



ICONIP 2023

November 20-23, 2023, Changsha, China

Invited Session Proposal for ICONIP2023

Title: Dendritic neuron model: Theory, design, optimization and applications

Description:

Different from the popular McCulloch-Pitts neuron model, dendritic neuron model (DNM) has four layers including the synaptic, dendritic, membrane and soma layers. By the plastic mechanism, the synapses can adaptively adjust their parameters, and then the dendrites can respond nonlinearly to activation or inhibition according to the inputs of synapses. In practice, DNM can be trained to utilize specific functions to prune superfluous synapses and use multiplication operations to prune useless dendritic branches so as to develop one-of-a-kind morphology for different tasks.

During recent years, the research of DNM has attracted considerable attention and significant advancements have been made in a range of engineering fields such as pattern recognition, medical diagnosis, stock price prediction and wind speed forecasting, etc. On the other hand, to achieve a better representation of oscillatory and phasor signals existing extensively in nature, complex-valued DNM has also been proposed and gained rapid development.

This special session focuses on the comprehensive investigation of DNM and complex-valued DNM. It is expected that new design and optimization methods can be established for DNM and complex-valued DNM. The submissions on analysis, design, optimization and applications of DNM and complex-valued DNM are welcome.

More details can be found via <https://jijunkai123.github.io/DNM/index.html>.

Topics include (but are not restricted to):

- Theory analysis of dendritic neuron model
- Optimization of dendritic neuron model
- Dynamics of dendritic neuron model
- Design of dendritic neuron model
- Implementation of dendritic neuron model
- Complex-valued dendritic neuron model
- Stability of complex-valued neural networks
- Learning algorithms of complex-valued neural networks
- Convergence analysis of complex-valued optimization algorithms

- Practical applications of dendritic neuron model including pattern recognition, time series prediction and renewable energy, etc.

Proposers:

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2. Junkai Ji, Research Associate, Shenzhen University, jjunkai@szu.edu.cn
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4. Dongpo Xu, Professor, Northeast Normal University, xudp100@nenu.edu.cn