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Title: Paradoxical oscillations from feedforward networks

Abstract:

Oscillations in the activity of neural networks are generally associated with recurrent circuitry, a notion that has guided the search for important mechanisms that lead to e.g. gamma rhythm generation in response to correlated inputs. Here we find that under fairly general conditions, feedforward circuitry can mimic oscillatory behaviour, yielding similar first and second-order spike train statistics. This leads to novel hypotheses for the occurrence and prevalence of such rhythms. The numerical simulations are supported by linear response theory which is built on the frequency response of stochastic leaky integrate-and-fire neurons. The results also highlight the partial equivalence of feedforward and feedback circuitry.