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Review Paper on Artificial Intelligence: A Comparative Study

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Abstract: *Adaptation and innovation are important to the manufacturing industry. Artificial intelligence may increase the efficiency of the existing economy. Development should lead to sustainable manufacturing using new technologies innovation process and the organization of R&D. To promote sustainability, smart production requires global perspectives of smart production application technology. We distinguish between automation oriented applications like robotics and therefore the potential for recent developments in "deep learning" to function a general purpose method of invention, finding a "adaption" within the importance of application oriented learning research since 2009. Number of AI based techniques, like machine learning, have already been established within the industry to realize sustainable manufacturing. Thus, the aim of the present research is to analyse systematically, the scientific literature relating to the application of artificial intelligence and machine learning (ML) in industry. In fact, with the introduction of the Industry 4.0, AI and machine learning are considered the drive of smart factory revolution. In this paper, we also focus on AI/ML have been successfully utilized in various processes' optimization, applications in manufacturing, and predictive maintenance in different industries.*

Keywords: AI Algorithms, Machine Learning, I.4 Technologies, Robotics, Deep Learning

I. INTRODUCTION

Artificial Intelligence describes the capability of machines to think just like humans and the ability to respond to certain behaviours. The need of Artificial Intelligence is increasing rapidally. Since AI was first introduced to the market, it has been the reason of the quick change in technology and business fields. Computer scientist are predicting that most of the *customer interactions will be managed without a human"*. This means that human's simple request will depend on computers and artificial intelligence. The idea of machines operating like human beings began to be the centre of scientist's mind and whether if it is possible to make machines have the same ability to think and learn by itself. These innovations have the potential to directly influence both the production and the characteristics of a wide range of products and services, with important implications for productivity, employment, and competition.

AI offers reliability, cost- effectiveness, solve complicated problems, and make decisions; in addition, AI restrict data from getting lost. AI is applied in most fields like business or engineering. One of the great tools in AI is called "reinforcement learning" which is based on testing success and failure in real life to increase the reliability of applications. Artificial Intelligence made our lives much easier and saved more time than ever.

Emerging Trends of Artificial Intelligence and Machine Learning in Sustainable Manufacturing.

Considering sustainability, the analysis shows that the new development of smart manufacturing has the potential to bring fundamental improvements in the industry by addressing the issue of scarce resources and improving productivity. It means that AI/ML techniques provide promising potential for improved quality control optimization in manufacturing systems.

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II. AI ALGORITHMS AND MODELS

AI is mainly based on algorithms and models as a technique which is designed based on scientific findings such as math, statists, and biology. The main use of algorithms is as a tool for predictive analysis and consequently for data pre-processing, result interpretation, or evaluation in order to improve energy and resource management.

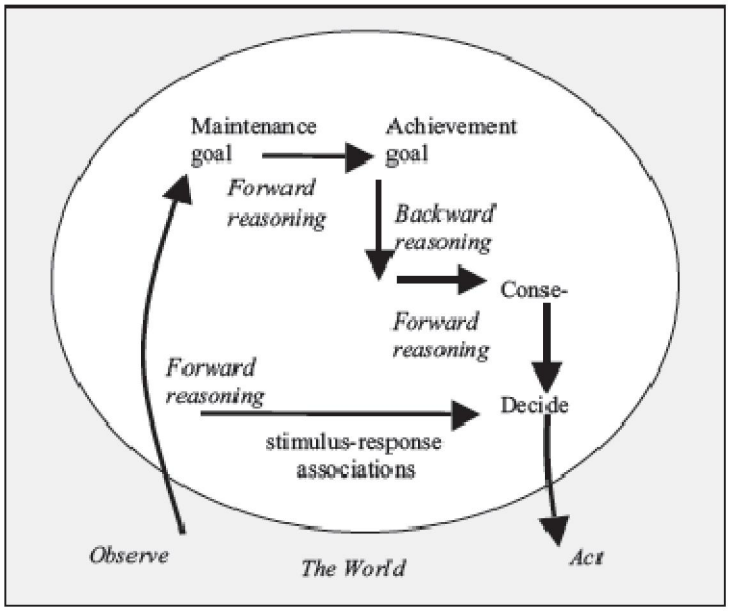
AI works based on several models such as: Ant Colony Algorithm, Immune Algorithm, Fuzzy Algorithm, Decision Tree, Genetic Algorithm, Particle Swarm Algorithm, Neural Network, Deep Learning, Support Vector Machine, and the Artificial Neural Network.

- Support Vector Machine (SVM) where it is used to build a classification model by finding an optimal hyperplane based on a set of training. It is also have been used for pattern classification and trend prediction lots of applications for instance: power transformer fault diagnosis, disease diagnosis and treatment optimization.

Furthermore, it emerged that AI/ML algorithms present a wide array of applications that provide an opportunity for sustainable development, which will involve several manufactures from different countries and sectors, including inventory and supply chain management, predictive maintenance, and production.

- ALP agent model:-Abductive logic programming (ALP) form of computational logic.

ALP agent model ALP in an agent cycle, is a powerful model of both descriptive and normative thinking. As a descriptive model, it includes production systems as a special case; and as a normative model, it includes classical logic and is compatible with classical decision theory. These descriptive and normative properties of the ALP agent model make it a dual process theory, which combines both intuitive and deliberative thinking.



III. BENEFITS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN INDUSTRIAL CONTEXTS

From the analysis of the research, the information focus on, there is a growing importance of innovation and digitalization in products, services, and processes. Consequently, the adoption of advanced manufacturing technologies, such AI and ML, is an emerging issue. In other words, AI/ML algorithms represent an opportunity to handle high dimensional problems and data. In all scientific sectors, along with computer science and engineering the interest is developing.

The most significant benefits of using AI and ML in industrial sectors include: (1) Greater innovation, (2) process optimization, (3) resources optimization, and (4) improved quality. (5) Smart manufacturing & Innovation.

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Applications related to green manufacturing and sustainable development, proving that AI/ML play an important role in increasing sustainability through the intelligent utilization of materials and energy consumption (i.e., reduction of energy consumption and pollutant emissions, environmental footprint monitoring and evaluation, etc.).

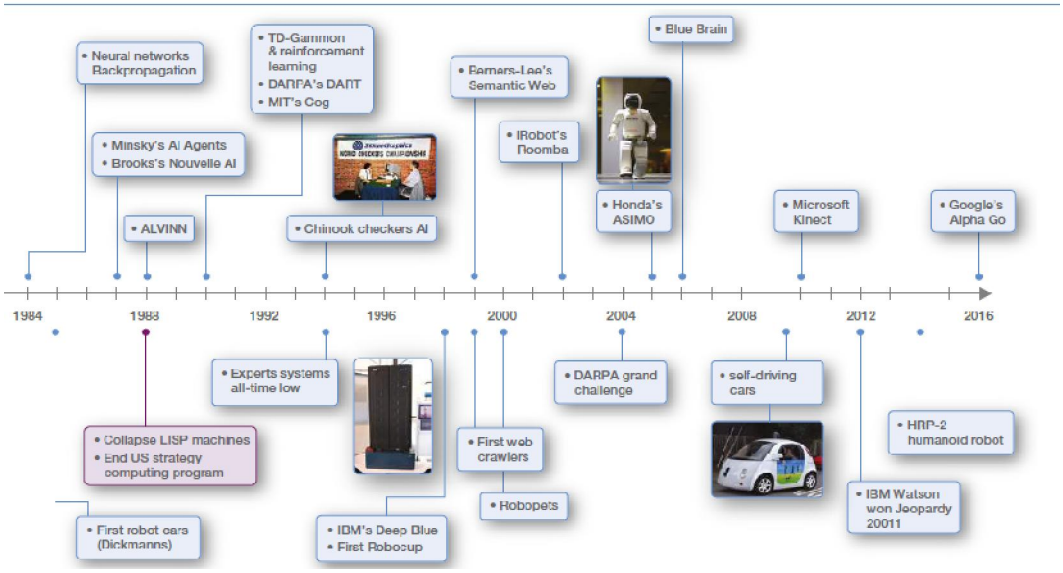

Figure 1: AI Timeline

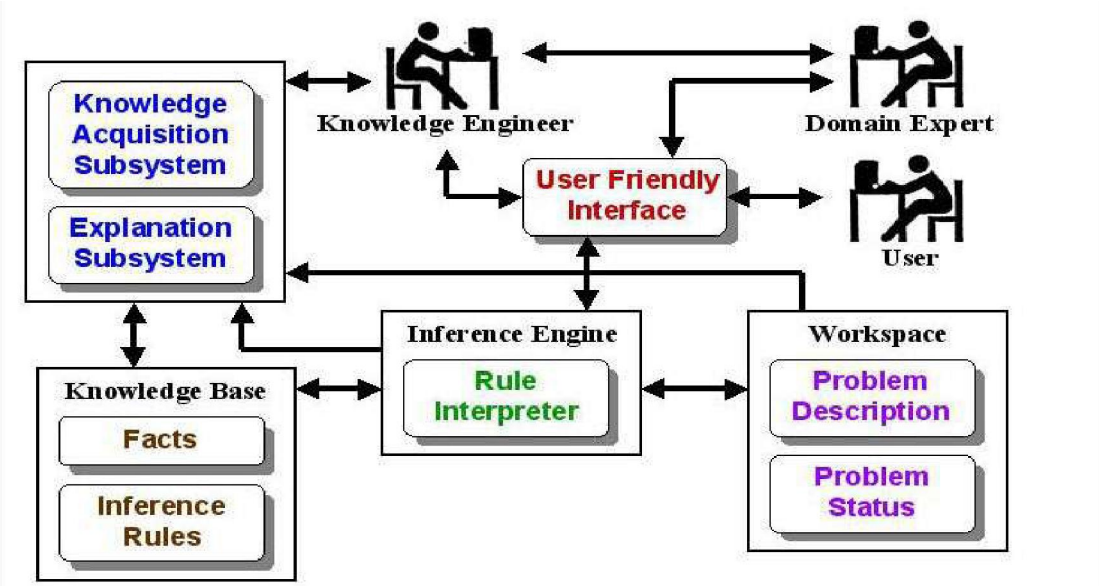

Figure 2: Benefits of AI

IV. ADVANTAGES

- Supply Chain Management &Ready product available in the appropriate place at a specific time
- Improves transparency, accelerates decision-making, and produces accurate demand forecasting
- Quality Control

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- Recognize the early signs of potential production failures within the shortest terms in order to save resources and sustain operational efficiency Improves the response time and allows eliminating possible failures
- Predictive Maintenance
- Detects possible production malfunctions that may cause product quality issues
- Creates accurate forecasts as to when the machinery must be repaired
- Energy consumption Recommendations that will strike a balance in energy use
- Improves excessive use of certain materials, redundant production scrap

V. APPLICATIONS

- Voice recognition
- Virtual agents
- Machine learning platform
- AI optimized hardware
- Decision management
- Deep learning platform
- Bio-matrics
- Robotic process automation
- Adaptive Manufacturing:

VI. CONCLUSION

- This research focused on the study of the AI and ML applications. This study provides a systematic review of applications in various scientific fields using ML techniques. From this analysis of the research carried out, the first information that emerged is that there is a growing importance of innovation and digitalization in products, services, and processes. AI with ML is one of the most important technologies today and is transforming the economy and society

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