the research employed more than one data collection method. Twenty-two of the papers used data mining, while twenty-one of them mentioned conducting tests. Ten studies relied on direct observation, while the other four were made due with written records. Eight key papers used surveys and twenty used interviews as a means of data collection. Twenty-two of the studies contained literary analysis, while two used questionnaires. While only three studies actually held workshops, four used focus groups as their primary data collection method. Two of the investigations relied on sample analysis. A single research used theory-as-discourse, Machine Learning subset selection, causal mapping, and prediction markets.

4.3 How are artificial intelligence and automated systems implemented in IT environments?

Pursuing an answer to this research issue will allow us to classify AI research depending on the specific AI technique(s) used. Several of these may be integrated into a single AI system. The IBM Watson system, for instance, utilises a trifecta of natural language processing, machine learning, and computer vision. However, this Systematic Literature Review will only classify studies according to their principal AI kind. The variation among the other kinds was smaller: 11 for expert systems, 5 for machine vision, and 6 for natural language processing. Only three research projects have robotics as their major emphasis, making it the field with the smallest percentage of research projects.

5. Discussion

This section provides a brief overview of the Systematic Literature Review's results and summarises the most important findings from the investigations that have been conducted thus far. What follows is a review of the

theoretical contributions and practical consequences. The overarching purpose is to unearth themes applicable to research and practise and highlight areas that need further study. We did a Systematic Literature Review in this study that summarises the state of artificial intelligence research in the field of information technology. We conducted a comprehensive literature analysis to find, categorise, and evaluate the 1877 articles published on AI and ML in IT between 2008 and 2022. After extensive screening, we were able to narrow this number down to 98 main studies. We analysed the studies by year, publishing channel, research techniques, and contribution to IT contribution study to get a grasp on the basics of AI in IT. However, before beginning this endeavour, we had to face the issue that the concepts of artificial intelligence were widely different and unclear.

These results highlight a shortage of research concerning I tools and (ii) models, while simultaneously demonstrating a continuous accumulation of cumulative knowledge relevant to AI in IT. It's shocking to notice that IT doesn't seem to make much effort to discover and implement cutting-edge AI-related technologies for research and development. Instead, most studies seem to concentrate on developing AI-based frameworks, methodologies, and techniques to simplify the process of building and managing software and other systems. This is especially true when it comes to machine learning. Assumably, the causes for the AI renaissance are connected to the factors that have led to the current lack of attention to tools and approaches.

Primary research indicates that machine learning is far and away the most popular kind of AI. Eleven research projects were classified as employing expert systems, making them the second most studied kind of AI. Only three of the key research really focused on robotics. It seems that machine learning's preeminence is at least in part attributable to the fact that it can be applied to a wider range of problems than the other categories. One way that primary research stands out from the others is that it employs a "machine learning approach," as was the case in several of these investigations.

The fact that machine learning applications have received the greatest attention within the AI research community is suggestive of where future investments should go and the nature of the value they are likely to provide to businesses. With this knowledge, CIOs and CTOs can begin testing out these methods internally and making the necessary expenditures to roll out these kinds of solutions progressively to the parts of the organisation where they may have the most impact.

6. Conclusion

Among the many conclusions drawn from this meta-analysis are the essentials to (i) conduct more high-quality academic research on artificial intelligence (AI), especially with respect to AI tools and models; (ii) provide a clearer definition of AI whenever possible; and (iii) build upon existing body of knowledge. The potential of AI research in IT has yet to be fully realised. While there is a fair lot of writing on the topic of AI, a thorough examination of the state of the art in this area with regard to IT is absent. This is particularly the case considering the currently varying definitions of AI in IT. As such, this research takes a look at what is already known about AI in the IT field. With this research, we have created one of the few Systematic Literature Reviews on AI in IT and provided a systematic evaluation of developments and omissions. As a result of our work, academics and practitioners in the field of IT now have a place to begin filling in the socio-technical knowledge gaps in AI research and IT. Thus, we advocate for future IT research to focus on AI, particularly on the definition of AI in modern IT studies.

6.1 Future Scope

Our results not only give a snapshot of where the field of AI in the workplace now stands, but also assist to identify promising avenues for further study in this area. Our analysis revealed a significant gap in the literature about the definition of AI in empirical research. It is crucial that future research appropriately describes the concept of AI that is employed, since AI applications include a wide range of approaches, technologies, and put diverse constraints on data, infrastructure, and utilising them in the organisational environment. Clearly expressing definitions may aid in understanding the assumptions and limits that characterise the body of work and facilitate greater comparison amongst empirical research.

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