Abstract

Experimentally studies have shown that visual cortical neurons apply BCM (Bienenstock Cooper and Munro) learning rule for modifications in synaptic strength. BCM rule uses adaptive threshold and in this both long term potentiation (LTP) and long term depression (LTD) is automatically taken care of. This overcomes the major disadvantage of Hebbian learning in
which there is a mechanism only for LTP and no mechanism for LTD. Based on the above-mentioned experimental findings we apply BCM learning rule for the development of orientation selectivity by simple cells. We find that BCM learning rule is sufficient for segregation of ON and OFF regions in developed receptive field (RF) structure of simple cells. Starting from unsegregated ON - OFF regions we obtain elongated segregated ON and OFF regions in the RF structure very similar to actual RF structure of simple cells. The orientation selectivity thus developed is also very similar to what is found in actual simple cells.

Reference

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The Role of Constraints in the Development of Receptive Field Structure of Simple Cells Using BCM Learning


**Index Terms**

Computer Science

Information Technology

**Key words**

Simple cells

orientation maps

LGN spontaneous activity

visual cortex

BCM Neuron

BCM learning