EVOLUTION OF ARTIFICIAL INTELLIGENCE IN VARIOUS FIELDS

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https://doi.org/10.34293/9789361639715.shanlax.ch.031

Abstract

Artificial Intelligence (AI) and Machine Learning (ML) have transcended from being theoretical paradigm to the one of the most pervasive enabling technologies in the current society. In this paper, we summarise the AI programs taking us through the history of AI to date, the delineation between weak AI and strong AI, and most importantly ML types which spans supervised, unsupervised, and reinforcement learning. The aim of this work is to present an overview of these developments, focusing on their applications in healthcare, autonomous systems, and robotics and on research challenges and opportunities. The review highlights AI use outcomes – efficiency, automation, decision-making – while shedding light on ethical, societal and research gaps that require further investigation. Combining basic knowledge with new development, this work helps us to better understand how AI builds the digital future.

Keywords: *Artificial Intelligence; Machine Learning; Weak AI; Strong AI; Supervised Learning; Unsupervised Learning; Reinforcement Learning; Applications; Evolution; Ethics*

Introduction

Artificial intelligence (AI) and machine learning (ML), continue to change industries, economies and societies in profound ways within the digital era. Introduction Though the idea of AI has been around for over half a century, innovations in processing power, availability of data and sophisticated algorithms, as well as advancements in machine learning and deep learning have finally brought it to the mainstream, moving AI out of the realm of research and experimental systems and placing AI solutions below the noses of business users. From driverless cars and medical diagnoses to natural language processing and robotics, AI has embedded itself in the human experience. The subject is still characterised by conceptual fuzziness and irregular implementation, though it has developed rapidly. The literature available in the market today on AI is often limited only by discipline or is too descriptive to consolidate the historical development, classification and practical implementation potential of AI. This emphasises the necessity for a systematic study of the concept that links the basic ideas to its recent developments. To follow up the trends of AI and ML over the years. To discriminate different AI and ML models, weak vs. strong AI and key learning paradigms. To review applications from different fields, present current issues, and point out future lines of research.

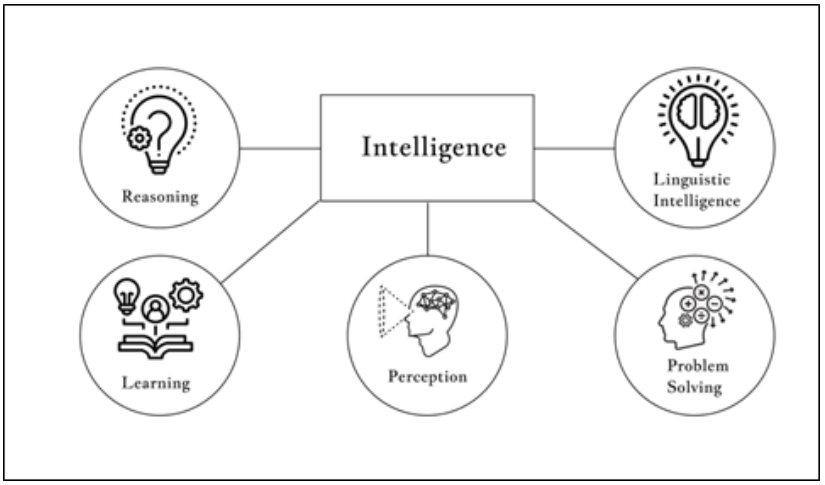

Figure 1: Artificial Intelligence in various fields

Related Work

A Modern Approach" that was published by Peter Norvig and Stuart Russell, they discussed their foundational view of artificial intelligence. They recognized AI as a combination of reasoning, learning, perception, linguistic strategies and problem-solving methods. Supervised Learning, a look into machine learning with Niklas Lavesson In this review, he is going to step on different variety of machine learning algorithms such as supervised, unsupervised and reinforcement learning with one practical scenarios. Another Item is by George F. Ludger who examined the architectures and tactics preceding man-made intelligence applications Tracing the history of AI, he explores methodologies such as weak AI and strong AI, contemporary applications such as natural language processing in chatbots, healthcare applications and others in ongoing developments.

Artificial Intelligance (AI)

John McCarthy, he was the one who coined this term "Artificial Intelligence" in 1956, as Science and Engineering of making intelligent machines, especially intelligent computer programs. In this, he defined "artificial intelligence" as a rarity of human quality intellect; it would be the best way of thinking that we can create in any particular domain (computer science, linguistic reasoning etc.). This is basically the way machines perform physical tasks while answering intricate questions by their own in a most aptorevealed_true way which could be referred as the new trendy concept AI. AI has an element of basic disciplines essential to all aspects of human life, such as philosophy, computer science, mathematics, linguistics, biology, neuroscience and sociology. It significantly assists in showcasing the same intelligent behavior, learning procedures and serving as a guide, or key facilitator of conversations with the users. Example of it is the Artificial General Intelligence (AGI), it is a system where machines are cognitive as well as humans, they can multi-task and work on multiple processes concurrently. A more extensive view of AI also covers learning, perception, problem-solving and the creation of new solutions. These systems include

features like natural language understanding and rule-based reasoning. There are types of artificial intelligence, and these can be classified into two major kinds;

1. Weak AI
2. Strong AI.

Weak AI

Weak AI encompasses machines that exhibit behavior resulting in human-like cognitive functions, but without truly being able to obtain them. Among others, these would be systems that are designed to think, or speak or perform simple moving operations as per a set of instructions. A chess game in which the computer can automatically move pieces and take action as well when it makes sense, for example. Despite the appearance of "thought", the computer has no real ability to reason, it only follows the rules that were programmed into it in order to make accurate moves.

Strong AI

Strong AI focuses on the concept of fully self-directed machines which are capable of doing calculation, thinking for ourselves can predict outputs. An illustrative example is the IBM tool "Watson" that provides a concrete depiction of what research-driven AI can achieve. Would it be possible to enjoy much more complex machines or even humanoids that are capable of operating on their own and surpass human intelligence in some areas.

Weak vs. Strong AI

Weak AI is a simulation of intelligence but not the real thing, an imitation of reason, but not real reasoning. For instance, chess-playing application draws on mechanisms to make optimal moves, but without bona fide cognitive comprehension. Strong AI, on the other hand, aims to build human-equivalent machines that can think and be conscious of itself (e.g. IBM's Watson). Weak AI prevails most contemporary applications while Strong AI is still mostly a matter for philosophical and ethical arguments

Machinelearning

The most known example of artificial intelligence, machine learning applied to these processes automates and helps humanize tasks by allowing machines access and process data-learning independently. Teaching is a key element in artificial intelligence — learning so that they can do things like analyze real-time data, learn and adjust to work properly, enhance their performance. AI, as we already discussed, is a larger concept of enabling machines to handle tasks that would typically require human intelligence; whereas machine learning goes one step further and essentially breaks down AI in how it learns.

AI vs MLIt is easy and common to talk about AI and machine learning together, especially in big data, data science and analytics land. Machine Learning is an efficient way used to handle and manage large datasets in diverse industries of larger scale. Just like supercomputers, these systems process with modern problem-solving and multitasking powers. Usually known as humanoid or smart machine, they are capable of talking and

answering complex questions besides running many tasks at a time. More broadly, machine learning is the fundamental technical approach in AI and underpins most of the recent advances and commercial applications of AI. Modern machine learning: a statistical process that facilitates the definition of an output from data and informs their subsequent use [3].

Types of Learning

1. Supervised learning.
2. Unsupervised/predictive learning.
3. Reinforcement learning.

1. Supervised Learning

In this process, the machine is trained by researchers against a specific input with correct output. At the time of writing, this is one of the most utilized ways to train neural networks and other machine learning models. It works with learning the mapping between a set of inputs on some target variable. In simple terms, the target can be of two types either discrete or continuous. Such a task is commonly done with the help of methods like decision trees, naive Bayes, boosting and multi-layer neural networks.

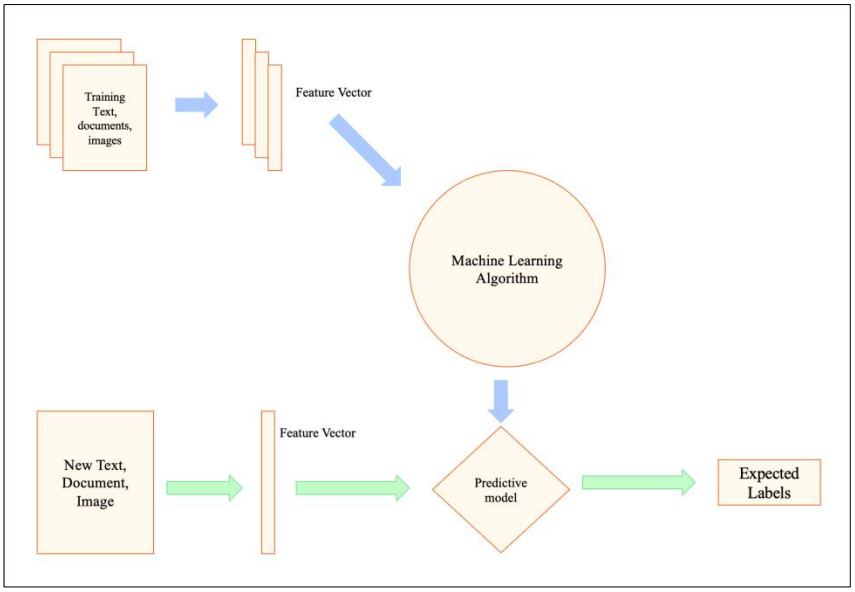

Figure 2: Supervised Learning

Unsupervised / Predictive Learning

The learning algorithm, in this way, operates on the basis of input data without defined and human-provided labels to identify structures within its input data.

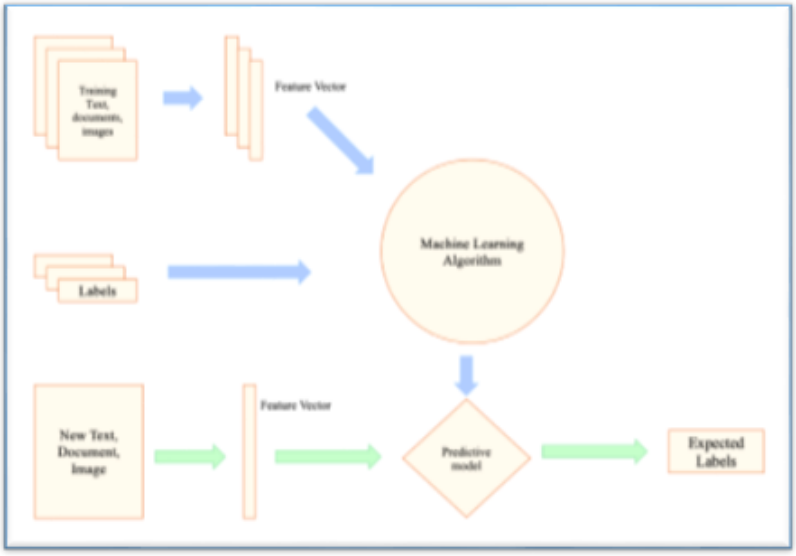

Figure 3 : UnSupervised Learning

This could mean looking for patterns that are not yet pervasive in most domains (and therefore might be harder to see), it could mean discovering the currently turned pattern behind other more obvious factors, or organizing data into some kind of a sensible order overall — and current researchers still work actively on working out all kinks so this methodology can be used to its full potential. There will be no target variables to guide, so usually the problem is tackled using clustering data into K groups (unsupervised learning).

Reinforcement Learning

AI agent decides how best to act as a way of achieving goals and completing tasks. This system interacts with a dynamic environment, in which it needs to perform its own actions in order to be successful (usually whilst competing against an opponent). It gets feedback in the form of positive or negative reinforcement according to its actions, so it can learn and select behaviors that provide greater expected returns over time.

Applications of AI and Machine Learning

AI has become something of a household name and synonymous with modern human life for the most part about technology surrounding us demonstrable enhancements in how we go about accomplishing our daily routines. Its real-world implementation is illustrated by several use cases. Digital personal assistants (such as Apple's Siri, Google Now from Google, Watson from IBM and Microsoft's Cortana) are included in the OSes with built-in productivity features like speech and gesture recognition. This tools allows the user to access information and manage tasks in a way that does not involve physical activity.

These assistants can respond to queries such as “Where is the Nearest Restaurant/ College / Bus Stand”. They also serve as prompts for outstanding work, alarm times, name of a person, friend’s birthdays and important discussion to improve better daily performance.

This leads to research across areas such as machine learning, robotics and humanoid in an effort to bring more human like behavior and emotions into machines. More importantly, this shift is further highlighted by ministries and designs for high-speed cars that use artificial intelligence to drive through the abundance of missiles that are made from labyrinthine technologies with individual radars or radar function, as well as navigational satellites driven by AI.

The self-driving car, Waymo, developed as part of a Google initiative, demonstrates the ability to navigate roads without human intervention. Additionally, NASA and Google have collaborated to introduce the first humanoid astronaut, Valkyrine, which serves as a remarkable example of advanced artificial intelligence.

Conclusion

The global digital transformation drive has placed AI and ML at the heart of this transition. This essay discusses how these types of intelligence (and their modern machine analog) are being more and more woven into the fabric of our everyday life. Modern machines are not only sharpening its knowledge driven education standards but also getting more integrated in upscaling the human intelligence. Peeking into the future, what to expect as we move more towards a world run by AI and high-tech machines is an enigma in of itself. The innovations brought about by scientists and engineers are changing the way we live and even driving progress worldwide. This theme reigns through the article — from robots who are beginning to perform and think like humans, to necessary research we must do now for an improved future. The innovation never ceases. These new technologies need to be developed and nurtured by younger generations. The convergence of science, engineering, and cutting-edge machine learning software have the potential to take humanity to all-new heights.

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