

Peer Review on Blue Brain Technology

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Abstract: The Blue Brain project(BBP) is the first comprehensive attempt to reverse-engineer the mammalian brain, in order to understand brain function and dysfunction through detailed supercomputer-based reconstructions and simulations also with the use of Blue Gene . To build comprehensive digital reconstructions of the brain this can be used to study the nature of the brain. This, in turn, helps in understanding how human beings process emotions, thoughts, and give us deeper insight into the decision making power of the human brain. The main aim is to archive the pink brain to a digital system. After the death of a human being, data such as his/her intelligence, knowledge, memory and feelings can be used for further development of society. A benefit of this concept of storage is the storing of data without deletion in real time, as a normal brain does. Real time experience is very much provident for the future generation.

Keywords: BBP(blue brain project), simulation, digital system, Blue gene

1. INTRODUCTION

The blue brain project (BPP) makes use of the Blue Gene supercomputer developed by IBM to carry out simulations. Hence the project is named the “Blue Brain“. The project was founded by Henry Markram at (EPFL) Switzerland way back in May 2005. EPFL is a research institute that specializes in natural sciences and engineering.

Today scientists are carrying out research to create an artificial brain that can think, respond, take decisions and store information. The main aim is to upload a human brain into the computer, so that it can think, and make decisions without the presence of a human body. After death, this virtual brain can act as the man. So, even after the death of a person, we will not lose the knowledge, intelligence, emotions, and memories of a person and this can be used for various situations like to continue the pending work, to decide on something based on his/her area..

The human brain is a complex system consisting of recursive connectors. It is more complex than any circuitry in the world. The human brain is a multi-level system with 1000 billion neurons (nerve cells) and 100 trillion synapses. A neuron is a cell designed to transmit information to other nerve cells, muscle, or gland cells whereas synapses help neurons to communicate with each other. Today it is possible because of advancement in technology. The world of technology has expanded in areas like humanoid robots, computing, virtual reality, wearable devices, Artificial Intelligence, Digital jewelry, Blue Eyes Technology, Brain Gate Technology and so much more at a rapid rate. A full human brain simulation (100 billion neurons) is planned to be completed by 2023 if everything goes well. If this happen this would be the first virtual brain of the world.

2. VIRTUAL BRAIN

A virtual brain is an artificial brain. It can think like the natural brain, take decisions based on the past experience, and respond as the natural brain can. It is possible to do so by using supercomputers, with a huge amount of storage capacity, processing power and an interface between the human brain and this artificial one. Through the data stored in the natural brain can be uploaded into the computer. So the brain and the knowledge, intelligence of anyone can be preserved and used forever, even after the death of the person.

Need of a Virtual Brain:-

We are developed because of our intelligence. Intelligence is the inborn quality that cannot be created. Some people have this quality so that they can think to such an extent where others cannot reach. Human society would always need such intelligence and such an intelligent brain. But the intelligence is lost along with the person after death. Virtual brain is a solution to it. It is a perfect technical solution to a very common human problem. The intelligence of a brain can be alive even after death.

We often face difficulties in remembering things such as people's names, their birthdays, and the spellings of words, proper grammar, important dates, history facts, and etc. A virtual brain can take away the extra stress we all face to remember things.

3. NATURAL BRAIN WORKING

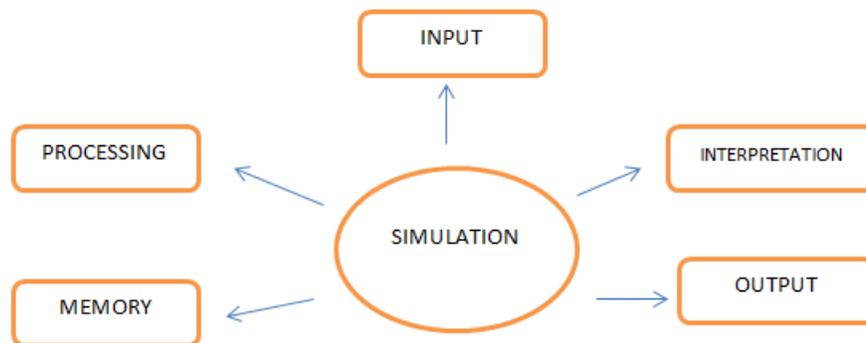


Figure 1. Simulation workflow

The human ability to feel, interpret and even see is controlled, in computer-like calculations, by the magical nervous system. Yes, the nervous system is quite like a magic because we can't see it, but it is working through electric impulses through your body.

The human brain is a multi-level complex system with 100 billion neurons and 100 trillion synapses. No any engineers have come close to making circuit boards and computers as delicate and precise as the nervous system. To understand this system, one has to know following three simple functions.

1. **Sensory input:** When our eyes see something or when our hands touch a warm surface, the sensory cells, also known as Neurons, send a message straight to our brain. This is called sensory input because we are putting things into our brain by way of senses.

2. **Integration:** It is best known as the interpretation of things like taste, touch, and sense which is possible because of our sensory cells, known as neurons. Billions of neurons work together to understand the change around us.

3. **Motor Output:** Once our brain understands the change, either by touching, tasting or via any other medium, then our brain sends a message through neurons to effector cells, muscles or gland cells, which actually work to perform our requests and act upon our environment. The word motor output is easily remembered if one should think that our putting something out into the environment through the use of a motor, like a muscle which does the work for our body as shown in fig 2.

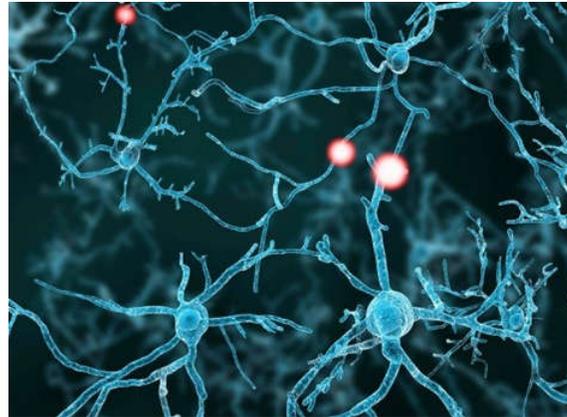


Figure 2.visualization of a neuron

4. Idea of Brain simulation

The following table compares the working procedures of the natural and simulated brain. This is a possible proposed solution. As per EPFL, development is still in progress.

INPUT	In the nervous system of our body, the neurons are responsible for transmitting information. The body receives the input by the sensory cells. These sensory cells produce electric impulses which are received by the neurons. The neurons transfer these electric impulses to the brain.	Here neurons can be replaced by a silicon chip. So, the electric impulses from the sensory cells can be received through these artificial neurons and send to a supercomputer for the interpretation.
INTER- PRETATION	The electric impulses received by the brain from the neurons are interpreted in the brain. The interpretation in the brain is accomplished by the means of certain states of many neurons.	The different values in these register will represent different states of the brain. The interpretation of the electric impulses received by the artificial neuron can be done by means of a set of registers.

OUTPUT	Based on the states of the neurons the brain sends the electric impulses representing the responses which are further received by a sensory cell of our body to respond to neurons in the brain at that time.	Similarly, based on the states of the register, the output signal can be given to the artificial neurons in the body which will be received by the sensory cell.
MEMORY	Certain neurons in our brain represent some states permanently. When required, this state is represented by our brain and we can remember the past things. To remember things we force neurons to represent certain states of the brain permanently or for any interesting or serious matter, this happens implicitly.	In the similar way the required states of the registers can be stored permanently and when required this information can be retrieved and used.
PROCESSING	When we think about something or make some calculation, logical and arithmetic calculations are done in our neural circuitry and are stored as states..	In a similar way, the decision making can be done by the computer by performing arithmetic and logical calculations on the stored states and the new inputs.

The uploading is possible by the use of small robots known as the Nanobots. These robots are small enough to travel throughout our circulatory system. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will be able to provide an interface with computers. Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connections. The information, when entered into a computer, could continue to function . The entire data in the brain will be uploaded into the computer.

5. APPLICATION

1. Gathering and testing 100 years of Data.
2. Cracking the neural code.
3. Understanding neocortical Information processing
4. A novel tool for Drug discovery for brain.
5. A global facilities.
6. A foundation for whole Brain simulation
7. A foundation for molecular modeling of brain function.

6. MERITS AND DEMRITS

Advantages:

1. Even after the death of a person his intelligence can be used.
2. This could boost study of animal behavior. That means by interpretation of the electric impulses from the brain of the animals, their thought process can be understood easily.
3. It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases.
4. We could make use of the information of the brain that was uploaded into the computer and use it to provide a solution to mental disorder.

Disadvantages:

There could be new types of threats, this technology would bring.

1. Increases the dependency on computer systems.
2. Computer viruses will pose an increasingly critical threat.
3. Data could be manipulated and used in wrong way.
4. This may lead to human cloning and we cannot imagine how big this threat would be against nature.

7. FUTURE SCOPE

1. Direct control over the activities of all individual neurons by means of Nano robots.
2. Arbitrary read /write access to the whole brain.
3. The line between the mind and the computer is blurred. Partial of full uploading is possible and inevitable.
4. More direct links into the brain with ability to read certain thoughts and copy a wide range of data and information into various parts of brain.
5. Improve the longevity.

8. CONCLUSION

BB storage space for a chat bot makes it more intelligent and faster to respond based on the experiences provided. BB storage space is an additional advantage provided for our existing system. This provides a larger amount of data stored in the memory with less effort. Understanding the natural brain's biological functioning through a virtual brain will not only make it easier for people with psychological disorders and other brain diseases but will also benefit the other areas of science with respect to the knowledge ,memory and skills too.

The potential social and economic impact is enormous. Necessarily, the project will dedicate a significant effort to educating young scientists in its new integrated approach to science, medicine and technology, and to dialog with the public on critical ethical, legal and social issues.

REFERENCES

1. *IEEE Signal Processing Magazine*, vol. 13, no. 5, pp. 4557, 1999.research.ibm.com/bluebrainJ. Baker, L. Deng, J. Glass, S. Khudanpur, Chih hui Lee, N.
2. Morgan, and D. OShaughnessy, *Developments and directions in speech recognition and understanding, part 1*, *Signal Processing Magazine, IEEE*, vol. 26, no. 3, pp. 7580, may 2009
3. J. Tebelskis, *Speech Recognition using Neural Networks*, Pittsburgh: School of Computer Science, Carnegie Mellon University, 1995.www.artificialbrains.com/blue-brain-project
4. [research.pubs.SpeechProcessing thebeautifulbrain.com.2010.02.bluebrain-film-preview](http://research.pubs.SpeechProcessing.thebeautifulbrain.com.2010.02.bluebrain-film-preview)
5. *International Journal of Computer Science and Information Technology Research* ISSN 2348-120X (online) Vol. 2, Issue 2, pp: (202-207), Month: April-June 2014,
6. Danish Ather Ambuj Kumar Agarwal, Ashendra Kumar Saxena "A Comparative Study :Agent Oriented Software Engineering Techniques" *Technical Journal of LBSIMDS, Lucknow, Vol 2; Issue2; Dec 12*
7. Ambuj Agarwal, "Implementation of Cylomatrix Complexity Matrix", *Journal of Nature Inspired Computing, Volume-1, Issue-2, Feb 2013*
8. Graham-Rowe, Duncan. "Mission to build a simulated brain begins", *New Scientist, June 2005. pp. 1879-85.*