
ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML) APPLICATIONS: A STATE OF THE ART SURVEY

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Abstract

For the manufacturing sector, adaptation and creativity are extremely necessary. This progress should contribute to sustainable production using new technologies. Smart production requires global perspectives on smart production application technologies in order to encourage sustainability. In this respect, a range of AI-based techniques, such as machine learning, have already been developed in the industry to achieve sustainable production, thanks to intensive research efforts in the field of artificial intelligence (AI). The objective of the present research was therefore to review scientific literature on the application of artificial intelligence and machine learning (ML) in industry in a systematic way. In reality, the implementation of Industry 4.0 is seen as the driving force of the smart factory revolution in artificial intelligence and machine learning. This review was intended to classify the literature, including the year of publication, the authors, the scientific sector, the region, the institution, and the keywords.

Keywords: *Artificial Intelligence (AI), Machine Learning (ML), Smart Manufacturing, Research Contribution.*

I. INTRODUCTION

Innovative technologies are needed in smart manufacturing systems to improve the quality and sustainability of production operations, while reducing costs [1]. In this context, artificial intelligence (AI)-driven technologies leveraged by 14.0 Core Enabling Technologies are ready to build new industrial paradigms (e.g. the Internet of Things, advanced embedded systems, cloud computing, big data, cognitive systems, virtual and augmented reality) [2].

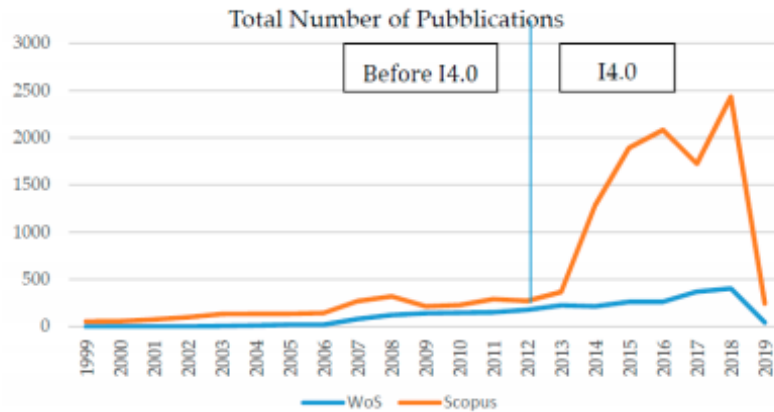


Fig. 1: Illustrates the research growth on Scopus as well as Web of Science.

The total analysis of the research area obtained from the 82 papers was 164, since each paper can be viewed as more than one analysis of the research area. The rating applies mainly to the new industrial revolution, given the limited number of documents found in the era before 14.0. The outcome is also consistent with the implementation of paradigm 4.0 in this case, which has accelerated research and technology adoption[3].

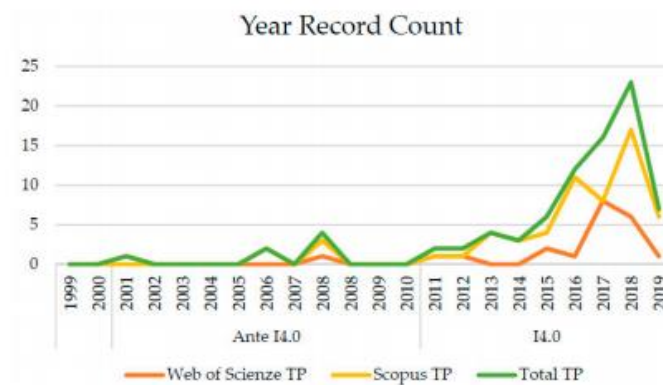


Fig. 2: Illustrates the years of publications.

Table 1: Comparative examination of cloud deployment prototypes [4].

Cloud Models	Pros	Cons
Public	• High scalability • Flexibility • Cost-effective • Reliability • Location independence	• Less secure • Less customizability
Private	• More reliable • More control • High security and privacy • Cost and energy efficient	• Lack of visibility • Scalability • Limited services • Security breaches • Data loss
Community	• More secure than public Cloud • Low cost than private Cloud • More flexible and Scalable	• Data segregation • Responsibilities allocation within the organization
Hybrid	• High scalability • Low cost • More flexible • More secure	• Security compliance • Infrastructure dependent

Smart manufacturing systems require creative solutions to improve the efficiency and profitability of production processes, while reducing costs [4]. In this context, artificial intelligence (AI)-driven innovations are ready to produce new industrial paradigms, leveraged by 14.0 Primary Enabling Technologies (e.g., Internet of Things, advanced embedded systems, cloud computing, big data, cognitive systems, virtual and augmented reality)[5].

II. LITERATURE REVIEW

Lee et al. conducted a survey on Machine Learning applications of artificial intelligence: analysis and prospect. One of the most exciting new Artificial Intelligence technology is machine learning. Learning algorithms that we use every day in many applications. One of the reasons why it works so well is that a learning algorithm, one introduced by Google or Microsoft, has learned how to rank web pages every time a web search engine such as Google or Bing is used to search the internet [5]. That's also machine learning every time Facebook is used and it recognises the pictures of friends. Email spam filters prevent the user from having to wade through loads of spam emails, which is a learning algorithm as well. A brief analysis and potential outlook of the vast applications of machine learning has been provided in this paper.

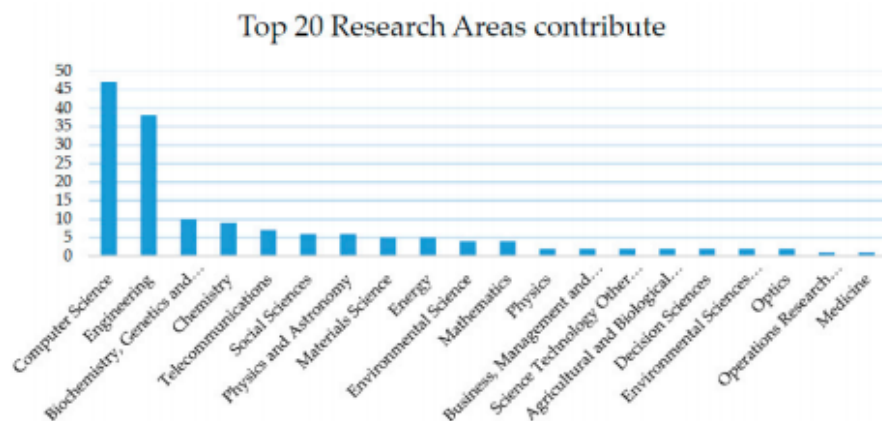


Fig. 3: Depicts the top 20 research areas contributions.

III. DISCUSSION AND CONCLUSION

This thesis focused on the study of the state of the art of applications for AI and ML, selecting literature on what has now become an especially hot subject in science research. The literature available on any subject is now broad and it can be difficult or even impossible to completely cover all the documents published with respect to a specific topic. A systematic collection of the most important literature was then introduced. A comprehensive analysis of applications in different scientific fields using ML techniques is given in this paper. Objective and straightforward investigative techniques, independent of the researchers' experience, were used for the collection of documents. The goal of the document was not only to provide a detailed context for literature on AI and ML research, but also to provide a starting point for the integration of information through research in this field and to recommend potential research paths.

IV. REFERENCES

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