

Blue Brain Technology

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Abstract: The brain is the most complex organ in human body. The aim of blue brain technology is to upload the complete information in the brain into a computer. We can achieve this even after the death of a human body. In this way, preserve the knowledge and intelligence. The Blue Brain technology is the latest invention in the field of neural networks. This technology will open doors in the field of artificial intelligence. The blue brain technology provides a comprehensive simulation of internal connectivity of the cerebral parts with the external artificial intelligent network. This study of human brain will lead to a total outline of the flow of the electrical signals through the brain. The intelligent neurons are a part of cortex accessible in the human brain. This new technology has made way for considerable improvement in supercomputing, also known as high performance computers.

Keywords: Blue Brain, Virtual, Artificial Intelligence, Connectivity.

1. INTRODUCTION

Blue brain is the name of the world's first virtual brain. It means a machine that can work as a human brain. Computer simulations in neuroscience hold the pledge of radically enhancing the scientific method by providing a means to test hypotheses using predictive models of complex, biological processes where experiments are not practical. Of course, simulations are just as fine as the quality of the data and the accuracy of the mathematical abstraction of the biological processes. The first stage of the Blue Brain Project was in progress after 15 years of systematically dissecting the genetic, micro anatomical and electrical property of the elementary unit of the neocortex, a solitary neocortical column, which is slight larger than the head of a pin. Today scientists are in the process of creating an artificial brain that can imagine, reply, take decision, and keep everything in memory. The main plan is to upload human brain into machine, so that man can think, take judgment without any effort. After the death of the body, the virtual brain will continue working as the man .So; still after the person passes way, we can use the knowledge, intelligence, memories, and personalities of that man for the progress of the human society.

The human brain is very complex than any creativity in the world. So, is it really potential to create a human brain? The answer is Yes. Since whatever man has produced today forever he has follow the nature. When man did not have a machine called computer, it was a big question for all .But today it is feasible due to the technology. Technology is developing quickly. IBM is currently doing research in creating a virtual brain. It is named Blue brain .If probable; this could be the primary virtual brain of the earth.

2. VIRTUAL BRAIN

2.1 What is blue brain?

IBM at present is developing a virtual brain known as the Blue brain. It would be the world's first virtual brain. In 30 years, we will be capable to scan ourselves into the computer.



Figure: 2.1 Blue brains

2.2 What is Virtual Brain?

We can state that Virtual brain is an artificial brain, which is not really the natural brain, but knows how to act as the brain. It can sense like brain, take decisions based on the past incident, and answer as the natural brain does. It is feasible by using a super computer with a vast amount of storage capacity, processing power and an interface connecting the human brain and this artificial one. In the course of this interface the data stored in the natural brain can be transmitted into the computer. So the brain and the knowledge, aptitude of anybody can be reserved and used for ever, even after the person passes way.

2.3 Why we need virtual brain?

We are developed, for the reason of our intelligence. Intelligence is the inborn feature that cannot be created. Some people have this quality, so they can think up to a level where others cannot reach. Human society is constantly in need of such aptitude and such a knowledgeable brain. But the intelligence is vanishes along with the body after the death. The virtual brain is a solution for this. The brain and intelligence will stay ever alive after the death.

We often face difficulties in remembering things such as people's names, their birthdays, and the spellings of words, proper grammar, important days, phone number, and important events. In today's active life, everybody wants to relax. Can we use any machine to help us out with these? Virtual brain might be the answer to it. What if we can upload ourselves in to the computer, live in a computer as a program.

2.4 Working of brain:

First, it is useful to explain the basic manners in which a person may be uploaded into a computer. Raymond Kurzweil in recent times provided an exciting paper on this topic. In it, he describes equally invasive and noninvasive techniques. The most interesting idea is the use of very small robots, or **nanobots**. These robots will be tiny enough to travel all over our circulatory systems. Traveling into the spine and brain, they will be capable of monitoring the motion and structure of our central nervous system. They will be intelligent to provide an interface with computer that is as close as our mind can be whereas we still reside in our biological form. Nanobots might also carefully scan the structure of our brain, give a complete readout of the connections linking each neuron. They would also document the current state of the brain. This information, when entered into a computer, could then carry on functioning as us. All that is essential is a computer with large sufficient storage space and processing power. Is the sample and state of neuron connections in our brain truly all that makes up our conscious selves? Many people judge firmly that we possess a soul, while few very technical people consider that quantum forces contribute to our awareness. But we have to now think technically. Note, on the other hand, that we need not identify how the brain actually functions, to transmit it to a computer. We need only know the media and contents. The actual mystery of how we achieved consciousness in the initial place, or how we maintain it, is a separate discussion.



Figure: 2.2. Working of brains

Actually this form appears to be very difficult to us. For this we have to first know how the human brain really works.

3. NATURAL BRAIN AND ITS FUNCTIONS

3.1 How the natural brain works?

The human capability to feel, interpret and even see is controlled, in computer like calculations, by the magical nervous system. Of course, the nervous system is fairly like magic since we can't see it, but it's functioning by passing electric impulse through our body.

One of the world's most "intricately organized" electron mechanism is the nervous system. Not yet engineers have come close to construct circuit boards and computers as accurate as the nervous system. To recognize this system, one has to know the three simple functions that it puts into action: sensory input, integration, motor output.

- 1) **Sensory input:** As soon as our eyes notice something or our hands sense a warm surface, the sensory cells, also acknowledged as Neurons, send a message directly to your brain. This action of receiving information from your surrounding is called sensory input as we are putting things in your brain by way of your senses.
- 2) **Integration:** Integration is most excellent known as the interpretation of things we have felt, tasted, and touched with our sensory cells, also known as neurons, into responses that the body recognizes. This process is the talent of the brain where many, many neurons work jointly to understand the environment.
- 3) **Motor Output:** Once our brain has interpreted all that we have learned, either by feeling, tasting, or using any other sense, then our brain send a message through neurons to effector cells, muscle or gland cells, which essentially work to perform our requests and act upon our environment. The word motor output is simply remembered if one should think that our putting something out into the surroundings through the use of a motor, similarly a muscle puts the effort for our body.

3.2 How we see, hear, feel, smell, and take decision?

1) Nose: Once the smell of food has reached your nose, which is lined with hairs, it schedules to an olfactory bulb, a set of sensory nerves. The nerve impulses take a trip through the olfactory tract, around, in a circular way, the thalamus, and finally to the smell sensory cortex of our brain, located between our eyeball and ear, wherever it has interpreted is to be understood and memorized by the body.



Figure: 3.1 Sensing and taking decision

2) Eye: Seeing is one of the most satisfying senses of the nervous system. This cherished action is principally conducted by the lens, which magnifies a seen image, vitreous disc, which bend and rotate an image against the retina, which translate the image and light through a set of cells. The retina is at the backside of the eye ball where rods and cones structure along with extra cells and tissues cospse the image into nerve impulses which are passing on along the optic nerve to the brain some it is reserved in the memory.

3) Tongue: A group of microscopic buds on the tongue divide everything we eat and drink into four kinds of taste namely sour, bitter, sweet and salty. These buds have taste pores, which alter the taste into a nerve impulse and drive the impulse to the brain through a sensory nerve fiber. Ahead of receiving the message, our brain classifies the unrelated kinds of taste. With the help of this we can differentate the taste of one kind of food to another.

4) **Ear:** Once the sound or sound wave has entered the drum, it moves to a big structure called the cochlea. In this snail like structure, the sound waves are separated into pitches. The vibrations of the pitches in the cochlea are calculated by the Corti. This organ transmits the vibrations as information to a nerve, which moves it to the brain for interpretation and memory.

4. BRAIN SIMULATION

How to apply this entire natural thing through using artificial things? Here is a comparative discussion.

- ✓ **INPUT-** The nervous system the human body, the neurons are in charge for the message passing. The body receives the input through the sensory cells. These sensory cells produce electric impulses which are usually send by the neurons. The neurons transmit these electric impulses to the brain.
- ✓ **INTERPRETATION-**The electric impulses received by the brain from the neurons are inferred in the brain. The interpretation in the brain is experted by the means of definite states of many neurons.
- ✓ **OUTPUT-**Depending on the state of the neurons, the brain sends the electric impulses representing the response which the sensory cell of human body is expected to respond.
- ✓ **MEMORY-**There are definite neurons in our brain which stand for definite states. When required these state is interpret by our brain and we can memorize the past things. To remember things we force the neurons to stand for certain states of the brain eternally and or for any motivating or serious matter this happens implicitly.
- ✓ **PROCESSING-**In a parallel way the decision building can be done by the computer by using some stored states and the received input and by performing several logical and arithmetic calculations. At present, there is no question how the virtual brain will job. But the problem is how the brain of human will be uploaded into it.



Figure: 4.1 processing of brain

4.1 Uploading human brain:

The uploading is probable by the use of small robots identified as the Nanobots. These robots are tiny and they travel throughout our circulatory system. Roaming into the spine and brain, they will be talented to check the activity and structure of our central nervous system. They will be able to offer an interface with computers that is as secure as human mind.

4.2 Current research work:

1) IBM, in partnership with scientists at Switzerland's Ecole Polytechnique Federale de Lausanne's (EPFL) Brain and Mind Institute will set in motion simulating the brain's biological systems and output the data as a working 3-dimensional representation that will recreate the high-speed electro-chemical interactions that obtain place within the brain's interior. These comprise cognitive functions such as language, learning, perception and memory in addition to brain malfunction such as psychiatric disorders like depression and autism. From there, the modeling will develop to other regions of the brain and, if successful, shed light on the relationships between genetic, molecular and cognitive functions of the brain.

2) Researchers at Microsoft's Media Presence Lab are increasing a "virtual brain," a PC-based database that hold a documentation of an individual's complete life skill. Called **MyLifeBits**, the project aims to make this database of human memories searchable in the manner of a conventional look for engine. "By 2047, almost all in order will be in cyberspace including all knowledge and creative works, said one of the project's leaders, Gordon Bell.

3) According to the **new scientist** Magazine statement Rodrigo Laje and Gabriel Mindlin of the University located in Argentina named Buenos Aires have formulated a computer model for a region of the brain called the RA nucleus which controls the lung's muscles and vocal folds.

The model brain can accurately echo the South American's song of a sparrow. The bird sing in air by forcing from their lungs past folds of tissue in the voice box. The electronic impulses of electric from the brain that force the lungs had been recorded and when the corresponding impulses were passed to the computer model of the bird's lungs, it begins to sing like the bird.

Mr.Mindlin told in weekly science magazine he was amazed on seeing the simple instructions from the brain change a constant signal into a complex series of bursts to create the intricacies of birdsong.He decides to add more brain power to his model which may reveal how birds improve their songs and study them from other birds.He hopes it might one day be potential to use similar models to map the neural brain circuitry of animals without difficult lab experiments – just by recording their calls and movements, the magazine said.

4.3 Hardware and Software Requirement:

1. A super computer.
2. Memory with a very large storing capacity.
3. Very high power processing Processor.
4. A very wide network.
5. A program to change the electric impulses from the brain to input signal, which is to be expected by the computer, and vice versa.
6. Very dominant Nanobots to act as the interface connecting the natural brain and the computer

5. BENEFITS AND DRAWBACKS

5.1 Benefits:

1. We can memorize things without any effort.
2. Result can be got in with the absence of a person.
3. Even after the death of a man his aptitude can be used.
4. The motion of different animals can be understood. From the interpretation of the electric impulses from the brain of the animals, their thinking can be understood easily.
5. It would permit the deaf to hear via direct nerve stimulation, and also be helpful for a lot of psychological diseases. By down loading the contents of the brain that was uploaded into the computer, the man can get rid of the madness.

5.2 Drawbacks:

There may be many new dangers that can be caused if these technologies are misused.

1. We become dependent upon the computer systems.
2. Others may use technical information not against us.
3. Viruses in Computer will cause an increasingly dangerous peril.
4. The real threat, however, is the disgust that people will have new technologies. That fear may terminate a large resistance. Clear proof of this type of fear is found today with respect to human cloning.

6. CONCLUSION

We will be able to transfer ourselves into computers at various points. Weather consciousness will emerge? We are really not sure of it. If consciousness arises because of some vital mass of interactions, then it may be possible. But we really do not understand what consciousness really is, so it is complex to say. Most arguments beside this outcome are seemingly easy to circumvent. They are either plain minded, or simply need extra time for technology to enlarge.

REFERENCES

- [1] <http://krazytech.com/technical-papers/blue-brain>
- [2] <http://krazytech.com/technical-papers/brain-computer-interface>
- [3] https://en.wikipedia.org/wiki/Blue_Brain_Project
- [4] http://www.isrjournals.org/journals/computerscience_information_technology_journals/bluebraintechnology1403857327.pdf