

Design of More Capable Nervous Systems

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Abstract

In this note the author discusses the design of neurons with advanced classification abilities. It might have implications for the treatment of neurological disorders.

Consider the highly cited work of Gidon et. al. [1] which showed that certain individual cortical neurons can classify inputs not normally separable linearly due to the presence of graded dendritic action potentials in contrast to the typical all-or-none action potentials. In the present note, the authors propose that if the ion channel behavior of the activation/inactivation variables [4] can be modified such that nonlinear classification [2] can be performed by a neuron, then this would possibly provide a route to “advanced cybernetic beings” capable of higher levels of data processing/intelligence than normal humans. This could be done by genetic [5] or drug interventions and provide yet another path to Huxley’s Brave New World [3] - though ethical considerations would be paramount.

Computer simulations and modeling would be the first step in finding the conditions on the variables at the node that lead to graded and/or alternate action potential waveforms. Treating the designed models as perceptron-style classifiers and studying their capabilities beyond linear classification would be the next step. Quantum effects at the nodal level which lead to subtler modifications in the activation variables could also be investigated and modulated. Apart from the curiosity of novel cybernetic [6] beings, these routes could lead to possible treatments for neurological disorders such as autism and schizophrenia.

References

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