Intelligent Cloud

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***Abstract*: Cloud computing is a distributed system that delivers computing as a service. It is sharing of computer resources over a network. The cloud is used as a storage location that can be accessed and computed from anywhere. Artificial intelligence means making the computers as intelligent as man. It is the study of how to make the computers to behave as much or better than human. Machines with artificial intelligence can be managed autonomously. Both cloud computing and artificial intelligence are emerging technologies. So the integration of these concepts together brings a tremendous advantage in the field of technology. By applying artificial intelligence to the cloud, a system can be developed, by which the computers can manage themselves. An intelligent cloud is the combination of cloud and artificial intelligence. The paper covers a study of intelligent clouds which includes Artificial intelligence, Cloud computing and intelligent cloud. Furthermore the advantages and disadvantages of intelligent cloud service are also discussed in the paper.**

Keywords* — *Cloud computing,artificial intelligence, intelligent cloud.

I. INTRODUCTION

The storage space and good decision making are the important facts for any applications in the field of technology. Cloud computing is an emerging technology that provides a large amount of storage. Cloud offers many other valuable services. There is a high level of interaction between natural intelligence and artificial intelligence. Introducing intelligent computing language in the software makes the machines autonomous. The application of artificial intelligence to the cloud may lead to the development of a system through which computers can manage themselves. It will make the machines autonomous. The creation and execution of applications in the cloud will help in powerful automation to handle situations and take decisions in real time over the internet. Today, it is necessary to consider computers' power consumption and regulate their operation according to the specific needs at any given time, thus reducing energy expenditure. An Intelligent cloud helps for the above purpose. Intelligent cloud enables the machines to take decisions autonomously in real time and use the resources and services available in the cloud efficiently.

II. CLOUD COMPUTING

Cloud computing is the emerging technology of delivering many kinds of resources as services, mainly over the internet. The delivering party is referred to as the service providers, while the users are known as the subscribers. Subscribers pay subscription fees typically on a per-use basis. Cloud computing is broken down in to few different categories based on the type of service provided. SaaS (Software as a Service) is the category of cloud computing in which the main resources available as a service are software applications. PaaS (Platform as a Service) is the category/application of cloud computing in which the service providers deliver a computing platform or a solution stack to their subscribers over the internet. IaaS (Infrastructure as a Service) is the category of cloud computing in which the main resources available as a service are hardware infrastructure. DaaS (Desktop as a Service), which is an emerging AaS service deals with providing a whole desktop experience over the internet, Cloud database is mostly used as a service called Database as a Service (DBaaS). Cloud computing is basically a sales and distribution model for various types of resources over the internet. A cloud database is a database that typically runs on a cloud computing platform. There are two common deployment models: users can run databases on the cloud independently, using a virtual machine image, or they can purchase access to a database service, maintained by a cloud database provider. Cloud databases are mainly used for data intensive applications such as data warehousing, data mining and business intelligence. The cloud database allow storage of a huge amount of data and easy to manage and reduce the costs as well. Cloud computing is very efficient in recovering the information after a disaster in the database. A cloud services reduces the cost and complexity of owning and operating computer networks and provide scalability, reliability and efficiency. In cloud computing the database outsourcing has become very important component nowadays.

III. ARTIFICIAL INTELLIGENCE

Artificial intelligence means making the computers intelligent. It is the study of how to make the computers to behave as much or better than human. There are mainly two differences between natural intelligence and artificial intelligence- The first one is that natural intelligence can forget and lose information and the second is its accuracy. In the case of Artificial Intelligence, whenever the same information is retrieved multiple times, the information remains the same. But in the case of natural intelligence when given the same information, it cannot be as exact, and is slower. Three recent breakthroughs have unleashed the long-awaited arrival of artificial intelligence:

1. Cheap parallel computation

Thinking is an inherently parallel process, billions of neurons firing simultaneously to create synchronous waves of cortical computation. To build a neural network, the primary architecture of AI software also requires many different processes to take place simultaneously. Each node of a neural network loosely imitates a neuron in the brain, mutually interacting with its neighbors to make sense of the signals it receives. To recognize a spoken word, a program must be able to hear all the phonemes in relation to one another; to identify an image, it needs to see every pixel in the context of the pixels around it, both deeply parallel tasks. But until recently, the typical computer processor could only ping one thing at a time.

2. Big Data

Every intelligence has to be taught. A human brain, which is genetically primed to categorize things, still needs to see a dozen examples before it can distinguish between say, cats and dogs. That's even more true for artificial minds. Even the best-programmed computer has to play at least a thousand games of chess before it gets better. A part of the AI breakthrough lies in the incredible avalanche of collected data about our world, which provides the schooling that AIs need. Massive databases, self-tracking, web cookies, online footprints, terabytes of storage, decades of search results, Wikipedia, and the entire digital universe became the teachers making AI smart.

3. Better algorithms

Digital neural nets were invented in the 1950s, but it took decades for computer scientists to learn how to tame the astronomically huge combinatorial relationships between a million or 100 million neurons. The key was to organize neural nets into stacked layers. Let's take the relatively simple task of recognizing that a face is a face. When a group of bits in a neural net are found to trigger a pattern, the image of an eye for instance, then the result is moved up to another level in the neural net for further parsing. The next level might group two eyes together and pass that meaningful chunk onto another level of hierarchical structure that associates it with the pattern of a nose. It can take millions of these nodes (each one producing a calculation feeding others around it), stacked up to 15 levels high, to recognize a human face. In 2006, Geoff Hinton, at the University of Toronto, made a key tweak to this method, which he dubbed "deep learning." He was able to mathematically optimize results from each layer so that the learning accumulated faster as it proceeded up the stack of layers. Deep-learning algorithms accelerated enormously a few years later when they were ported to GPUs. The code of deep learning alone is insufficient to generate complex logical thinking, but it is an essential component of all current AIs, including IBM's Watson, Google's search engine, and Facebook's algorithms.

The advent of AI didn't diminish the performance of purely human chess players. Quite the opposite, cheap, super smart chess programs inspired more people than ever to play chess, at more tournaments than ever, and the players got better than ever. There are more than twice as many grand masters now as there where when Deep Blue first beat Kasparov. The top-ranked human chess player today, Magnus Carlsen, trained with AIs and has been deemed the most computer-like of all human chess players. He also has the highest human grand master rating of all time.

If AI can help humans become better chess players, it stands to reason that it can help us become better pilots, better doctors, better judges, better teachers. Most of the commercial work completed by AI will be done by special-purpose, narrowly focused software brains that can, for example, translate any language into any other language, but do little else. Drive a car, but not converse. Or recall every pixel of every video on YouTube but not anticipate your work routines. In the next 10 years, 99 percent of the artificial intelligence that you will interact with, directly or indirectly, will be autistic, super smart specialists.

In fact, this won't really be intelligence, at least not as we've come to think of it. Indeed, intelligence may be a liability especially if by "intelligence" we mean our peculiar self-awareness, all our frantic loops of introspection and messy currents of self-consciousness. We want our self-driving car to be inhumanly focused on the road, not obsessing over an argument it had with the garage.

IV. INTELLIGENT CLOUD

The integration of both cloud computing and artificial intelligence provide another service "Cloud as a brain". Artificial intelligence and cloud are symbiotic because each service compliments the other. Advanced artificial intelligence tasks can require an entire datacenters worth of computing resources. In some cases, multiple datacenters could be needed to perform advanced AI tasks. Artificial intelligence requires abundant systems resources and traditional means of doing these tasks meant going out and buying the equipment or collocating servers.

Since artificial intelligence tasks can now be performed in the cloud, these tasks can be spread across datacenters if needed. Artificial intelligence works by hashing large amounts of data. The artificial intelligence engine then compares the data with data known to be correct against the data the engine proactively gathers and examines. The algorithms are designs to add new knowledge to a particular nesting of data once new data is obtained and confirmed to be true using internal methodologies. As you can see, these types of processes would overload your normal personal computer which is why the public cloud is ideal for artificial intelligence tasks.

"The cloud will take on a more active role in connecting the Internet of Things by acting as the ever-present 'brain' that ties everything together. The cloud takes on functions that mimic or act like our brain in terms of rule execution, inference and deduction similar to Apple computer's Siri or IBM's Watson that is available to everyone, everywhere[6].

More important, this feature could be built into a future cloud so that every application could leverage these functions. This would act as the glue that enables the Internet of Things to work in a coordinated fashion, sharing these 'brain-like' functions of the cloud."

Other capabilities enabled by the Cloud as a Brain, would include:

- Cloud agents. Intelligent software programs that act autonomously on behalf of a user to carry out tasks like scheduling appointments with doctors or finding the best price on products. The Cloud as a Brain will enable new levels of performance by these agents as they take advantage of unlimited compute capacity, reasoning and smart data.
- Sensors everywhere. As we instrument the world, monitoring centers need to be able to correlate sensor inputs and even have sensors collaborate with other sensors or trigger other sensors in an array. Again, Cloud as a Brain becomes the glue tying these sensors together and enabling the collaboration.
- Robot assistants. As robotic assistants, driverless cars, drones, worker bots and humanoid servants will become commonplace, robots will require high-levels of precision, reliability and the ability to respond to new situations. That is where the Cloud as a Brain will offer collaboration, smart data, interaction with sensors, contextual awareness and machine learning.
- Augmented reality heads-up displays. In the near future our glasses, contact lenses and possibly even retinas will be instrumented with an augmented reality layer to enhance our situational awareness. Expanding and continuously updating, searching, identifying and contextualizing the real-time experience encountered through our eyes will require the Cloud as a Brain to process such big data in real time.

- It will be interesting to see if and when other major cloud players open up their intelligent assistants, including Google Now, Microsoft's Cortana (not yet released) and Apple's Siri. My guess is that the Watson Cloud opens up a new front in both the cloud provider wars and the smart phone wars, where other vendors are compelled by the marketplace to release their Cloud as a Brain platforms.[8]

V. INTELLIGENT CLOUD SERVICES

Watson is a prime example of artificial intelligence. Watson rose to fame due to its appearance on the hit television game show Jeopardy.IBM has since harnessed Watson's Cognitive Computing model and released it as a service in the cloud. Watson's Cognitive Computing model lets the system learn from incorrect data therefore Watson becomes smarter in its decision making skills, just like a human. Watson is available as a Service and organizations can begin utilizing the artificial intelligence cloud service within their specific field.[7]

VI. CONCLUSIONS

Intelligent cloud offers a unique way to use and manage cloud resources.Cloud provides reliability, elasticity, scalability with low cost and also provides a large space for data storage. The intelligent c loud ever presents a 'brain' that ties everything together. They share similar concepts and features such as schema free database, simple API, eventual consistency, scalability synchronous or asynchronous replication, powerful management and control etc. Intelligent cloud already became a part of life for new generation people. The existing implementations of intelligent cloud may be the footsteps to a vast development in future.

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