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Information Technology, Automation and Robotics

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ARTIFICIAL INTELLIGENCE

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The toFig of this work is artificial intelligence, what it represents, its development throughout the years, and its use in everyday life. The main purpose is to show the value of artificial intelligence to the world, and to put into perspective the way AI has been developed and utilized with the creation and evolution of intelligent machines. Artificial intelligence has had a substantial influence on people's lives, however many people still believe that AI will one day lead to more bad than it will ever do good to the world. The main goal of this paper, is to learn and explore the world of artificial intelligence, and perhaps help readers dive deeper in order to learn new and exciting things.

Keywords: intelligence, learning, reasoning, problem solving, perception, algorithm, application, development

I. INTRODUCTION

Artificial Intelligence (AI), is intelligence demonstrated by machines, unlike the natural intelligence displayed by humans and animals, which involves consciousness and emotionality. It is commonly referred to as the simulation of human intelligence in machines that are programmed to think and mimic the actions of humans. The main characteristic of artificial intelligence is its ability to rationalize and take actions which have the highest probability to achieve a certain goal.

There is a specific distinction between two different types of AI. 'Strong AI' usually refers to AGI (Artificial General Intelligence), whereas attempts to emulate 'natural' intelligence are referred to as ABI (Artificial Biological Intelligence). As machines become more and more advanced, many of the tasks linked with thinking and reasoning are no longer associated with artificial intelligence. This is a phenomenon known as the 'AI effect'. Still, despite these advances in machines and

computer processing speed, there are no programs that can match human flexibility over wider domains or in tasks requiring common sense. Modern machine capabilities commonly classified as AI include understanding human speech, competing at the highest level in strategic game systems, autonomously operating vehicles, and military simulations.

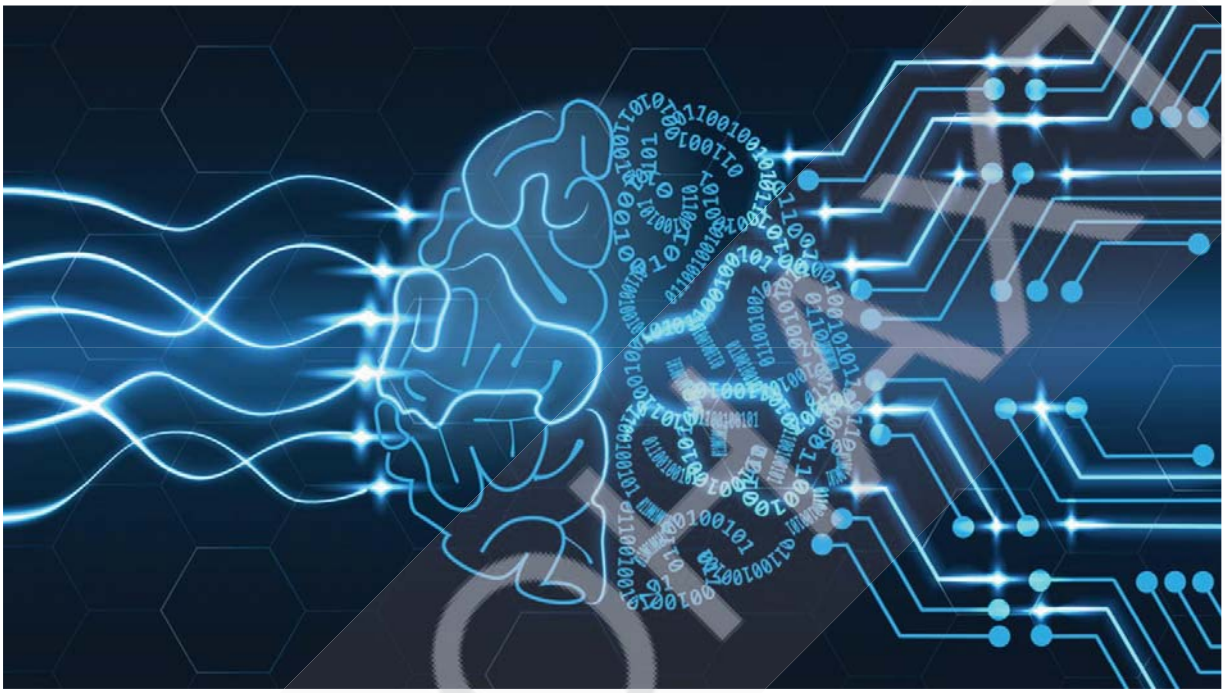

Figure 1. Representing Artificial Intelligence

II. LITERATURE ANALYSIS

2.1. Understanding Artificial Intelligence

When people hear the term AI, most associate it with robots. This is mainly due to how AI is portrayed in popular films and novels. However, this is far from the truth. Artificial intelligence is based on the principle that human intelligence can be represented in an easy way in order for machines to try to replicate. A tyFigal AI analyzes its environment and takes actions that maximize its chance of success.

AI work usually revolves around the use of algorithms. Algorithms are sets of unambiguous instructions that a mechanical computer can execute. Many AI algorithms are capable of learning from data, i.e. they can enhance themselves by learning new heuristics, or write new algorithms by themselves.

The goals of artificial intelligence include learning, reasoning, problem solving, and perception. Machine learning, a fundamental concept of AI research since the field's inception, is the study of computer algorithms that improve automatically through experience. There are two types of machine learning, unsupervised and supervised. Unsupervised learning is the ability to find patterns in a stream of input, without the help of humans. Supervised learning includes two

methods, classification and numerical regression, both dependent on a human to input data first. Classification is a method which determines the category of an object. Regression is the attempt to produce a function that describes the relationships between inputs and outputs and predicts how the outputs would change as the inputs change. Reasoning means drawing inferences appropriate for the situation. Inferences are classified into deductive and inductive. Inductive reasoning is usually found in science, where data is collected and tentative models are developed to describe and predict future behavior. Deductive reasoning is common in mathematics and logic, where elaborate structures of irrefutable theorems are built up from a small set of axioms and rules. Problem solving, particularly in AI, can be characterized as systemic search through a range of possible actions in order to reach some predefined goal or solution. Problem solving methods are divided into special purpose and general purpose. A special-purpose method is used only for a specific task or problem, whereas general-purpose methods can be used in a variety of situations. Many diverse problems have been sold by artificial intelligence programs, such as, finding a winning move or a sequence of moves in a board game, devising mathematical proofs, and manipulating virtual objects in a computer-generated world. Machine perception is the ability to use input form sensors (such as cameras, microphones, wireless signals, and radars) in order to deduce and understand different aspects of the world. The scanned environment is then decomposed in various spatial relationships. However, this is difficult to analyze and deduce, as many objects in the world can have a different shape depending on the viewing angle, the direction and intensity of illumination in the scene, and the contrasts with the surrounding field. At present, artificial perception is sufficiently well advanced to enable optical sensors to identify individuals, and autonomous vehicles to drive at moderate speeds on open roads.

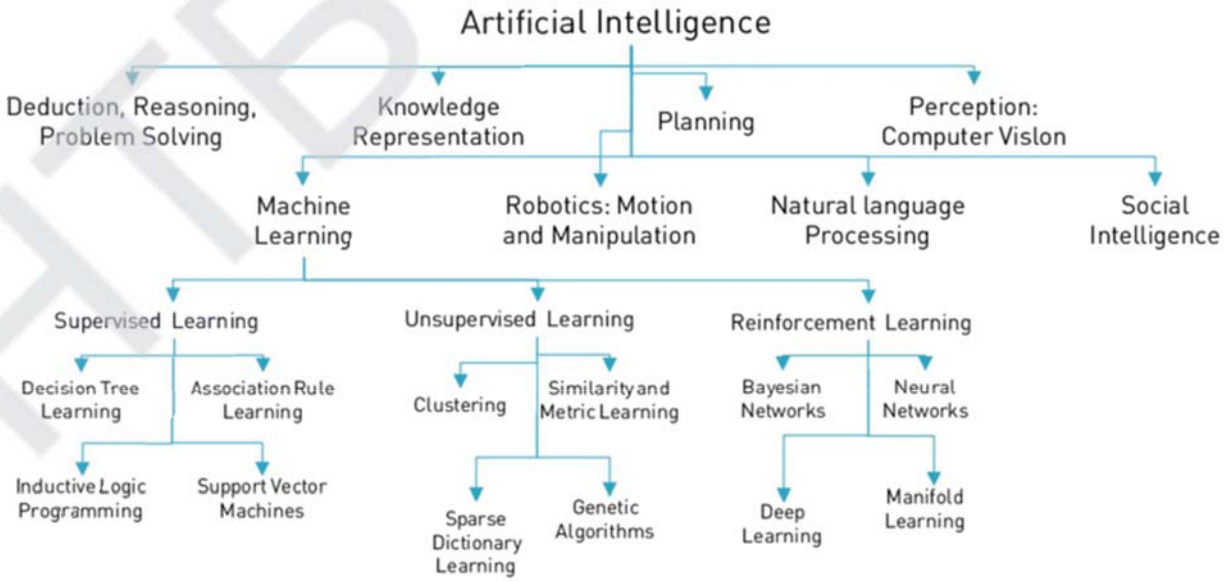

Figure 2. An overview of disciplines used to represent AI

2.2. Methods and Goals in AI

No established unifying theory or paradigm guides AI research. There are multiple approaches to giving the true definition of artificial intelligence and answering the most frequently asked questions regarding the development of AI. There are four main approaches commonly used to describe and define the evolution of artificial intelligence.

Figure 3. Approaches to artificial intelligence

2.2.1. Cybernetics and Brain Simulation

In the 1940s and 1950s, a number of researchers explored the connection between neurobiology, information theory, and cybernetics. Some of them built machines that used electronic networks to exhibit rudimentary intelligence. However, this method was quickly abandoned and it did not resurface again until the 1980s.

2.2.2. Symbolic Approach

When access to digital computers became possible in the mid-1950s, AI research began to explore the possibility that human intelligence could be reduced to symbol manipulation. During the 1960s, this approach had achieved great success at simulating high-level "thinking" in small demonstration programs. Approaches based on cybernetics or artificial neural networks were abandoned in favor of the symbolic approach. Researchers in the 1960s and 1970s were convinced that symbolic approaches would eventually succeed in creating a machine with artificial general intelligence and considered this the goal of their field. There were four styles that catered to this approach:

a) Cognitive simulation – Economist Herbert Simon and Allen Newell studied human problem-solving skill and attempted to formalize them. Their work laid the foundations of the field of artificial intelligence, as well as cognitive science, operations research and management science. Their team of researchers used the results of psychological experiments to develop programs that simulated the techniques that people used to solve problems.

b) Logic-based – Unlike the approach above, scientist John McCarthy felt that machines did not need to simulate human thought, but should instead find the essence of abstract reasoning and problem-solving, regardless of whether people used

the same algorithms. His laboratory at Stanford focused on using formal logic to solve a wide variety of problems, including knowledge representation, planning and learning.

c) Anti-logic or scruffy - Researchers at MIT discovered that solving difficult problems in vision and natural language processing required ad hoc solutions. They argued that no simple or general principle (like logic) would capture all the aspects of intelligent behavior. The description "scruffy" was given by artificial theorist Roger Schank, who noted that their "anti-logic" approach was not thought of as well as the previous two styles.

d) Knowledge-based – When computers with large memories became available around 1970, researchers from all three traditions above began to build knowledge into AI applications. This revolution in AI development lead to the deployment of expert systems, the first truly successful form of AI software. A key component of the system architecture for expert systems is the knowledge base, which stores facts and rules that illustrate AI.

2.2.3. Sub-symbolic Approach

By the 1980s, progress in symbolic AI seemed to have stalled and many believed that the symbolic approach would never be able to satisfy the needs of bigger AI development. A number of researchers began to look into "sub-symbolic" approaches to specific AI problems. There are two main sub-symbolic methods that manage to approach intelligence without specific representations of knowledge.

a) Embodied Intelligence – Researchers from the related field of robotics rejected symbolic AI and focused on the basic engineering problems that would allow robots to move and survive. Their work revived the non-symbolic approach of cybernetics and reintroduced control theory in AI. This coincided with the idea that aspects of the body (such as movement, perception and visualization) are required for higher intelligence.

b) Computational intelligence and soft computing – Interest in neural networks was revived in the mid-1980s. Artificial neural networks are an example of soft computing; they are solutions to problems that cannot be solved with complete logical certainty, where an approximate solution is often sufficient. The application of soft computing to AI is studied collectively by the emerging discipline of computational intelligence.

2.2.4. Statistical learning

Around the 1990s, AI researchers adopted sophisticated mathematical tools, such as hidden Markov models (HMM), information theory, and Bayesian decision theory to compare or unify competing architectures. The shared mathematical language permitted a high level of collaboration with more established fields (such as mathematics, economics or operations research). The development of statistical learning resulted in higher levels of accuracy in many practical domains, such as data mining, without necessarily acquiring a semantic understanding of the datasets. Nowadays, experiment results are often rigorously measurable, and can often lead to amazing new discoveries. Many researchers have said that the shift to statistical learning, while very substantial to the growth of AI development, has shifted the

narrative from explainable AI, i.e. the methods of developing artificial intelligence have become less and less understandable for the layman.

2.3. Applications of Artificial Intelligence

The applications for AI are endless, because the technology can be used in various sectors and industries. Modern artificial intelligence techniques are pervasive and there are so many that it is impossible to list them all. When one of these techniques reaches mainstream use, it is no longer considered artificial intelligence. This phenomenon is called the AI effect. Artificial intelligence has been widely used in the healthcare industry for dosing drugs and different treatments to patients, and for surgical procedures in the operating room. Other examples of machines with artificial intelligence include autonomous vehicles (such as drones and self-driving cars), computers that play games (like Chess or Go), search engines, online assistants, image recognition and many more. Each of these machines weigh the consequences of any action they take, because each action will impact the end result. Artificial intelligence also has applications in the financial industry, where it is used to detect and flag activity in banking such as unusual debit card usage and large account deposits, which help the bank's fraud department. Applications for AI are also being used to help streamline and make trading easier. This is done by making supply, demand, and pricing of securities easier to estimate.

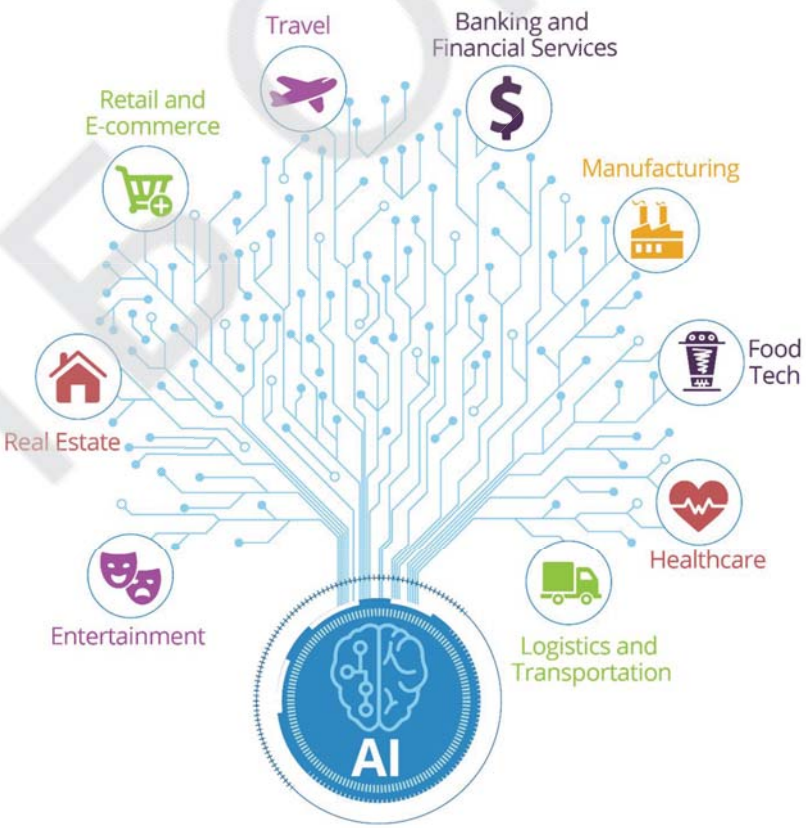

Figure 4. Applications of AI

III. OBJECT, SUBJECT, AND METHODS OF RESEARCH

Because of the nature of the toFig, the most viable way to gather information is to read already existing articles on AI. The interesting part is that very little is known about the true extent of AI development. Companies are reluctant to reveal the proprietary technologies and approaches to its use in the industries. Its application in everyday life seems to grow by the day, with many companies deciding to pursue machines that use AI in their respective sectors and industries. The subject of this work was not only to show and to present AI to the world, but to encourage readers to dive deeper into the meaning of artificial intelligence and understand its value to the world.

IV. RESULTS

Table 1. Summary of approaches to AI

Approaches to AI			
Cybernetics	Symbolic	Sub-symbolic	Statistical Learning
The first method used to connect artificial intelligence with human intelligence. It was short-lived, but it had its influence on another approach later in the development cycle of AI.	An approach that, at the time of its early stages, was considered to be the breakthrough in the development of artificial intelligence. It helped paint the Figture of what AI should represent.	It brought back cybernetics into the development of AI and introduced the idea that the movement of a body is necessary for reaching higher intelligence.	This method has had the biggest influence on the rise of artificial intelligence. It connected AI to the mainstream world and introduced the technology to companies and industries all around the world.

Table 2. Applications of AI in various sectors and industries

Applications of AI				
Healthcare industry	Travel and Transportation	Financial industry	Online Assistance	Manufacturing
In most recent times, the healthcare industry has been most influenced by AI. It has helped with treatments of patients and surgical operations in the operating room.	Artificial intelligence has been used in the development of autonomous vehicles, mainly self-driving cars. AI has also helped to increase passenger safety, reduce traffic congestion and accidents and lessen carbon emissions.	AI has helped the financial industry in finding and punishing bank fraud (such as large influx of money at a single time, strange deposits and much more). Artificial intelligence has also been used to improve online banking, allowing people to escape long queues and finish their banking activities from home.	Most mobile phones nowadays come out with online assistants, such as iPhone's Siri or Samsung's Bixby. Furthermore, AI has been used in GPS applications in order to ease the way of giving directions to the driver, by using audio and video representations of the directions simultaneously.	Artificial intelligence has played a major role in the manufacturing industry that it even has its own name, industrial AI. It has helped to improve productivity, reduce cost, and optimize the work done in manufacturing as a whole.

V. CONCLUSION

With the development of machines, artificial intelligence has become an essential part to many industries and their usage grows by the day. However, the long-term economic effects of AI are uncertain. Economists are unsure whether the growing amount of use of AI in industries means a higher rate of unemployment, but they generally agree that it could have a net benefit, if productivity gains are

redistributed. A 2017 study showed that the People's Republic of China will have gained the most economically from AI with 26.1% of GDP by 2030. The relationship between artificial intelligence and employment has always been a complicated one. While AI has led to unemployment in some sectors, it has also offered new jobs through micro-economic and macro-economic effects. Economists have pointed out that in the past, technology has usually contributed to the increases in total employment, rather than decrease. However, they acknowledge that we are in uncharted territory with AI, and a little mistake could cost a lot in the long run. Furthermore, there have been multiple concerns that AI could be used by terrorists in order to instigate digital warfare. Things like lethal autonomous weapons should be properly governed, otherwise there is massive potential for misuse. One thing is certain, artificial intelligence has massively helped in every sector and continues to do so every day. Most of the things we have nowadays would not have been possible without the involvement of AI in today's most important industries.

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ENVIRONMENT FOR TEACHING CHILDREN THE KAZAKH ALPHABET

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Abstract. Creating a program for kindergarten and junior school students for learning purposes is an actual toFig of the present time, but it is not sufficiently developed in Kazakhstan. This project is a convenient program for teaching children the Kazakh alphabet with interesting tasks to test the learned material.

Keywords: *teaching children, learning, integrated environment, Kazakh alphabet, C++ Builder.*

I. INTRODUCTION

The aim of the project is creating a environment for teaching the Kazakh alphabet.

The main tasks of the project:

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The collection includes student works of the participants of the competition, which were not included in the number of prize-winners. The texts of the competitive works are published in the form in which they were submitted by the authors. The authors of the articles are responsible for the content and form of submission of the material.

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