A memory frontier for complex synapses

Anonymous Author(s)
Affiliation
Address
email

Abstract

Blah blah blah.

1 Introduction

sec:intro

2 Mathematical setup

sec:setup

We use a well established formalism for the study of learning and memory with complex synapses (see [1–3]). In this approach, potentiating and depressing plasticity events occur at random times, with all information about the neural activity and learning rules responsible for them absorbed into their rates.

We make the following assumptions:

- There are N identical synapses with M internal functional states each.
- There are no spatial or temporal correlations in the pattern of potentiating and depressing event.
- There are no correlations in the states of different synapse.
- Plasticity events occur at random (Poisson distributed) times at rate r.
- The fraction of these that are potentiating or depressing are given by f^{pot} and f^{dep} respectively.

3 Upper bounds

sec:bounds

4 Memory curve envelope

sec:env

5 Discussion

sec:disc

References

Fusi2005cascade

[1] S. Fusi, P. J. Drew, and L. F. Abbott, "Cascade models of synaptically stored memories," *Neuron* **45** (Feb, 2005) 599–611, PubMed:15721245.

Fusi2007multistate

[2] S. Fusi and L. F. Abbott, "Limits on the memory storage capacity of bounded synapses," *Nat. Neurosci.* **10** (Apr, 2007) 485–493, PubMed:17351638.

arrett2008discrete

[3] A. B. Barrett and M. C. van Rossum, "Optimal learning rules for discrete synapses," *PLoS Comput. Biol.* **4** (Nov, 2008) e1000230, PubMed:19043540.