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A SELF-AWARE A.I: EMULATING THE HUMAN BRAIN

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Abstract

In this paper I have compiled a possible method to emulate the functioning of the human brain in a tangible A.I model using the fields of Machine Learning, Deep Learning, neuromorphic computing, and neural networks.The conclusion this investigation suggests that it is possible to create A.I models that mimic specific functions of the brain, but due to the biological barriers faced by machines, we currently cannot create one such model that can harness the total magnitude of computing that the brain can do. All current models of A.I are based on one single scientific method whereas in my method; I have designed an amalgamation of systems that behaves like one single entity.

Keywords: *Machine Learning, Deep Learning, Neural Networks, Neuromorphic Computing, Mind-uploading*

INTRODUCTION

This paper aims to discuss the theory for creating a true A.I model that is aware about its existence and can comprehend its electrical consciousness. The strong A.I should depict behavior similar to humans in relation to decision making skills without any pre-set data processing algorithms. The A.I model should be able to handle any given scenario a human can from the decision making and core – logic point of view of human intelligence. The A.I model should be able to think on its own as an individual body without any human influences.

Our brain consists of approximately 86 billion neurons. In the process of emulating the human brain one needs to create a digital copy of these neurons and manage to upload it to a relevant computational device that is powerful enough to handle the memory requirements of the digital model resembling the human brain. The concept of copying the mental state of the human mind and uploading it to a functional computational device in a digitalized form that can be manipulated by software is known as ' mind – uploading ' [1].

A mind-upload is one of many suggested possible ways that a W.B.E { Whole Brain Emulation } can be achieved. Currently mind-upload cannot be performed successfully because the immense processing requirements of the process do not exist. However, these processing requirements would soon be met as mentioned in [2]

Today we can use other renowned technologies like algorithms based on Deep Learning and Machine Learning, Different Neural Network models and trusted procedures like neuromorphic computing to aid our pathway towards a strong Artificial Intelligence.

To fully understand Artificial Intelligence, we need to understand a broad spectrum of concepts that lead to the birth of Artificial Intelligence. The roots of Artificial Intelligence are embedded in Human psychology and in the thought of human consciousness. The pursuit for the development of a true Artificial Intelligence is based on the idea that there can be a species that has an intellectual level higher than that of humans. Artificial intelligence has paved vastly different ways from its early start in the 1950s. It has certainly helped human kind progress in numerous ways like sorting hundreds of petabytes of data and extracting useful information from them by the use of machine learning algorithms and neural networks but somewhere in these years it has lost its true purpose of origination due to this immense diversification of ideas.

This paper is solely based on the idea for the development of a strong Artificial intelligence model that can surpass human intelligence in every aspect of intellect possible. The purpose for creating this model of A.I is again extremely diverse and beneficial for human kind. If we successfully manage to create an actual self-aware A.I; it would change the human species forever. This "change" can currently not be predicted whether it would be in the favor of human kind or not.

Over the years scientists have adapted the idea of creating a model similar to that of the human brain for the basis of this true A.I. The problem at hand is the complexity of the human brain. The human brain is divided into mainly three parts the cerebrum, the brainstem, and the cerebellum. The cerebrum is the largest part of the brain and scientists have found that our consciousness resides in this part. The brain can be thought of as a region of space concentrated with neurons that differ in certain parts to handle different stimuli and make relevant computations specific to the scenario.

Humans currently don't know the following things about the human brain: the number of components the human brain has and how does the brain actually compute data by intercommunicating at a microscopic level between the neurons. Machines work in a similar way to the neurons, but they have some differences that give rise to certain complications. Neurons communicate by electrical synapses that pass from one end of the neuron to the other end; in the case of machines this electrical synapse is replaced by the flow of electrons that passes along the body of a conducting material.

The human brain mainly has 3 different chemicals that transmit information through the neurons in the form of electrical synapses these chemicals are K^+, Na^+ and Cl^-, think of these as three different flavors of electricity that flow through the brain and this is where the problem arises when we work with machines that are solely based on the transmission of electrons for the flow of electricity.

Theory

Human Beings have 5 defined senses which are sight, sound, smell, taste, and touch. In the following section we will look at how we can use Machine Learning, Deep Learning and Neural networks to replicate these senses.

Sight.

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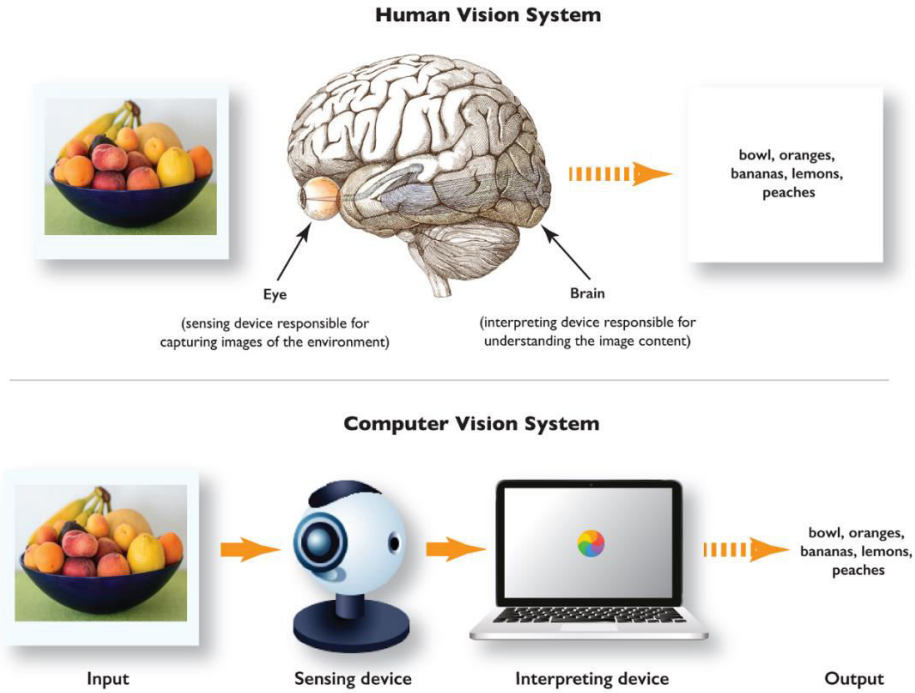
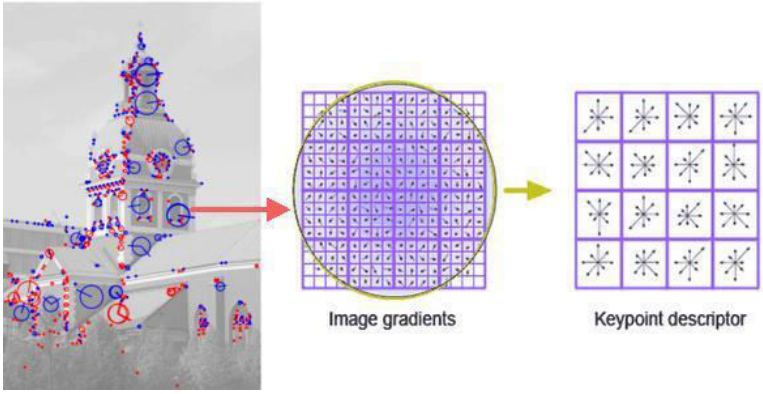
What human beings call the sense of sight is referred to as Computer Vision [3] in the field of Artificial Intelligence.



Now let's look at algorithms used in Computer Vision.

1. SIFT (scale-invariant feature transform) [4]



Detects and describes local features in digital images by locating key points and refurbishing them into Quantitative information.

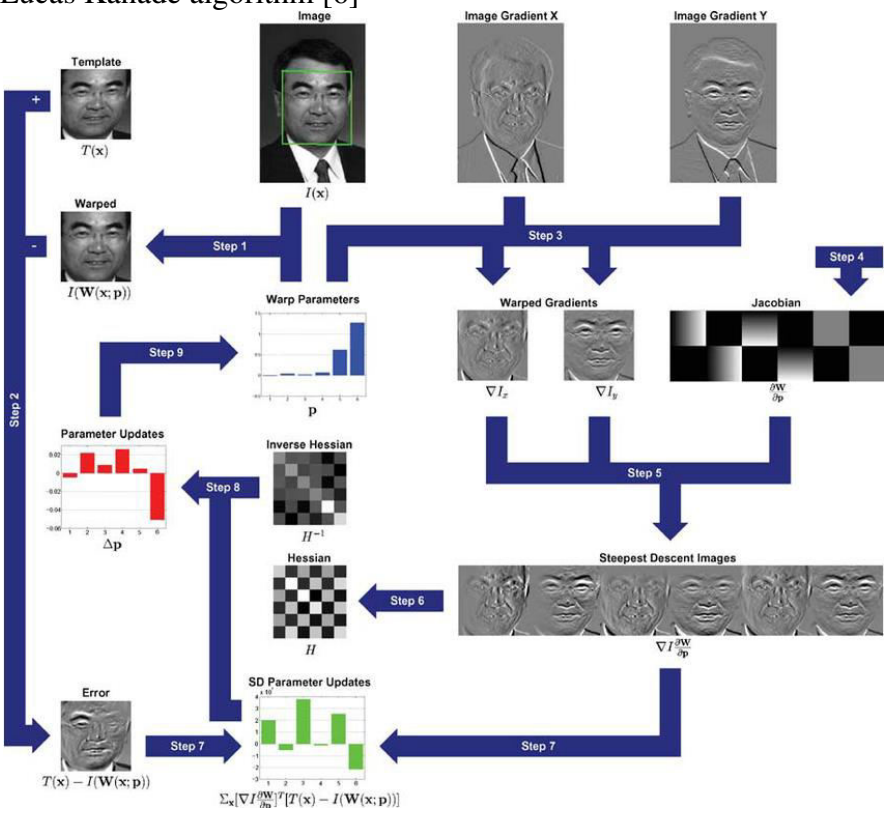
2. Viola – Jones Algorithm [5]

$$C_m = \begin{cases} 1, & \sum_{i=0}^{I_m - 1} F_{m,i} > \theta_m \\ 0, & \text{otherwise} \end{cases}$$

$$F_{m,i} = \begin{cases} \alpha_{m,i}, & \text{if } f_{m,i} > t_{m,i} \\ \beta_{m,i}, & \text{otherwise} \end{cases}$$

It is used to detect a human face in an image with other items. The location of the human face should be irrespective of any quantifiable attributes of it.

3. Lucas Kanade algorithm [6]



Gives an estimate for the movement of features in successive images of a reel loop.

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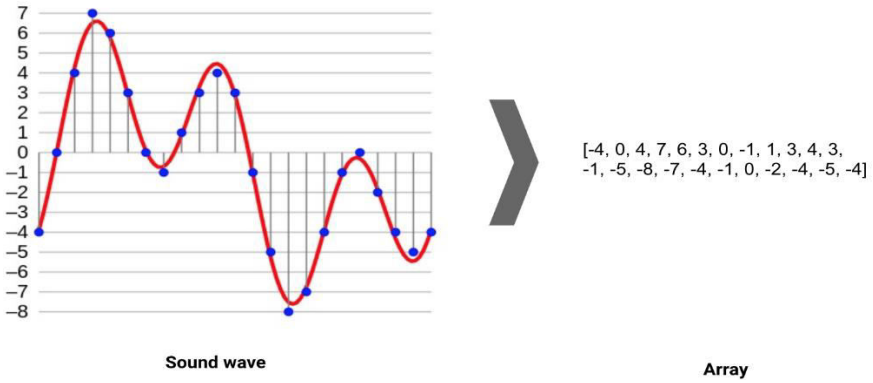
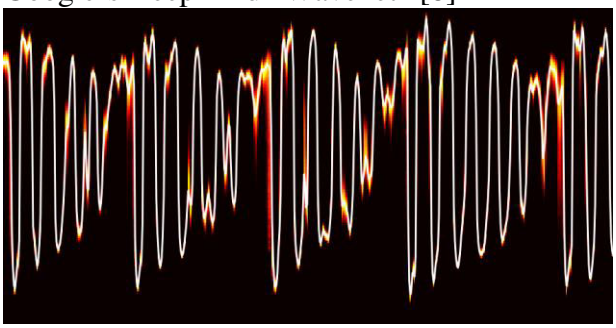
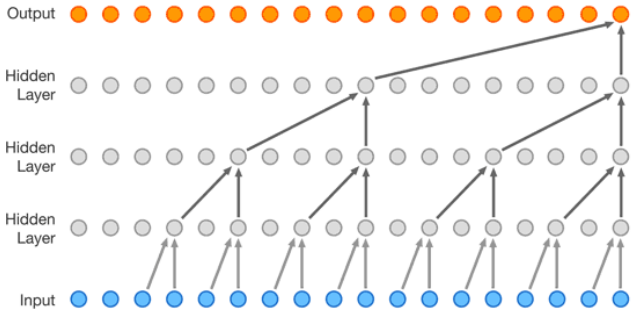
Sound

The sense of sound is replicated using audio analysis [7] by the help of Machine Learning and Deep Learning Methods.



Google's Deepmind "Wavenet" [8]

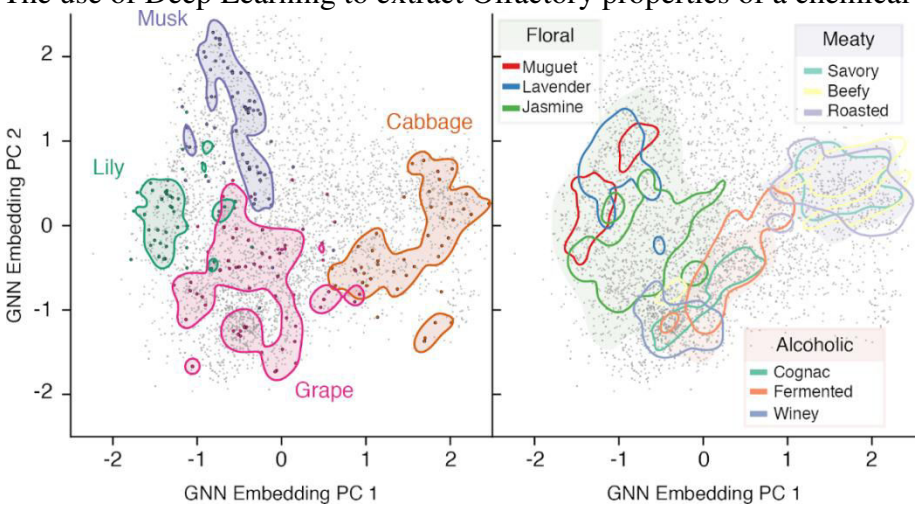




A deep neural network for the production of raw audio

Smell

The use of Deep Learning to extract Olfactory properties of a chemical compound [9]



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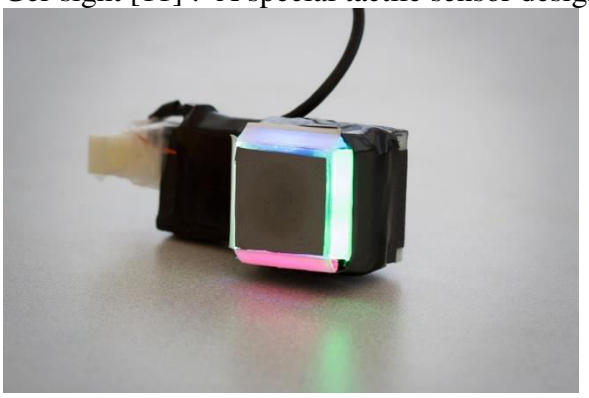
Taste

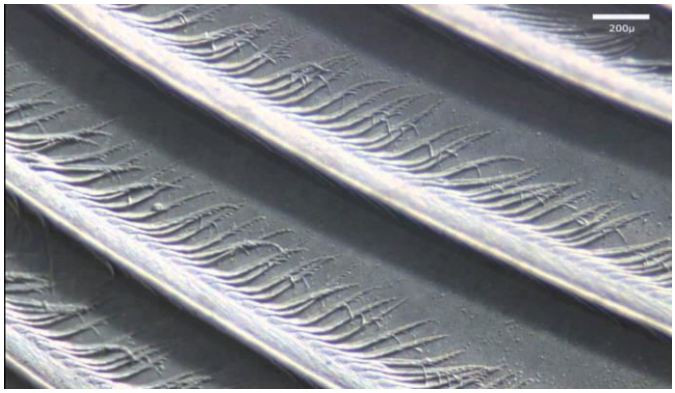
Like humans A.I does not have tastebuds hence as of now it is incapable of this sense, but it can still make recommendations whether a food item tastes good or bad and also what is the type of taste that food item possess (Spicy, sweet, sour, bitter, etc.) all of this is based on data that is produced by multiple human beings relating to their individual preferences. As of now, there are no tangible algorithms or systems that can make a A.I model primarily recognize taste as human do in real time without the help of a preference database produced by human beings.

Touch

The use of Deep Learning methods to simulate the sense of touch in machines. [10]

Gel-sight [11] : A special tactile sensor designed at MIT





The use of Vis-gel [12] dataset to judge the amount of touch required to grasp an object.

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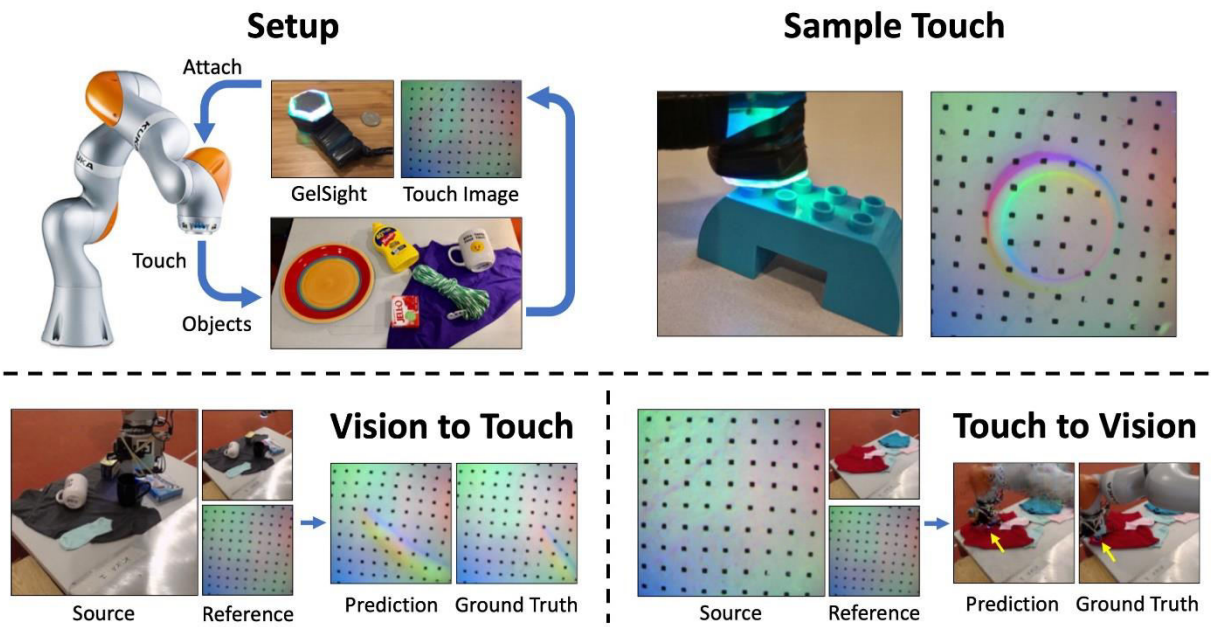

Final Method

We have looked at the 5 senses of the human beings and their extraction for A.I through Machine Learning , Deep Learning, and neural networks. Humans have these senses but on their own they are of no use, they need a central node from where these senses can be controlled this is where the human brain comes into picture, the brain acts as a central processing unit with an attached mother board where these senses are represented by different device drivers.

Let's now talk about how we can simulate this central point in a A.I model so that all the features { sight, sound, smell, taste, and touch } can be controlled consciously.

The closest thing that comes to simulate this human brain is a super computer [13]

A neuro-morphic super computer [14]

By using this computational device and earlier mentioned methods and algorithms we can now create one single model consisting of most human senses, this can now be further refined by collecting more data and parsing it according to the function needed. Humans have an advantage over this machine that they are constantly exposed to stimuli without the need of an input, but this can be overcome by an open source project being created where scientist from all over the world can input several types of data in this machine 24 hours thus solving the constant stimuli problem.

CONCLUSION

This investigation managed to compile the most important algorithms to implement the 5 senses of humans in a tangible Artificial Intelligence model. A method for controlling these module features was also successful by the method of neuromorphic supercomputers.The essence of the paper is unique due to it's nature of complexity relating to the amalgamation of several diverse systems and technologies. The limiting factor which was noticed throughout the compilation was processing power, computing power and financial cost to access the hardware needed to carry out this method in real life. It is extremely difficult for an individual to carry out this experiment due to its extensive cost nature hence it is advisable that this method is replicated by large organizations in the computing industry. The future of this research will be to develop more sustainable and scalable models of this method so that the A.I model can be created without the need of such large magnitude of resources. This can be achieved by the use of Quantum computing.

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