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The future of artificial intelligence in the Arab world

The experience of some Arab countries

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Abstract:

For more than two decades, artificial intelligence has been making major transformations in various sectors: from education, healthcare, to public transportation, business, entertainment, war, and more. Therefore, this sector has turned into a major competition arena among the countries of the world.

Arab countries live in different internal conditions, which are clearly reflected in their plans to adopt artificial intelligence in their discourse, strategies, and institutions. Arab countries, especially in the Gulf, hastened to adopt the latest technologies, institutions, standards and plans to localize and use artificial intelligence, which reflected positively on their ranking in global indicators. On the other hand, other Arab countries are still groping their way, with attempts to teach artificial intelligence subjects in some curricula with the aim of laying the foundations for this industry.

Key words: intelligence; artificial intelligence; research centers; the strategy; innovation decisions.

JEL Classification Codes: J23, J24.

Introduction:

Scientists in the world outside the Arab countries are currently making tremendous efforts to develop artificial intelligence, which has become superior to humans in performing many tasks, not only physical and arithmetic, but also intellectual, such as medical diagnosis and legal research.

Recent years have witnessed a remarkable trend in the Arab world to support the process of artificial intelligence, in ambitious steps supported by official procedures and decisions that may change the technology landscape in the region in the near future.

The first efforts to implement promising strategies in the field of artificial intelligence were launched by some Arab countries. Similar to the UAE's strategy for artificial intelligence, as well as the great focus on teaching the principles of artificial intelligence at university levels in many countries in the region.

This is what makes us wonder through the following dilemma: What is the position of Arab countries in the global artificial intelligence race?

A- General concepts about artificial intelligence

1- Artificial intelligence concept:

a- What is Artificial Intelligence?

According to the father of Artificial Intelligence John McCarthy, it is "The science and engineering of making intelligent machines, especially intelligent computer programs". Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think. AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems (www.titorialspoint.com- artificial_intelligence).

b- Philosophy of Artificial Intelligence:

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, "Can a machine think and behave like humans do?" Thus, the

development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

2- The history of artificial intelligence: (http://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf)

The history of artificial intelligence goes back to the classical philosophers in Greece, and the study of the subject of artificial intelligence began in 1940 AD in a school of thought called communication, where the study of the thinking process began, and Alan Turing presented a research paper in which he studies a thinking machine that imitates a human being without noticeable differences in it. 1950 AD. Hodgkin Huxley came after him to present a model that simulates the human brain in the form of an electrical network representing neurons, and an electric current that simulates the impulses that turn on or off the cells. These models and studies helped launch the concept of artificial intelligence in 1956 AD at a conference held by Dartmouth College. Due to the lack of high speeds and storage capacities, artificial intelligence research stopped for a long time, and then resumed in the eighties after the United States and Britain introduced the fifth generation project in computer technology In theearly nineties, artificial intelligence research shifted its field to the so-called smart proxy, which is used in news retrieval services, online shopping and web browsing, and researchers are still trying to use artificial intelligence in unprecedented fields such as; Physical assistance provided by bots, customer service software, answering the phone, and more.

3- How artificial intelligence works :

Artificial intelligence works in the digital environment through the availability of digital devices and specialized software to analyze and design algorithms, and machine learning, and in general, the artificial intelligence system absorbs large amounts of training data.

Training data is used to form associations and patterns that are then used to build future predictions, such as automated response in smart robots, and the process of

identifying and describing objects in images by reviewing millions of examples saved in a smart device (Boucher, 2020, p. 02).

4- Artificial Intelligence Categories :

Artificial intelligence enters into many electronic and digital fields, and it exists in different forms and in many devices, so that it simulates the intelligence found in the human mind, and artificial intelligence falls under two main categories, which are as follows:

- **Narrow AI**: Narrow artificial intelligence is also known as weak artificial intelligence, which is a type of intelligence that simulates human intelligence but is specific to one and limited type of intelligence, and narrow artificial intelligence focuses on performing one type of task but very well, so that it focuses on performing one task professionally, But it operates under much more constraints than human intelligence (Karamzadeh & Moharrami, 2015).
- Examples of narrow AI include
    - Google search engine.
    - Image recognition software.
    - Personal assistants,
    - such as Alexa and Siri.
    - Self-driving cars

❖ **Artificial General Intelligence**: Artificial general intelligence is also known as strong artificial intelligence, and it is a type of intelligence found in machines and smart devices, and artificial general intelligence is characterized as a type of intelligence in the machine that gives it general intelligence like a human being, so that this intelligence is used to solve any problem.

- Examples of devices with artificial general intelligence are; Robots that are used to accomplish many tasks and that make their decisions based on the situation, but building robots that have intelligence similar to human beings is still difficult and needs to build neural networks as large and complex as the ones in the brain.

5- types of artificial intelligence: (Types of Artificial Intelligence – BMC Software | Blogs)

The following are the types of artificial intelligence:

5-1- reactive machines:

Interactive machines are defined as the simplest existing level of a robot, as it is a machine designed to deal with one type of data and respond to current situations only, and they are machines that are not able to create memories or use current information to build and make future decisions to improve their level or develop their intelligence, It is only designed to respond to the current situation. Examples of interactive machines include; Machines designed to play chess against humans, such as IBM's Deep Blue, are designed to respond to a player's movements by evaluating pieces on the chessboard and moving them according to their coded playing strategies.

5-2- limited memory:

A finite memory machine is a machine capable of storing a finite number of information based on data previously handled by a finite memory machine, such that a finite memory machine can construct knowledge from memory when paired with its pre-programmed data. Examples of machines that use limited memory include; Self-driving cars, as these cars store pre-programmed data such as; Maps or traffic signs, and compare this stored data with information surrounding the vehicle such as; The speed and directions of nearby vehicles and side-by-side pedestrian movement and take appropriate action based on this data.

5-3- theory of mind:

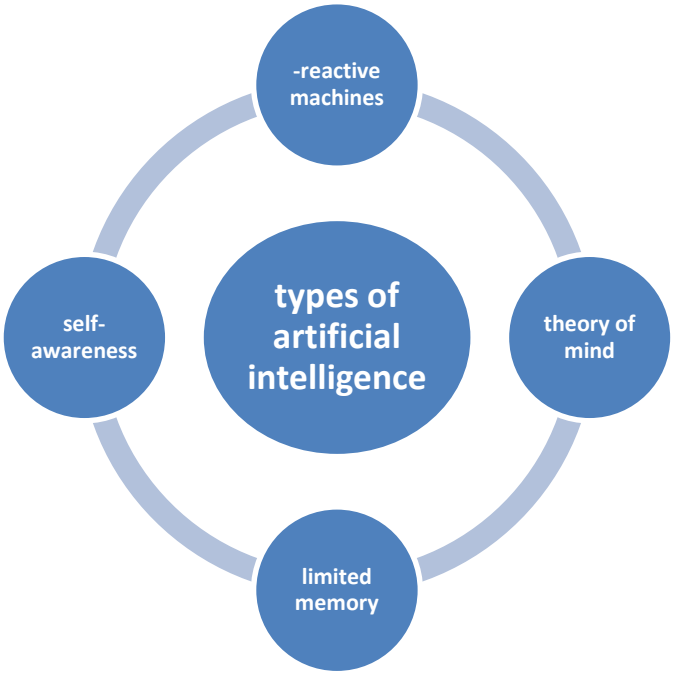
Theory of mind was used in the design of the famous robot Sophia, a robot capable of using information to interact with situations in a human-like manner, which would teach the machine or robot how to act in a different and new situation.] Theory of mind in the development and design of robots that use conversational robots is based on the human mind, which is based on the feelings and thoughts that exist in the human being before he makes the decision-making process, so that the theory of mind robot Sophia talks to humans, and uses information and images to make decisions and respond to humans, in addition to To show dazzling facial expressions.

5-4- self-awareness:

Self-awareness devices are an ultimate goal for the existence of artificial intelligence, and they are devices that do not currently exist. These machines have awareness of the human mental level and understand why they are in this world, so that the machine not only asks for something it needs, but also understands that it needs something, and this means that the machine She understands her inner state deeply and can predict the feelings of others around her just like a human being

For example, when a person shouts in front of us, we realize that he is angry, and this conclusion is based on the feelings that the person feels himself, so that these conclusions go back to the existence of the mind.

Fig 1: **types of artificial intelligence**



Source: (Types of Artificial Intelligence – BMC Software | Blogs)

6- **Advantages and disadvantages of artificial intelligence**: (Bhbosale, Pujari, & Multi, 2020)

Everything has benefits, but it often has disadvantages and disadvantages, and the following is an explanation of the advantages and disadvantages of artificial intelligence:

Table N° 1 : Advantages and disadvantages of artificial intelligence

Defects	Advantages
Its applications are expensive	Good at detail-oriented jobs
Limited experts working in the field of artificial intelligence	Reducing time spent on data-intensive tasks
Inability to transfer information from one task to another.	Provide consistent results.
Deep technical expertise required	Introducing virtual agents powered by artificial intelligence.

Source: (Bhbosale, Pujari, & Multi, 2020)

7- artificial intelligence applications: (Borana, 2016)

Artificial intelligence is used in many important technological and life applications, which facilitated many aspects of life and performed various functions that were limited to the human mind alone and among the most important applications of artificial intelligence!!! are the following:

- **Robotics** which are used in many industries such as healthcare, finance, and marketing.
- **Exploring outer space** Like machines sent into space; Satellite, map building, and location tracking technology.
- **Customer service**: Such as robots that are used to respond to customer chats, and robots that perform customer service and e-marketing functions.
- **Stock market and finance:** Such as the algorithms that are used in analyzing stocks in the financial market, and analyzing and forecasting profits and losses.
- **digital media**: So that it displays advertisements of interest to the target person by analyzing his data and understanding his trends from his searches on the Internet.

- **healthcare sector**: So that health care machines can analyze the patient's condition based on his data, predict diseases that may occur to him in the future, and determine the type of treatment.
- **face recognition** : This technology is used in many devices such as the smart phone, and works to learn and perceive patterns to produce fast and effective results.
- **Virtual Voice**: Aids It aids and imitates human intelligence through voice communication.
- **fitness apps**: Examples of fitness apps that use artificial intelligence are smart watches that count steps, calculate calories, and other fitness-related app

8- The most important artificial intelligence research centers in the world (What is the position of Arab countries in the global artificial intelligence race?)

Presence of many pioneering innovations that push the industry forward. For this purpose, research centers and specialized institutes have been established that lead research and development in the field of artificial intelligence in the world, including:

8-1- The Alan Turing Institute

Based in the British Library in London, established in 2015. The institute helps make the UK the best place in the world for data science, AI research, collaboration and business.

8-2- Oxford Group

Located in the United States of America at the University of Oxford, it collects statistics and uses them in various research and sciences, including public health, autonomous intelligent systems, and animal husbandry.

8-3- ElkanIO . Research Laboratory

Headquartered in Cochin, Kerala, India, this lab was set up in 2017 to tackle real-world problems, and has hands-on experience developing artificial intelligence.

8-4- MIT . Institute

This institute is located in America, and the Massachusetts Institute of Technology is one of the best laboratories in the United States. It deals with several fields, including robotics, software and engineering.

8-5- UTCS AI-Lab

Located at the University of Texas, this lab is concerned with addressing the central challenges of machine perception, both from a theoretical and an empirical, implementation-oriented perspective.

8-6- Berkeley Lab

It is located in California, and is interested in collecting artificial intelligence research and linking it to scientific disciplines and the humanities.

B-The reality of artificial intelligence in the Arab world

In recent years have witnessed a remarkable trend in the Arab world to support the process of artificial intelligence, in ambitious steps supported by official procedures and decisions that may change the technology landscape in the region in the near future.

And the first signs began to implement promising strategies launched by some Arab countries; Similar to the UAE's strategy for artificial intelligence, as well as the great focus on teaching the principles of artificial intelligence at university levels in many countries in the region.

1- The pursuit of Middle Eastern countries in the artificial intelligence race

Some countries in the Middle East, the Gulf countries in particular, are distinguished in their race towards artificial intelligence from the rest of the countries in that they have the means of success from government support and great financial support, unlike the countries of the West, which may suffer some research centers, despite the abundance of minds, from the scarcity of financial support.

In the US, one of the biggest problems we have is not being able to get the budget to build something until it is proven," saidthompson (IBM CEO Middle East).

But this dilemma may not exist in the countries of the Middle East, as the budget is available, but the problem is a lack of leading minds in this field, which made them use those resources to import brains.

Another advantage that characterizes some Middle Eastern countries, according to Dr. Hatem Bugshan, head of the Great Innovation Center in Saudi Arabia, "Young people constitute 30% of the total population in the Middle East, which is a huge number, so if we try Raising these generations, after 15 to 20 years, they will be able to lead their country to be among the first adopters and successful implementers of artificial intelligence."

It is expected that the gains of Middle Eastern countries from the use of technology in 2030 will be about $230 billion

2- The most prominent efforts of Arab countries in the field of artificial intelligence:

Measures of the level of investment, innovation and implementation of artificial intelligence techniques through several criteria such as infrastructure strength, operational environment, research and development, and others, showed that Saudi Arabia ranks first in the Arab world, and 22nd globally in the global index of artificial intelligence (What is the position of Arab countries in the global artificial intelligence race?).

The UAE ranked second in the Arab world and 36 globally, followed by Qatar in third place in the Arab world and 42 globally.

As for the other Arab countries that entered the list, they are, respectively: Bahrain in the 50th place globally, Tunisia in the 53rd place, Morocco 57th and Egypt 58th

a- Saudi Arabia:

the kingdom of saudi arabia ranks first in the Arab world, and 22nd globally in the Tortoise Intelligence Global Index.

The Kingdom is working to create plans to put it at the forefront of countries that rely on artificial intelligence, as it has established a government institute called

"SDAYA". The center provides a number of electronic services that link the government and citizens.

In the context of the Kingdom's efforts to develop its capabilities, a specialized summit was held in October of last year, in which it brought together decision-makers and experts from different countries of the world under the slogan "Artificial Intelligence for the Good of Humanity".

The summit aims to build dialogues of global importance, whether in terms of recovering from the pandemic or trends that shape the field of artificial intelligence, and to discuss some of the main strategic considerations necessary to establish an effective and influential system of artificial intelligence.

b- Qatar:

Qatar ranks third in the Arab world and 42nd in the world.

The Qatari government has been interested in establishing a strong structure that enables it to develop reliance on artificial intelligence in various fields, in order to keep pace with the great transformation that the world is witnessing in this field.

It uses artificial intelligence in the fields of education, communications, gas and health, and seeks to develop it in order to cope with the requirements of life.

c- Tunisia:

With the outbreak of the Corona epidemic in the world in general and in Tunisia in particular, the Tunisian government has turned to relying on artificial intelligence to help confront the pandemic.The Tunisian government has supported programmers and scientists to use artificial intelligence for radiography, and to invent a robot to triage suspected HIV infections and search for a vaccine . Among the innovations of the Tunisian people is the achievement of the Tunisian student Yassin Bin Suleiman from an international prize for artificial intelligence, when he invented a robot that counts money. 5,500 students from 99 countries competed in the competition, outnumbered by the Tunisian student.

d- Egypt:

Egypt is working on developing capabilities in order to keep pace with the development and progress of artificial intelligence, as it has implemented capacity-building programs and trained state and private sector employees, students and graduates on artificial intelligence techniques, each in its field.

It also published community awareness programs to educate citizens about the importance of artificial intelligence and its benefits, and the possibility for citizens to benefit from it according to their different interests and according to their field of specialization and work.

The first computer science university specialized in artificial intelligence was also established in Egypt.

e- Morocco:

The State of Morocco has sought to use artificial intelligence in education and medicine and develop them to get the best results, as it has established a platform (Mathscan) for teaching mathematics in schools, this is the first application in the Arab world.

And artificial intelligence techniques were used in medicine to detect the Corona virus (Covid-19) by analyzing blood cells to identify infected cells, and artificial intelligence was used to develop the vaccine for this disease.

In Morocco, the Moroccan researcher Hajar, who was ranked first in the world in the category of "integrated comprehensive artificial intelligence", was also created in the "WomenTech" Awards, which reward women who achieve international achievements and patents in the field of advanced technology.

This achievement came through a patent for analyzing and processing the data contained in the mobile phone. This invention gives the phone the ability to recognize our feelings and interact with them through personal messages based on our psychological stat ranks first in the Arab world, and 22nd globally in the Tortoise Intelligence Global Index.

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3- Arab cooperation in the field of artificial intelligence :

Arabs are trying to cooperate in the field of artificial intelligence, unite efforts and exchange visions about this growing sector. The Arab Labor Conference, for example, which started on September 18, includes a technical committee on artificial intelligence and new work patterns.

The Arab Working Group for Artificial Intelligence also holds meetings to discuss a unified Arab strategy, and issues and areas of priority for Arab countries. The team will also discuss the importance of joint cooperation in bridging the digital gap between developed and developing countries, overcoming the disparity in technological capabilities by exchanging experiences, and forming a common framework for building human resources in the Arab world .

The Arab Working Group on Artificial Intelligence was formed according to a decision of the Arab Council of Ministers for Communications and Information at its twenty-third session, in response to the need for Arab countries to agree on a common position and a unified plan of action in the field of artificial intelligence.

Conclusion:

In recent years, artificial intelligence (AI) has received great and growing interest. Most countries of the world have raced to pay attention to it, develop it, and use it in several fields, because of its great and influential effects on various aspects of life, as it has become an integral part of the daily life of all people.

Several Arab countries do not yet have clear strategies for artificial intelligence, and they are not yet able to set priorities in this field, while there are other Arab countries that have become advanced in the world in terms of planning and employment.

These countries have relied on several components for the success of their strategy for artificial intelligence, including ensuring innovation-friendly legislation, changing the role of government to be an enabler of innovation and ensuring that the necessary infrastructure is available to all.

Countries should update curricula to include programming skills, skills that computers or machines cannot do, such as critical thinking, collaboration, team building, and social and emotional skills.

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