Polynomial dendritic neural networks 抄袭 It may be time to improve the neuron of artificial neural network 声称自己提出 DD 一般形式且并未引用!

- It may be time to improve the neuron of artificial neural network 原内容（https://doi.org/10.36227/techrxiv.12477266）

刘刚的树突网络一般形式：2020 年提出。协议：CC BY-NC-SA 4.0

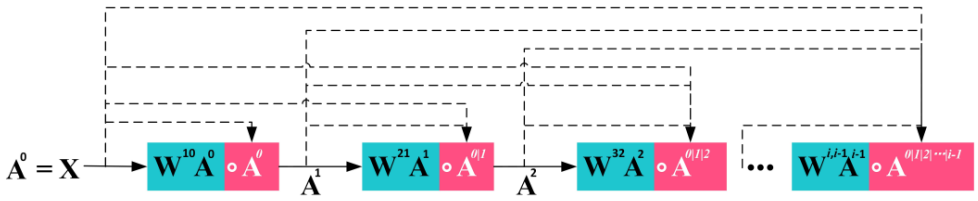

Fig. 4. Generalized Dendrite module. '|' denotes 'or'. The dotted line represents any of them.

Where A^2 is the output of dendrite or the input of the cell body. ∘ denotes Hadamard product.

The operation of the "dendrite" only consists of matrix multiplication and Hadamard product. Thus, the computational complexity is lower [34], [41]. Additionally, the mapping capacity of Gang neuron can be adjusted by the number of dendrite modules.

2) Generalized Dendrite module ($\circ A^i$): Figure 4 shows a generalized Dendrite module. The module is represented as follows.

$$A^i = W^{i,i-1}A^{i-1} \circ A^{0|1|2|\ldots|i-1} \tag{6}$$

Where A^{i-1} and A^i are the inputs and outputs of the module, respectively. $A^{0|1|2|\ldots|i-1}$ is any of A. ∘ denotes Hadamard product.

其中 x0 = 1，w0 即为偏置 b（文中已经提及）

至于其插入的线性模块刘刚早已在文中指出，可以在此结构任意插入线性模块以调整维度。

[45]). In this way, many linear modules are redundant after being connected in series. I think the use of DD should be more flexible. When the user wants to reduce or increase the dimension, just insert a linear module. We can use one linear module

- **Polynomial dendritic neural networks 核心内容抄袭树突网络 DD 的一般形式！ 且声称 DD 是其抄袭的特例！**

  （https://link.springer.com/article/10.1007/s00521-022-07044-4 ）

$$X_l = (W^l X^{l-1} + b^l) \circ (A_l X^{l-1} + t^l) \tag{7}$$

where, in the following, the operation $\circ$ is the Hadamard product, $b^l, t^l \in \mathbb{R}^{d_l}$ are biases, and $W^l, A^l \in \mathbb{R}^{d_l \times d_{l-1}}$ are weight matrices. In this model, W^l, A^l, b^l, and t^l are parameters.

$$X_l = (W^l X^0 + b^l) \circ (A^l X^{l-1} + t^l) \tag{8}$$

This model states that X^l receives input X^0 with weight W^l (the signals are transmitted through layers $1, 2, \ldots, l-1$. Here we use the weight W^l to model the signal changes). The dendritic activation uses the dendrites $\overline{x_i^{l-1} x_j^l}$ which are directly related to X^l and thought to have main effects on X^l's activation, where $x_i^{l-1} \in X^{l-1}, x_j^l \in X^l$.

Proposition 4 *In (8), X^l is a polynomial of X^0 with degree $l+1$.*

Proposition 7 *The DD in [24] is a special case of APDN (8).*

Therefore, module (8) can be applied to more networks than the DD in [24]. Such generalization is necessary because the number of neurons at different layers usually is different. For example, [10] studied pyramidal neurons. In such cases, usually $d_i \neq d_l$ for $0 \leq i, j \leq L$.