IOT Concepts in Virtual Brain Simulation

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Abstract: ***Artificial intelligence like machine learning, cloud computing, has been growing from last decade. There is a correlation between human intelligence and artificial intelligence. The artificial intelligence is inspired from natural intelligence like human intelligence, self learning, environment responses etc. IOT is the sub domain of artificial intelligence. The central idea of this paper is to study of simulation among brain intelligence and study the virtual environments. IOT is the challenging and creative domain of artificial intelligence.***

Keywords: Internet of Things (IOT), Brain Simulation etc.

Introduction

IOT acts as sensory system for our mode of virtual brain. IOT involves concepts of sensor perception and contains network like functions, interfaces and objects. It also shares server, network lines and application interface with the Internet, which are similar to sensory network of human brain. Hence IOT forms the basis of sensory system of our virtual brain model.

In the Internet virtual brain architecture, the central nervous system of the Internet virtual brain is the Internet's core hardware layer, which binds to the information layer to provide support and services for the virtual neural systems of the Internet. Cloud computing has similarities with our central nervous system; it acts and interacts in same way as nervous system of our brain does. IOT interacts with cloud computing through network line and terminals to provide data and receive services.

Machinery equipment such as intelligence, 3D printing and wireless sensor become the tools for the Internet brain to reform the world. These equipments return data to the internet brain so that the virtual brain can take the decision depending upon the input data. Hence these equipments form the structure of motor nervous system of our internet brain model.

With the rise of technologies like social networks, cloud computing, Internet of Things, and Industrial Internet, the data and information on the Internet are growing and accumulating at an unprecedented rate. The sensory and nervous system of our virtual brain model produces large amount of data which is scattered all over the internet. This data involves crucial information regarding different aspects of our world. The term' big data' refers to this data which acts as basis of information for our virtual brain. It is similar to a database system for our personal computers. Hence big data forms the knowledge base for our virtual brain.

The development of AI was full of ups and downs but the research on brain decoding algorithm based on artificial neural networks kick-started the \development of AI as wisdom and intelligence base for a virtual brain. The deep learning mechanism and knowledge acquisition techniques of intelligent systems were used to make this virtual brain gain knowledge in a similar fashion as that of a human brain.

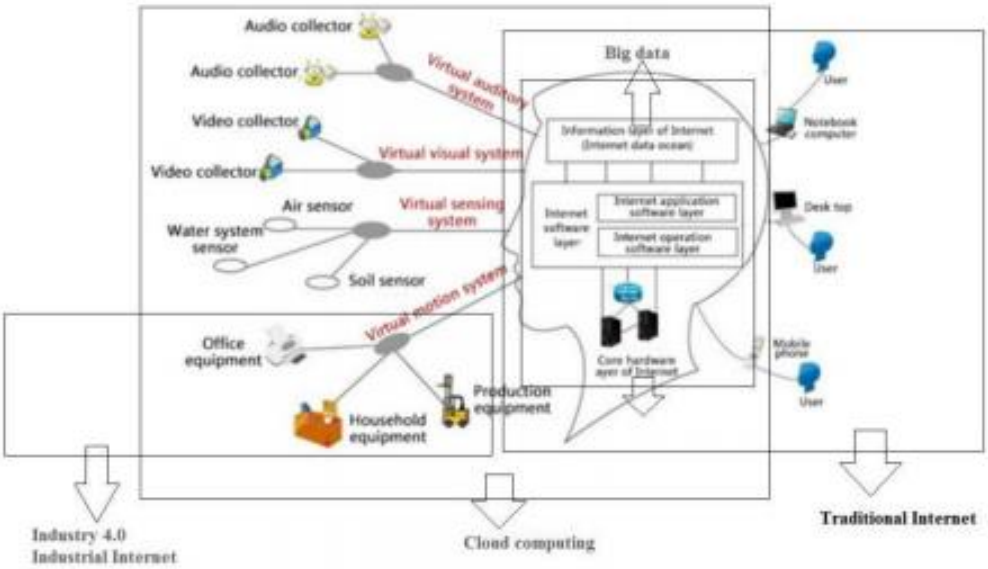

Fig. 1 IOT & Modern Technology's[9]

The brain-like Internet architecture provides new insights for the establishment of new artificial intelligence systems which also inspires us to explore if it is possible to build the artificial intelligence system model simulating the Internet brain in a supercomputer by the Internet function and architecture.The theoretical basis of the artificial intelligence system with the Internet-like brain is to implement the above-mentioned brain-like model of the Internet in the supercomputer.

With the development of the application library of the artificial intelligence system model of the Internet-like brain, it is possible to establish a new artificial intelligence system model by imitating the Internet function and architecture in the supercomputer. The establishment of the artificial intelligence system model of the Internet-like brain includes the following three steps:

Step I. Hardware basis for the artificial intelligence system of the Internet-like brain.
Step II. Realization of the functions of the artificial intelligence system of the Internet-like brain.
Step III. Present the operation of the artificial intelligence system of the Internet-like brain in the server in a visual way by using data visualization technology as the interactive interface so that people can control it by neuron accounts simulating social network.

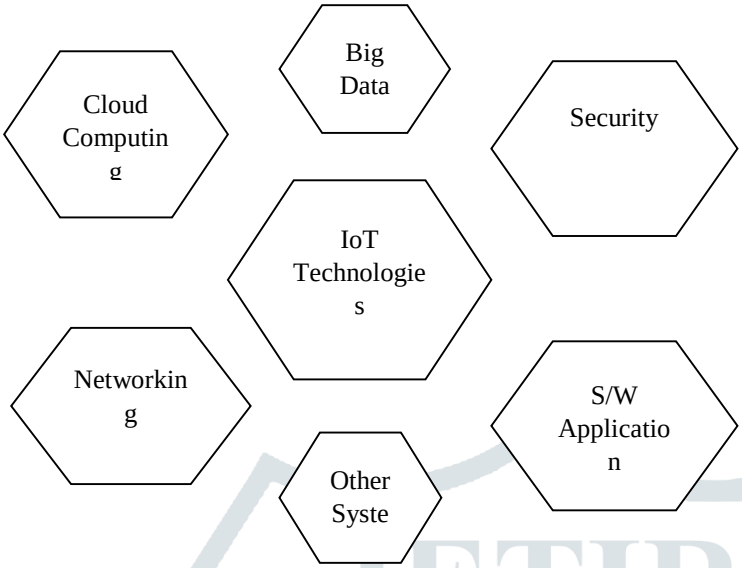

Fig. 2 IOT Technologies

The Artificial Environment in Which We Live

This brings us to the fact that the environment in which we live is also not natural. We control the trees that grow in our parks, the temperature in our homes and workplaces, as well as the animals that live around us. And if we achieved that much power to manipulate the natural environment in which we live, once we discovered how to create virtual (digital) environments, we acquired full control of every system that exists within them.

Computer programs are artificial systems built by humans to accomplish specific tasks which, normally, will either make our daily routines easier (generate reports, shop groceries online, make coffee, etc.) or enhance our capacities (remote working, weather forecasting, disease detection, etc.). These systems exist within environments which are themselves artificial systems, such as virtual machines, operating systems, or computer hardware. In this article, the term *computer system* will be used to describe any piece of code which contains an inner environment and communicates with an outer environment through an interface, such as functions, software, operating systems, and so on.

Recursiveness from the Outer to the Inner Environments

A computer Operating System (OS) interacts with the outer environment, for example, the memory and the CPU, through an interface built specifically for that purpose. Similarly, within the OS there are many computer programs interacting with the drivers, memories and other programs. These programs, in turn, are composed of functions which may accept input and produce an output.

Such interactions can be viewed as recursive collaborations, in which a system provides an interface to the outer environment, as well as having its inner environment serving as the outer environment to underlying systems. And although systems situated in the deepest part of the recursion might cause large effects in the outermost systems, such as an infinite loop causing an entire Operating System to freeze, it is usually the latter which has a greater impact in the innermost systems. If the Operating System fails to interact with the CPU, it will not be able to execute any program within it.

Types of artificial environments

When designing artificial intelligence (AI) solutions, we spend a lot of time focusing on aspects such as the nature of learning algorithms [ex: supervised, unsupervised, semi-supervised] or the characteristics of the data [ex: classified, unclassified…]. However, little attention is often provided to the nature of the environment on which the AI solution operates. As it turns out, the characteristics of the environment are one of the absolutely key elements to determine the right models for an AI solution.

There are several aspects that distinguish AI environments. The shape and frequency of the data, the nature of the problem, and the volume of knowledge available at any given time are some of the elements that differentiate one type of AI environment from another. Understanding the characteristics of the AI environment is one of the first tasks that AI practitioners focused on in order to tackle a specific AI problem. From that perspective, there are several categories we use to group AI problems based on the nature of the environment.

1-Complete vs. Incomplete

Complete AI environments are those on which, at any given time, we have enough information to complete a branch of the problem. Chess is a classic example of a complete AI environment. Poker, on the other hand, is an incomplete environment as AI strategies can't anticipate many moves in advance and, instead, they focus on finding a good 'equilibrium" at any given time.

2-Fully Observable vs. Partially Observable

A fully observable AI environment has access to all required information to complete target task. Image recognition operates in fully observable domains. Partially observable environments such as the ones encountered in self-driving vehicle scenarios deal with partial information in order to solve AI problems.

3-Competitive vs. Collaborative

Competitive AI environments face AI agents against each other in order to optimize a specific outcome. Games such as GO or Chess are examples of competitive AI environments. Collaborative AI environments rely on the cooperation between multiple AI agents. Self-driving vehicles or cooperating to avoid collisions or smart home sensors interactions are examples of collaborative AI environments.

4-Static vs. Dynamic

Static AI environments rely on data-knowledge sources that don't change frequently over time. Speech analysis is a problem that operates on static AI environments. Contrasting with that model, dynamic AI environments such as the vision AI systems in drones deal with data sources that change quite frequently.

5-Discrete vs. Continuous

Discrete AI environments are those on which a finite [although arbitrarily large] set of possibilities can drive the final outcome of the task. Chess is also classified as a discrete AI problem. Continuous AI environments rely on unknown and rapidly changing data sources. Vision systems in drones or self-driving cars operate on continuous AI environments.

6-Deterministic vs. Stochastic

Deterministic AI environments are those on which the outcome can be determined base on a specific state. In other words, deterministic environments ignore uncertainty. Most real world AI environments are not deterministic. Instead, they can be classified as stochastic. Self-driving vehicles are a classic example of stochastic AI processes

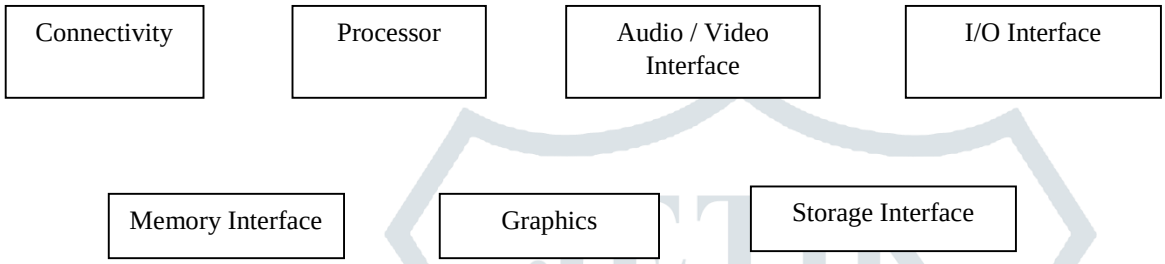

Fig. 3 IOT device components

Conclusion

In the end we conclude that such a virtual brain model is possible but requires lot of research and implementation to be done. The theoretical basis for the core of such a model is already formed but their implementation in real world is still left. If developed, this model can take this world towards technological advancement.

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