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Virtual Brain

Miss. Smita S. Deulkar[1], Prof. Rupali Chikhale[2]
[1]*Department of Computer Science (MCA), MCA Sem-5, GHRIIT, Nagpur*
[2]*Department of Computer Science (MCA), GHRIIT, Nagpur*

Abstract: *Today the scientists are researching for creating the artificial brain that is able to think, respond, to take decision, and store anything in memory. The main aim is that, uploading human brain into the machine. So that mancould think, that takes decisioneffortlessly. After the death of the body, the virtual brain will act as the man that means after the death of a person the data will not be loss like the knowledge, intelligence, personalities, feelings and memories of that man, whichwill be used for the development of the human society. Technology is growing faster with every day. IBM has now jumped in research for creating a virtual brain that is called as "Blue brain". If it is possible, then this would be the very first virtual brain of the world. IBM, is in partnership with the scientists at Switzerland's Ecole Polytech-nique Federale de Lausanne's (EPFL).The Brain and the Mind Institute will bestarting for simulating the brain's biological systems, and the output of the data will look like working in 3-dimensional model that will be recreated in the high-speed electro-chemical interactions that will took place inside the brain's interior. These will include the cognitive functions like language, learning, interpreted and memory in addition to the brain malfunction such as psychiatric disorders like depression and autism. From this here, the modeling will be expanded to the other regions of brain and, if successful, then it will shed light on the relationships between the genetic, molecular and intellectual functions of the brain.*

Keywords: *The Simulation, the Blue-gene, The Module,The Neural Code.*

I. Introduction

Human brain is the most beautiful yet valuable creation of God. The man is called as intelligent because of its brain. The brain translates the information that is delivered by the influence, which will then enable the person to react. But we loss all the knowledge that is stored in brain after the body is destroyed after the death of man. That knowledge may be used for the development of the human society. What will happen if we create a brain and we will upload the contents of natural brain into it?

II. Blue Brain

A. Definition

The name of the world's first virtual brain. It means that the machines can function as same as human brain. Today's scientists are in the research for creating the artificial brain which can think, response, take decision, and keep each and everything in the memory. The main aim/task is uploading human brain into the machine. So that, man can thinks of decision taking effortlessly. Nobody hadunderstood the complexities of the human brain. It is one of the most complex circuitry than any the world. So, the question that may bearisingwould be like "Is it really possible to create a human brain?" The answer would be "Yes". Because everything till now man has created today, as he had followed the nature. When human does not have any device likecomputer, which was a big question for everyone.

Fig. *Blue Brain*

Technology is growing nowadays speedily than each and every thing. IBM is doing research for creating the virtual brain, said to be "Blue brain". If it is possible, then this would be the very first virtual brain in the world. Within the next 30 years, it will be possible to scan ourselves into the computers. Is this is the starting of timeless life?

B. What is Virtual Brain?

VB it is an artificial brain, which not only, act as the brain but actually act as the natural brain. It is able to think like brain, it takes decisions on the basis of past experiences, and also it gives responses like the natural brain. It is achievable that by using super computer,and with the large quantity of storage capacity, and also the transforming the power and an interaction between the human brain and the artificial. With the help of this interface the data stored in natural brain could be uploaded to the computer. So the brain and its knowledge, and the intelligence of anyone can be storedand accessed forever, even after the person's death.

Fig *.Virtual Brain*

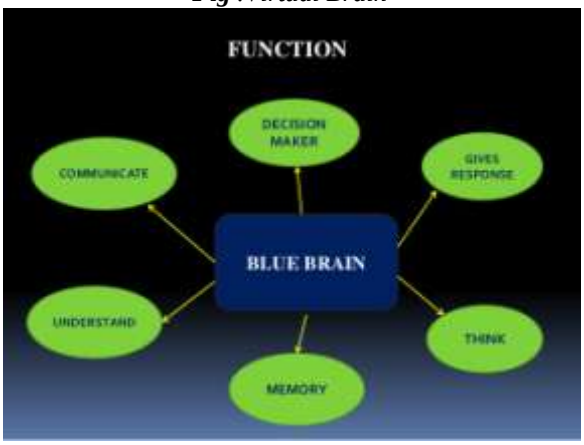


Fig. *Functional block diagram of virtual brain*

C. How is it Possible?

First of all, it is convenient to describe the essential aspects in which a person can be uploaded into the computer. The most encouraging thing is that it uses from very small robots, or maybe nanobots. These robots are small enough to travel all over in our circulatory systems. Passing into the spine and to the brain, with this they would be able to monitor the activity as well asthe structure of our central nervous system. They will be able to hand over the interface with the computers, that are as close as our mind can be in the time that we still consist in our biological form. Nanobots can also be scanning carefully the structure of our brain, by giving a complete readout of the connections between each neuron. With this they are able to record the current state of the brain. When this information, is entered into the computer, then it can continue to work/act like humans. Allthat is needed is a computer with large amount of storage space as well as processing power. Reallywith thisconcept it appears to be complex as well as very difficult for us. For this first, we will have to know that how the human brain does actually works?

III. Working Of Natural Brains

The brain actually provides serves as the body's information processing center. It obtain signals from the sensory neurons in the central and factor nervous systems, and in response it generate stands need new signals that instruct the corresponding body parts to react or move in some another way. It also non-segregated signals received from the body with indicators from beside sector of the brain, giving rise to perception and awareness. The brain weights about 1,500 grams (3 pounds) and constitutes about 2 percent of total body

weight. It consists of three major divisions; 1. The huge paired hemispheres (one half of sphere) of the cerebrum.2.The brainstem, consisting of the thalamus, hypothalamus, epithalamiums, subtha-lamus, midbrain, pons, and medulla oblongata.3.The cerebellum. By using the magical nervous system, the human have capacity to feel, explain and even see controlled, in the computer calculation. The nervous system is work as a magic because the people can't see it, but its working by electricimpulses through our body. One of the world's most "complicated organized" electron tools is the nervous system. Not only for engineers has come to making circuit boards and computers as elegant and accurate as the nervous system. One of the most important knowing three simple functions that play the action are; sensory input, integration & motor output.

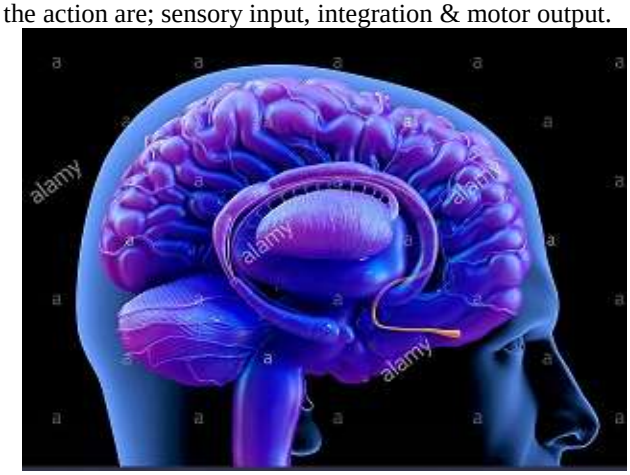


Fig. 1*.Medial view of the left hemisphere of human brain*

A. Sensory Input:

When our eyes see something or our hands touch a warm surface, then the sensory cells also called as Neurons and send a message direct to your brain. This movement of obtaininginformation from our surrounding environment is known as sensory input because we are putting things in our brain by way of our senses.

B. Integration

Integration is best known as the explanation of things that we have felt, tasted, and touched with our sensory cells, also called as neurons, of their responses that the body acknowledges. This process is all skilled in the brain from where many neurons are work together to understand the environment.

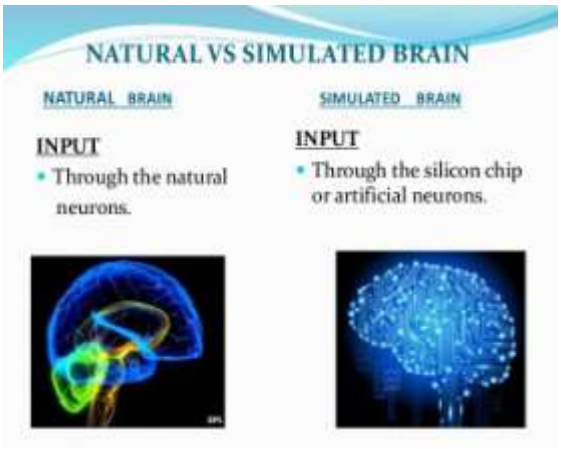
C. Motor Output

Once our brain has clarified all these that we have to learned, either by touching, tasting, or using the another sense, then our brain sends by a message by neurons to effecter cells, muscle or gland cells, that actually work to execute our requests and to move upon our environment.

IV. Brain Simulation Natural Brainsimulated Brain Input

In the nervous system of our body the neurons are liable for the message passing. The body receives all input by the sensory cells. These sensory cells produce the electric impulses, which are then received by the neurons. Then the neurons transfer these electric impulses to the brain.

INPUT In a similar way it is possible to create the artificial nervous system. The scientists have already created the artificial neurons by replacing them with the help of silicon chip. It has been tested that these neurons are able to receive the input from the sensory cells. So, the electric impulses from the sensory cells can be received from the artificial neurons and then it can send it to the super computer for the interpretation.



INTERPRETATION

The electric impulses that are received by the brain from the neurons are explained in the brain. The interpretation in the brain is gifted by the means of certain states of the many neurons.

INTERPRETATION The interpretation of an electric impulses received by the artificial neuron can be done by the means of a set of register. The different values in these register will be representing different states of the brain.

OUTPUT

Based on the states of the neurons the based on the states of the neurons the representing the responses which are further received by the sensory cell of our body to respond. The sensory cells of which part of our body is going to receive that, it depends upon the state of the neurons in the brain at that time. OUTPUT is similarly based on the states of the register as well as the output signal can be sent to the artificial neurons in the body which will be received by the sensory cell.

MEMORY

There are some neurons in our brain that represent certain states permanently. When it is required these states are interpreted by our brain and we can remember all of the past things. To remember things we force neurons for representing particular state of the brain permanently or for any other amusing or deliberate matter this is happened essentially.

In MEMORY it is possible to store the data permanently by using the secondary memory. In the same way the essential states of the registers can also be stored permanently. And whenever required these information can possibly be retrieved and used.

PROCESSING.

Whenever we take the decision, think about something, or at least do any computation, Logical and arithmetic calculations are done side-by-side in our neural circuitry. The past experience is stored and the current inputs received are used and the states of certain neurons are changed to give the output. When PROCESSING in a similar way the decision making task can be completed by the computer with the help of some stored states and the received input & by performing some arithmetic and logical calculations.

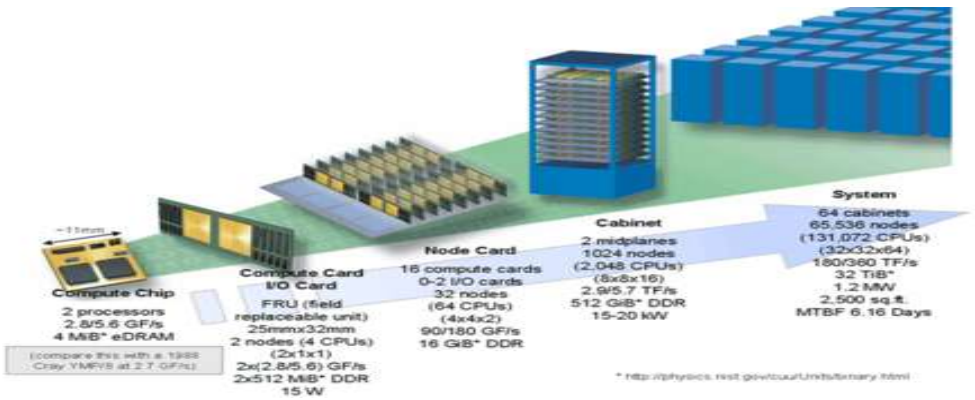


***Fig. 2**. Blue Gene/L supercomputer Architecture*

V. How The Blue Brain Project Will Work? A.Architecture Of Blue Gene

The Blue Gene/L is built with the help of the system-on-a-chip technology in which all of the functions of a node (except for main memory) are integrated onto a single application-specific integrated circuit(ASIC). The ASIC includes 2 Power PC 440 cores running at the 700 MHz's Related with each core is a 64-bit "double" floating point unit (FPU) that can be operated in a single instruction, with multiple data (SIMD) mode. Each (single) FPU can execute up to 2 "multiply-adds" per cycle, which means that the high working timing of the chip is 8 floating point operations per cycle (4 under normal conditions, with no use of SIMD mode). This leads to a high performance of over 5.6 billion floating point that can be operated per second (gig FLOPS or GFLOPS) per chip or node, or 2.8 GFLOPS in non- SIMD mode. The two CPUs (central processing units) can be used in "co-processor" mode (resulting in one CPU and 512 MB RAM (random access memory) for computation, the other CPU are being used for the converting of the I/O (input/output) of the main CPU) or in the "virtual node" mode (in which both CPUs with 256 MB each are used for computation). So, the aggregate performance of a processor card in virtual node mode is: 2 x node = 2 x 2.8GFLOPS = 5.6 GFLOPS and its high performance (optimal use of double FPU) is: 2 x 5.6 GFLOPS = 11.2 GFLOPS. A rack (1,024 nodes = 2,048 CPUs) therefore has 2.8 tera FLOPS or TFLOPS, and a peak of 5.6 TFLOPS. The Blue Brain Projects Blue Gene is an 4-rack system that has 4,096 nodes, equal to 8,192 CPUs, with a high performance of 22.4TFLOPS. A 64-rack machine should be providing 180 TFLOPS, or 360 TFLOPS at peak performance.

VI. Applications Of Blue Brain Project

Headings, or heads, are organizational devices that are used for guiding the reader through your paper. There are two types of headings and they are as follows:

A) Component heads and text heads.

B) Text heads

A. What can we learn from Blue Brain?

The Detailed, biologically accuracy of the brain simulations offers crucial to answer some of the fundamental questions about the brain which cannot be addressed without any other any current experimental or theoretical approaches. These includes,

1) Defining functions of the basic elements

Without any regardless a century of practical and theoretical research, where we are not able to supply a comprehensive clarity of the computational function of multiples ion channels, receptors, neurons or synaptic pathways in the brain. A detailed model will allow fine control of one of components and allowed anorganized inspection of their contribution to the emerging nature.

2) Understanding complexity

At a present time, detailed, accurate brain concurrently are the onlyapproach that could allow us to explain why the brain needs touse many different ion channels, neurons and synapses, asspectrum of receptors, and complex dendritic and axonalarborizations, rather than the simplified, uniform types foundin many parts of models.

3) Exploring the role of dendrites.

This is the only one of current approach to growth the dendritic object theory, which is suggests that three-dimensional(3D) voltage objects are generated repeatedly across dendritic components anyway of the origin of the neurons, and the points are used to keep such dendritic device.

4) Revealing functional diversity

Various types of models engineer a perform aparticular task, whereasaspect rum of tasks might be possible with a biologically form design. Properly understand memory storage and recovery. This approach provide the possibility to determining the way in which presenting the information are imprinted in the circuit for storage and recovery, and could reveal the part that various parts of neuron act in these crucial functions.

5) Tracking the emergence of intelligence

This approach offers the possibility to retrace the stepstaken by a network of neurons in the emergence of electrical states used to embody presentations of the organism and itsworld.

6) Identifying points of vulnerability

While the neocortex grant huge computational power to mammals, defects are common, with catastrophic cognitive effects. At present, a detailed model is the onlyapproach that could produce a list of the most unsafe circuit parameters, revealing likely candidates for the functionand targets for treatment.

7) Simulating disease and developing treatments

Such simulations could be used to check hypotheses for the pathogenesis of neurological and psychiatric diseases, and to expand and test new treatment strategies.

8) Providing a circuit design platform

Completed models could recover powerful circuit designs that could be implemented into silicone chips for use asintelligence devices in industry.

9) Gathering and Testing 100 Years of Data

The most instant advantage is to provide the working model into which the past 100 years knowledge about the microstructure and workings of the neocortical column can be tested and collected. The Blue Column will also manufacture a virtual library to traverse in 3D the micro architecture of the neocortex and enter all the key research connected to its structure and functionality.

10) Cracking the Neural Code

The Neural Code mentions that how thebrain creates edit the object to utilize electrical patterns. In the same way that the neuron is the componentry cell for computing in the brain, the NCC is the componentry network for computing in the neocortex. Creating an exact copy of the NCC which faithfully to reproduces the emerging electrical active of the real micro-circuit, is an complete requirement to releasing how the neocortex processes, stores and retrieves information.

11) Understanding Neocortical Information Process

The power of an exact simulation lies in the predictions which are generated about the neocortex. Indeed, iterations between simulations and experiments are necessary to build an exact copy of the NCC. These iterations are therefore expected to reveal the function of individual elements (neurons, synapses, ion channels, and receptors), pathways (mono-synaptic, di-synaptic, multisynaptic loops) and physiological processes (functional properties, learning, reward, goal-oriented behavior).

12) A Novel Tools for The Drug Discovery for Brain Disorders

Grasping the functions of different component and pathways of the NCC will supply a solid foundation to explore the cellular and synaptic bases of a broad spectrum of neurological and psychiatric diseases.The impact of receipt or, ion channel, cellular and synaptic shortage can be testing in simulations and the optimal practical tests can be determined.

13) A Global Facility

A software replica of a NCC will allow researchers toexplore hypotheses of brain function and this functionaccelerating research. Simulation runs can be determined which parameters should be use and measures in the practical's. An advanced 2D, 3D and 3D immersive visualization system will allow us to "imaging" of many aspectsof neural dynamically during the processing, storage and recovery of information. Such imaging practical'smay not be possible in reality or may be restrictively very costly to perform.

14) A Foundation for Whole Brain Simulations

With current and predict able future computer technology it seems doubtful that a mammalian brain can be simulated with full cellular and synaptic complexity (above the molecular level). An accurate replica of anNCC is for required in order to produce decrease models that keep critical functions and computational capacity, which can be equivalent and interconnected to form neocortical brain regions. Comprehension of the NCC architecture can be shifted to smooth reconstruction of subcortical brain regions.

15) A Foundation for Molecular Modeling of Brain Function

An accurate cellular replica of the neocortical column will provide the first and essential step to a gradual increase inmodel complexity moving towards a molecular leveldescription of the neocortex with biochemical pathways beingsimulated. Molecular types of model of the NCC will supply the substrate for interfacing gene expression with the help of network structure and function. The NCC lies at the interface between the genes and complex learning functions.Establish the link will allowed the predictions of the cognitive result of genetic disorders and allow reverse engineering of cognitive deficiency to determine the genetic and molecular source [1].It is the part of simulation will become a reality with the most advanced part of Blue Gene development.

VII. Advantages And Limitations

A. Advantages

We can remember things without doing any effort and take decision can be made without the presence of a person. Even after the death of a human then their intelligence can be used. The activity of different kinds of animals can be understood. That means by simplification of the electric obligation from the brain of the animals, their thinking can be understood lightly. It would allow the deaf to hear via direct nerve stimulation, and it also be helpful for many psychological diseases. By downloading the contents of the brain that was uploaded into the computer system.

B. Limitations

There are many new dangers technologies will be open. We can be susceptible to new forms of harm. We become dependent upon the computer systems. Others may use technical knowledge against us. Computer viruses will pose an increasingly critical threat. The people have new technology that is the fear may culminate in a large resistance. Clear proof of this type of fear is found now with respect to human cloning.

VIII. Conclusion

In the conclusion, we will be able to transfer ourselves into computers system at the various points. Most disagreement against the outcome is apparently easy to circumvent. They are either simple minded and simply required the time for technology to increase. The only serious threats raised are also overcomeas we note the combination of biological and digitaltechnologies.

Acknowledgment

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[1.] https://www.scribd.com/document/119046307/Chapter-5