The Relationship between Artificial Intelligence and Internet of Things: A quick review

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Abstract:

Internet Of Things (IOT) is a network of various devices that are connected over the internet, and they can collect and exchange data with each other. These IOT devices generate a lot of data that needs to be collected and mined for actionable results through use artificial intelligence (AI) to manage huge data flows and storage in the IOT network. In this paper we briefly discussed about what IOT is, what AI is, Algorithm of AI, Challenge AI with IOT, application of artificial intelligence system in the IOT. The self-optimizing network and software defined network are parts of the important parameters in the Artificial Intelligence IoT System. This paper provides a general discussion about importance of the IoT in different applications. The paper covers different applications of IoT and shows the relationship between AI and IoT. The role of the AI in IoT applications is extensively discussed. In the future work, we are planning to work on improving the performance of IoT applications using advanced AI methods and algorithms such as Machine Learning and Deep Learning.

Keywords: Internet of Things (IOT) , Artificial Intelligence (AI)

1. Introduction

The IOT concept was coined by a member of the Radio Frequency Identification (RFID) development community in 1999, and it has recently become more relevant to the practical world largely because of the growth of mobile devices, embedded and ubiquitous communication, cloud computing and data analytics [1].

Internet of things common definition is defining as: Internet of things (IOT) is a network of physical objects. The internet is not only a network of computers, but it has evolved into a network of device of all type and sizes , vehicles, smart phones, home appliances, toys, cameras, medical instruments and industrial systems, animals, people, buildings, all connected, all communicating & sharing information based on stipulated protocols in order to achieve smart reorganizations, positioning, tracing, safe & control & even personal real time online monitoring , online upgrade, process control & administration[2,3].

A very simple IoT system should comprise of self-optimizing network and software defined networks. The self-optimizing network helps to optimize the network for huge data transmission and reception, The Self-optimizing network can be done automatically by a router and system update the router's table. The system will compute and determine the shortest path for the data to flows [4].

DOI: 10.5281/zenodo.3686810

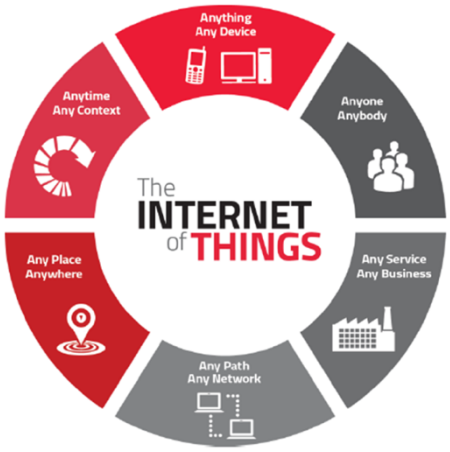

Fig. 1: Internet of Things [4]

With the huge volumes of data collected through the connected IoT devices, artificial intelligence (AI) algorithms and techniques can analyze and learn from the data in order to create public services and value. The increasing adoption of AI, which provides advanced data analytics options, largely improves the utilization of IoT.[14] The artificial intelligence (AI) field is concerned with intelligent machines, or rather with embedding intelligence to computers, i.e., "artificial intelligence is the science and engineering of making intelligent machines"[8] Artificial intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it.

AI textbooks define the field as "the study and design of intelligent agents"[10]where an intelligent agent is a system that perceives its environment and takes actions that maximize its chances of success.[11] John McCarthy, who coined the term in 1955,[12] defines it as "the science and engineering of making intelligent machines."[13] In order for the Artificial Intelligence system applied into the IoT networks, certain terms and principles must understand. For Artificial intelligence, there are two commonly used techniques - neural network and fuzzy logic [6]. There are many AI algorithms that can be used to solve a class of problems for example: Breadth-first search , uniform cost search ,Depth-first search ,Depth-limited search, Bidirectional search , Genetic algorithm .

2.ARCHITECTURAL ALTERNATIVES FOR AI IN IOT

AI approaches can be extracted to address any problem in terms of a two-stage process. The first stage of process, a set of AI models are built , these model are built by machine learning algorithms with a set of training data , the best models are built with a large amount of training data .once these models are built , they can be used to make inferences from the sensor input data , and guide the operation of the system [5] .

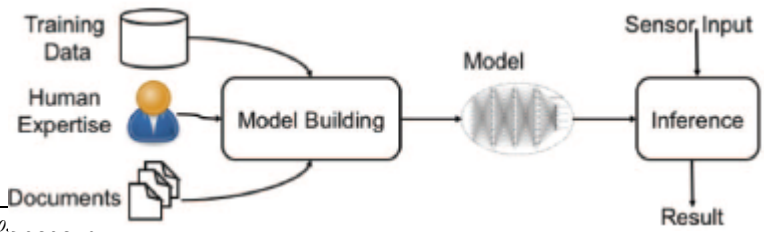

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Fig. 2: IoT Applications Architecture

3. Challenges AI with IOT

AI and IOT both have challenges, when we merge this both technologies challenges become more complex, some of these challenges are [7]:

1. Security: -
   Since AI and IOT are collecting important and sensitive data from user, we must ensure that the data is secure.

2. Compatibility and Complexity

   because of many devices connected in IOT that have many different technologies, this may cause many difficulties after combining these devices.

3. Artificial Stupidity

   Artificial stupidity means the AI program is unable to perform basic tasks perfectly, Algorithms of AI systems must be well developed and used to understand and interpret data so that more accurate and rational decisions can be taken.

4. Lack of Confidence

   As we know IoT is latest emerging technology that's why both consumers and businesses have a serious concern about the security and have a little confidence about to protect IoT devices and on integrity of the data created.

5. Cloud Attacks

   the rapid growth of cloud computing technologies has attracted unwanted attention from harmful viruses. IoT needed large amount of data, which is stored in cloud, because of these the risk of data security increases.

6. Technology

   We can say that this is the biggest challenge that includes competition for all technologies instead of facing many challenges, facing these challenges and giving competition to all technology is not an easy task.

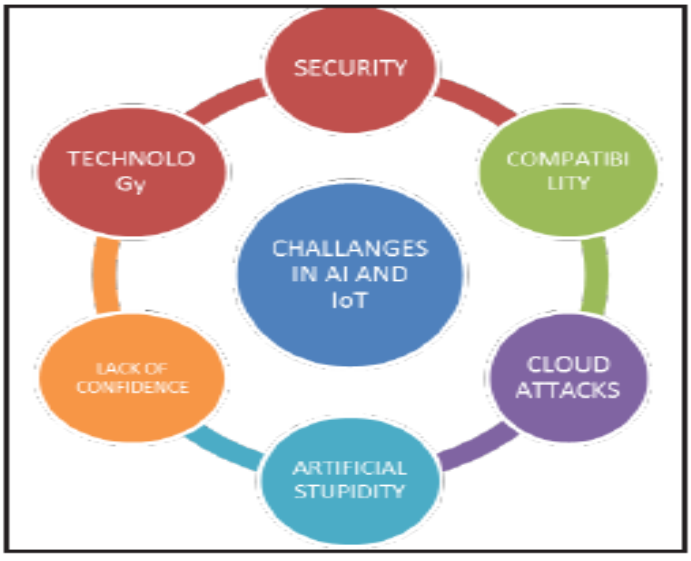

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Fig. 3: Challenges of AI and IOT

4. Some applications of artificial intelligence system in the IoT

1. Home automation:

An IoT-based monitoring and control system for home automation, this is an embedded system that uses a PIC microcontroller which provides intelligent energy preservation. It can control and automate most of the home appliances (such as lights and fan on/off) through a manageable smart phone-based android interface [9].

2. Oil field production:

An oil and gas company use IoT to optimize oilfield production. To this end the company is using sensors to measure oil extraction rates, temperature, well pressure, and other variables [9].

3. Smart hotel:

using AI-based IoT provides to its customers Smart booking system, Flexibility in room temperature control, Helpful information selection based on customers, Customer history re-synchronization by returning guests, Real-time support to customers on online platform to face their problems [9].

5. Conclusion

This paper provides a general discussion about importance of the IoT in different applications. The paper covers different applications of IoT and shows the relationship between AI and IoT. The role of the AI in IoT applications is extensively discussed. In the future work, we are planning to work on improving the performance of IoT applications using advanced AI methods and algorithms such as Machine Learning and Deep Learning.

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