THE IMPACT OF ARTIFICIAL INTELLIGENCE ON TODAY' S SOCIETY

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Abstract: *The evolution of Artificial Intelligence is closely linked to the evolution of technology. Thus, the increasing computing power of computers, their ability to perform more and more complex tasks, the access to very large volumes of data, the use of graphical processing units, are some of the elements that have contributed to the development of Artificial Intelligence, which has nowadays an active role in our daily lives. This paper aims to present the impact that the adoption of Artificial Intelligence has on the economic environment, through an analysis of some fields of activity together with a series of processes corresponding to each field.*

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JEL classification: D83, D89.

1. Introduction

Due to the evolution of today's world, to new computing technologies and the multitude of fields of use, concepts such as Machine Learning, Deep Learning, Artificial Intelligence (AI) are increasingly common.

Although, sometimes in practice these terms are used as synonyms, they do not refer to the same things, between them there is an inclusion relationship visually represented by Fig.1.

Thus, Deep Learning is a subset of Machine Learning which is a subset of Artificial Intelligence.
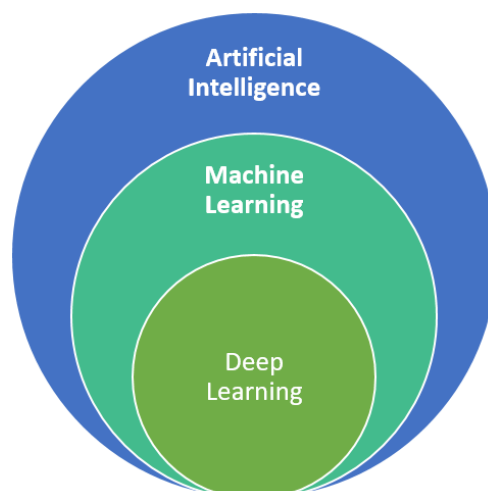

Fig.1. Link Artificial Intelligence -Machine Learning-Deep Learning

Source: Master Intelligence Economique et Strategies Competitives, 2018. *Artificial Intelligence, Machine Learning, and Deep Learning: Same context, Different concepts,* [online] Available at: <https://master-iesc-angers.com/artificial-intelligence-machine-learning-and-deep-learning-same-context-different-concepts/> [Accesed 22 March 2020].

The term Artificial Intelligence was first used in 1956 in the Dartmouth Summer Research Project on Artificial Intelligence workshop, considered the event that initiated Artificial Intelligence as a research discipline (Research Publications, 2006). The stated purpose of the workshop was that for 2 months, 10 scientists from various fields (mathematics, computer engineering, information theory, neural networks, natural language processing, etc.) to study how aspects of learning or any other characteristic of intelligence, can, in principle, be described so precisely that a machine can be created to simulate them, thus solving problems previously reserved for humans (McCarthy et al., 1955).

The American scientist John McCarthy, one of the initiators of the 1956 project, in the article "What is Artificial Intelligence" (McCarthy, 2007) referred to Artificial Intelligence as "the science and engineering of making intelligent machines, especially intelligent computer programs."

With a multitude of definitions, Artificial Intelligence refers to a branch of computer science that deals with the simulation of intelligent behavior in computers (Merriam Webster Dictionary, 2020), representing the ability of a computer or computer-controlled robot to perform tasks commonly associated with intelligent beings (Britannica, 2020).

In 1959, the American Arthur Samuel, considered a pioneer in the field of computer games, first used the term Machine Learning and demonstrated that machines can learn from previous mistakes (History of Information, 2020), stating that "programming computers to learn from experience should ultimately eliminate the need for a multitude of detailed programming efforts" (Samuel, 1959).

The objective of Machine Learning is to develop algorithms that allow patterns based on training data sets to be identified and then scenarios to be made or predictions to be generated as accurate as possible for future events.

Therefore, programs developed based on Machine Learning improve their performance in accomplishing a certain task through learning (training) and experience gained by comparing the results obtained with the desired results.

Deep Learning requires a complex architecture that mimics the neural networks of the human brain (SIVECO Romania, 2018) and represents a category of Machine Learning algorithms that use artificial neural networks in processing very large sets of input data, pattern recognition and data classification to draw correct conclusions without the help of people.

In fact, the main difference between Machine Learning and Deep Learning is that Machine Learning models are progressively improving based on data that needs to be structured / labeled and require the supervision and intervention of a programmer when the prediction is inaccurate, while in Deep Learning the data do not have to be structured / labeled, learning is from one's own mistakes, unsupervised and implicitly much faster.

2. Artificial Intelligence and the economic environment

McKinsey & Company, one of the largest strategic management consulting firms in the world, conducted an online survey on Artificial Intelligence in 2019 with the participation of 2360 members of the McKinsey.com online group, employees from all levels of management in various industries, from 115 countries.

A percentage of 58% of the respondents stated that in the companies they belong to, Artificial Intelligence was adopted in at least one function or business unit, the increase being 11% compared to 2018. In Europe, the increase is from 51% (2018) to 58% (2019) (Artificial Intelligence Index, 2019).

The fields of activity together with a series of processes corresponding to each field in which Artificial Intelligence is used are presented in Table no. 1 and Table no. 2.

Table no.1. Areas of activity and processes in which Artificial Intelligence is used
(% respondents)

Areas of activity	Service operations (e.g. customer care, back office)		Product and / or service development		Marketing and sales		Manufacturing	
	2018	2019	2018	2019	2018	2019	2018	2019
Automotive	27	26	39	43	15	13	49	53
Professional services	38	36	34	31	36	29	11	10
Electric Power & natural gas	46	49	41	42	15	17	19	21
Financial services	49	55	26	25	33	43	6	2
Healthcare	46	50	28	31	17	19	9	10
High tech	48	49	59	55	34	37	20	12
Pharma	31	19	31	41	27	16	28	41
Retail	23	47	13	33	52	36	7	14
Telecom	75	74	45	48	38	28	22	21
Travel & logistics	51	52	34	20	32	17	4	7

Source: Made by the authors based on data available at
Artificial Intelligence Index, 2019. *Annual report.* [pdf] Available at: <https://hai.stanford.edu/sites/g/files/sbiybj10986/f/ai_index_2019_report.pdf> [Accesed 25 March 2020].
Artificial Intelligence Index, 2018. *Annual report.* [pdf] Available at: <http://cdn.aiindex.org/2018/AI%20Index%202018%20Annual%20Report.pdf> [Accesed 25 March 2020].

Table no.2. Areas of activity and processes in which Artificial Intelligence is used
(% respondents)

Areas of activity	Supply chain management		Risk		Human resources	
	2018	2019	2018	2019	2018	2019
Automotive	11	18	2	9	8	4
Professional services	19	17	15	12	16	18
Electric Power & natural gas	14	19	14	12	15	17
Financial services	7	12	40	42	9	10
Healthcare	21	12	19	10	18	10
High tech	23	14	17	14	21	20
Pharma	13	11	3	3	6	6
Retail	38	34	9	14	8	4
Telecom	26	27	23	30	17	22
Travel & logistics	18	31	4	5	2	10

Source: Made by the authors based on data available at
Artificial Intelligence Index, 2019. *Annual report.* [pdf] Available at: <https://hai.stanford.edu/sites/g/files/sbiybj10986/f/ai_index_2019_report.pdf> [Accesed 25 March 2020].
Artificial Intelligence Index, 2018. *Annual report.* [pdf] Available at: <http://cdn.aiindex.org/2018/AI%20Index%202018%20Annual%20Report.pdf> [Accesed 25 March 2020].

As can be seen, companies are choosing to implement Artificial Intelligence to a greater extent in the processes that lead to increased company revenues.

Thus, in the automotive field, Artificial Intelligence was used mainly in the manufacturing process (53%) in 2019, followed by the development of products / services (43%) in 2019, both registering an increase of 4% compared to 2018.

Collaborative robots used to automate assembly lines take over repetitive, tedious tasks, thus reducing production time. Being part of the team, together with people, it contributes to the creation of an intelligent production environment. In painting and welding operations, Artificial Intelligence allows robots to identify material irregularities and alert the personnel responsible for quality control.

For transporting different types of materials from the warehouse to the production lines, inside the factories, etc. automatically guided vehicles are used.

In the case of cars, Artificial Intelligence, by monitoring dozens of sensors, can identify dangerous situations, warn drivers or take control of the vehicle to avoid accidents (Eisenberg, 2018).

In the automotive industry, Artificial Intelligence makes it possible: autonomous driving, predictive maintenance (detecting problems before they affect vehicle operation), connecting vehicles, driving monitoring (which includes a driver monitoring system that provides real-time presence information and driver status).

Among the areas analyzed, the use of Artificial Intelligence in the process of developing products and / or services appears in the first place, in 2019, in the field of Hight Tech (55%), followed by telecommunications (48%). Compared to 2018, for this process, the Hight Tech field registered a decrease of 4%, while in telecommunications there was an increase of 3%.

The upward trend in investments of communications service providers in product / service development is explained by the continuous concern for innovation, investments being focused on optimizing network quality, preventive maintenance, virtual assistants for customer support and automation of processes through robotics (Churchill, 2020).

According to the results of a worldwide study in which 1872 respondents from the fields of activity present in Table no.1 participated, in the period 2020-2023, by adopting Artificial Intelligence technologies, the fields in which the largest reductions in labor force will be registered are cars and telecommunications (Statista, 2020).

Thus, among the respondents in the automotive field, 18% estimate that the adoption of Artificial Intelligence will lead to a decrease of over 10% of the workforce in their companies and 28% of respondents estimate that the decrease will be between 3% - 10%. In the field of telecommunications, 18% of respondents estimate that the decrease in labor force will be greater than 10% in their companies and 37% of respondents estimate that the decrease will be in the range of 3% -10%.

On the other hand, the High tech field will register an increase in labor force by at least 10%, according to the estimates of 15% of respondents.

In the field of financial services, 42% of the use of Artificial Intelligence is found in the risk management process, for the prevention, identification and eradication of fraud, the increase being 2% in 2019 compared to 2018.

In tourism, Artificial Intelligence is used to provide online support to customers, to collect and interpret data in order to obtain conclusions about customers, business practices and pricing strategies (Revfine.com, 2020), based on customer browsing behavior can be offer personalized recommendations on new travel destinations, accommodation options, transportation, all of which help to improve travel experiences.

The highest increase recorded in 2019 compared to 2018 in terms of the adoption of Artificial Intelligence is found in the processes of service operations (24%) and development of products and / or services (20%) in the field of Retail. By analyzing a large volume of data, Machine Learning and Deep Learning technology can identify patterns in

customers' purchasing preferences, retailers can thus meet the wishes of consumers with personalized offers, which will lead to increased sales.

With the help of Artificial Intelligence, augmented reality, it will be possible to create virtual test booths, shopping assistance will be robotic, the use of smart mirrors (also called digital mirrors) will allow consumers to try, virtually, as many items of clothing they want without need a test booth. Chatbots, those computer programs designed to simulate a conversation with human users, through text or voice interactions (Search Customer Experience, 2020), have also begun to be used by small business owners to provide immediate customer support 24 / 7, to answer their questions and help them navigate through various options to quickly find the products they want. The way customers receive personalized, fast attention, results in their loyalty.

It is expected that by 2030, capitalizing on the power of Artificial Intelligence, its Machine Learning, Deep Learning subdomains by companies, will lead to an increase in global gross domestic product of up to 14%, the equivalent of $ 15.7 trillion. This increase in global GDP is estimated to be driven by up to 55% of labor productivity growth in 2017-2030 (PricewaterhouseCoopers, 2020).

The highest economic benefits from the adoption of Artificial Intelligence are expected to be achieved by China (with a 26.1% increase in GDP by 2030), followed by North America (14.5% GDP growth) and Southern Europe (11.5% GDP growth) (PricewaterhouseCoopers, 2020).

3. Conclusions

The adoption of Artificial Intelligence will lead to an increase in the quality of the products offered, to more qualified, more personalized services, to a better organization of time and implicitly to the increase of productivity. Also, by changing the decision-making process of purchasing and consumption, there will be increases in consumer demand.

For companies that adopt technology efficiently, Artificial Intelligence brings cost savings, improving efficiency and increasing competitive advantage.

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