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The Concept of Synapse against Popular Opinion

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Short Research Article

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ABSTRACT

Emulation of the operation process in the human brain was performed by Artificial Neural Network (ANN). The new comments of this study with the concept of progressive tense like an action to new Comparison ANN with Biological Neuron Network were stated against popular opinions. However, their opinions just pointed out the role of Synapse as the weights in the framework of ANN. In this paper, another concept was better suggested. The role of Synapse should be treated as the weights of ANN, which connect two neurons of two hidden different layers. There was a new proposed opinion in this study when an accurate ANN model was built with optimal weights. The role of Synapse should be both the converting the action potential into electrical energy and chemical energy and synaptic strengthening corresponding to long-term potentiation (LTP) in Biological Neuron Network. From the concept of pharmacology, the action of updating weights with optimal values after training more data, was similar as keeping a normal converting for LTP just using medicaments for resisting some ageing brain diseases e.g. Dementia. The new proposed opinion by comparing both Neural Networks should be reasonable in this study.

Keywords: Artificial Neural Network (ANN); synapse; electrical energy; chemical energy; synaptic strengthening; Long-Term Potentiation (LTP); pharmacology; dementia.

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1. INTRODUCTION

A biological neuron is very complex; only four main parts are introduced because the Artificial Neural Network (ANN) emulates these four parts [1]. The physical meaning of ANN is an argument, although a study to research earthquakes prediction i.e. such as Lin et al. study [2] was reported.

Some literatures compared the Artificial Neural Network (ANN) with the Biological Neuron Network .e.g. synaptic weights and bias levels [3, 4,5]. The results were included in Table.1. Their opinions were popularly considered. Synapse is only an analogy for weights. The role of Synapse should be treated as the weights of ANN, which connect two neurons of two hidden different layers. Therefore, their comparisons did not have the concept of progressive tense referred to the explanations in Table.1.

The comparison between Artificial Neural Network (ANN) with Biological Neuron Network should be future interpreted and rewritten more corrected and detailed in this paper. The more training data combine with weights of two neurons from two different hidden layers when training an ANN model [2]. The Synapse in a Biological Neuron is last processing [6]. Therefore, the information of Table. 1 meets some logic problems. Acording to Hebb's Learning Rule, the popular opinion will be also re-interpreted from the concept of pharmacology as the aim of this paper through comparing ANN with Biological Neuron network.

Table 1. Analogy between biologic and artificial neural networks

Biological neuron network	Artificial neuron network
Soma	Neuron
Dendrite	Input
Axon	Output
Synapse	Weight

Table. 1 This table shows the analogy between biologic and artificial neural networks [5,1]. Synapse is an analogy for weights. It has not clear concept of progressive tense. The role of Synapse in biologic neural network should be not true and is very limited fidelity to biological realism.

2. DISCUSSION

The synapse plays a role related to the memory. This process of synaptic strengthening is known as the long-term potentiation (LTP) [7]. Therefore, the role of Synapse should be both the converting the action potential into electrical energy and chemical energy and synaptic strengthening corresponding to LTP. As least there are new proposed in this study although ANN has very limited fidelity to biological realism. The Synapse has relationship to the adjusting of weight and bias of ANN similar as Hebb's Learning Rule [8]. The Synapse was related to weight and bias in the concept of popular opinions. However, the physical viewpoints and meanings are necessary for the ANN, so that the physical concept about ANN could help the human to create new better mathematical tool to perform to biological realism. Finally, Artificial Intelligence (AI) technology could be reasonably controlled by understanding the physical meaning of Synapse. On the other hand, from the concept of pharmacology, the comparison between ANN and Biological Neuron Network could be treated as updating weights with optimal values. It is similar as the action to keep normal converting for LTP just using medicaments for resisting some ageing brain diseases e.g. Dementia. This new comparison should be reasonable.

3. CONCLUSION

The role of Synapse should be both the converting the action potential into electrical energy and chemical energy and synaptic strengthening corresponding to LTP in Biological Neuron Network. The role of Synapse was treated as the weights of ANN, which connect two neurons of two hidden different layers. Synapse is not only an analogy for weights. This concept was different from previous studies. Updating to optimal weights through training data, was similar to have normal LTP with medicaments for resisting some ageing brain diseases e.g. Dementia. The explanation of this study was reasonable through comparing both Neuron networks.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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In Memory of death to the mother of the author,`` Lo, Yu-Mei" (8 Nov 1943-at am: 5.44 on 9 Oct 2016).

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