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The spike response model: A framework to predict neuronal spike trains. (English)

[Zbl 1049.92009](#)

Kaynak, Okyay (ed.) et al., Artificial neural networks and neural information processing — ICANN/ICONIP 2003. Joint international conference ICANN/ICONIP 2003, Istanbul, Turkey, 26–29, 2003. Proceedings. Berlin: Springer (ISBN 3-540-40408-2/pbk). Lect. Notes Comput. Sci. 2714, 846-853 (2003).

Summary: We propose a simple method to map a generic threshold model, namely the Spike Response Model, to artificial data of neuronal activity using a minimal amount of a priori information. Here, data are generated by a detailed mathematical model of neuronal activity. The model neuron is driven with in-vivo-like current injected, and we test to which extent it is possible to predict the spike train of the detailed neuron model from that of the Spike Response Model.

In particular, we look at the number of spikes correctly predicted within a biologically relevant time window. We find that the Spike Response Model achieves prediction of up to 80% of the spikes with correct timing (± 2 ms). Other characteristics of activity, such as mean rate and coefficient of variation of spike trains, are predicted in the correct range as well.

For the entire collection see [[Zbl 1029.00055](#)].

MSC:

[92C20](#) Neural biology

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