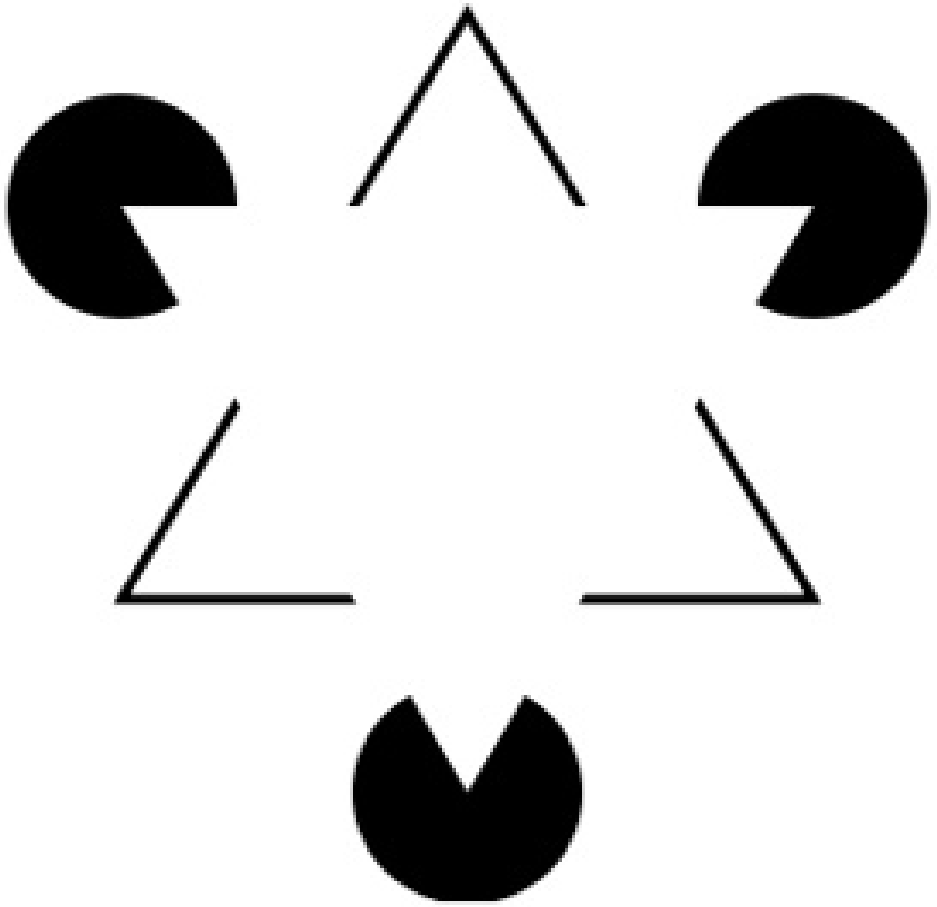
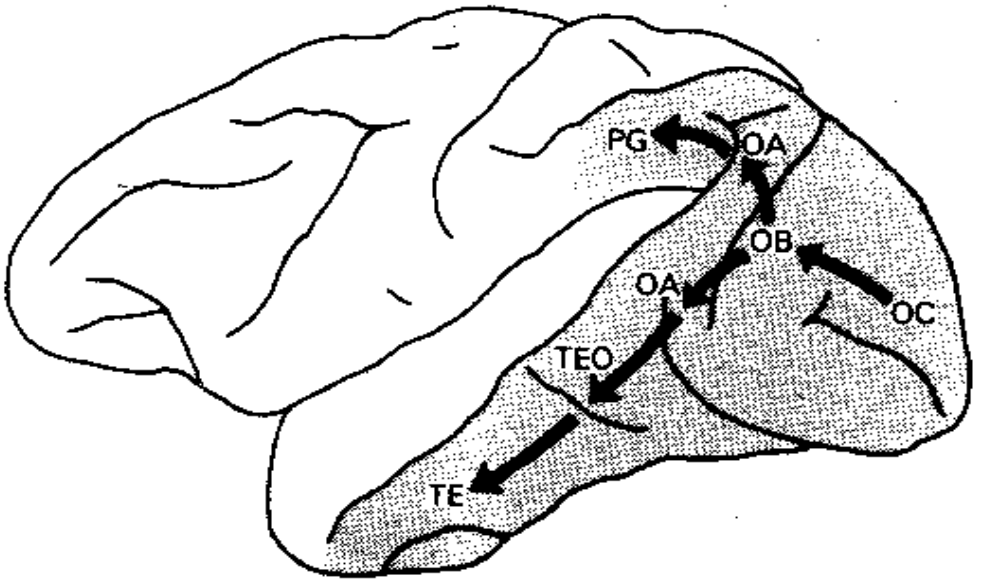
Keypoints, Cell Assemblies and Cognitive Maps: A Connectionist Approach to Machine Vision



Nathan Merritt &
Professor Eric Chown



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Outline

- Cell Assemblies in the brain are building blocks of perception and cognition
- Simulate a CA network using multiTRACE
- Provide the network with rich input through SIFT “keypoints”

Cell Assemblies

- A collection of tightly associated neurons which can sustain activity
- Activity in a CA indicates conscious perception
- Layers of CAs form hierarchical networks, from perception to abstraction

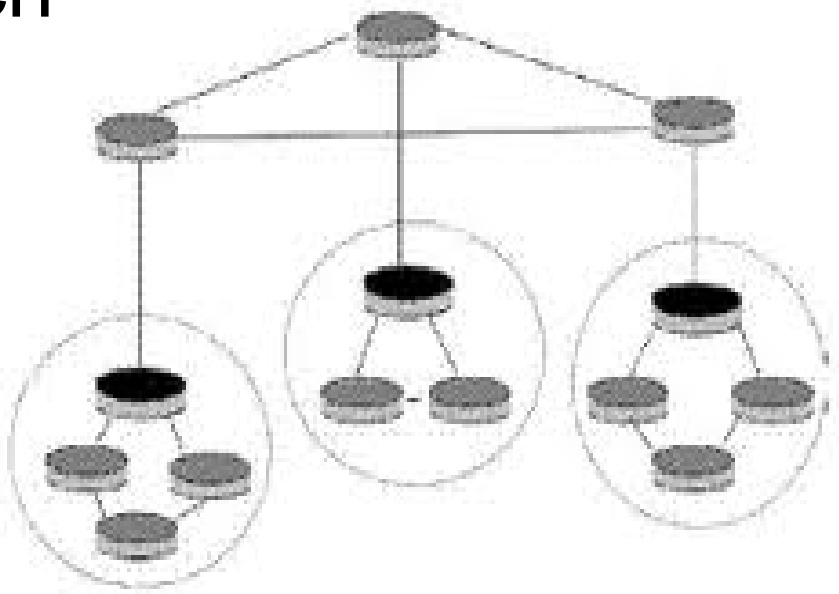

Image from http://scielo.unal.edu.co

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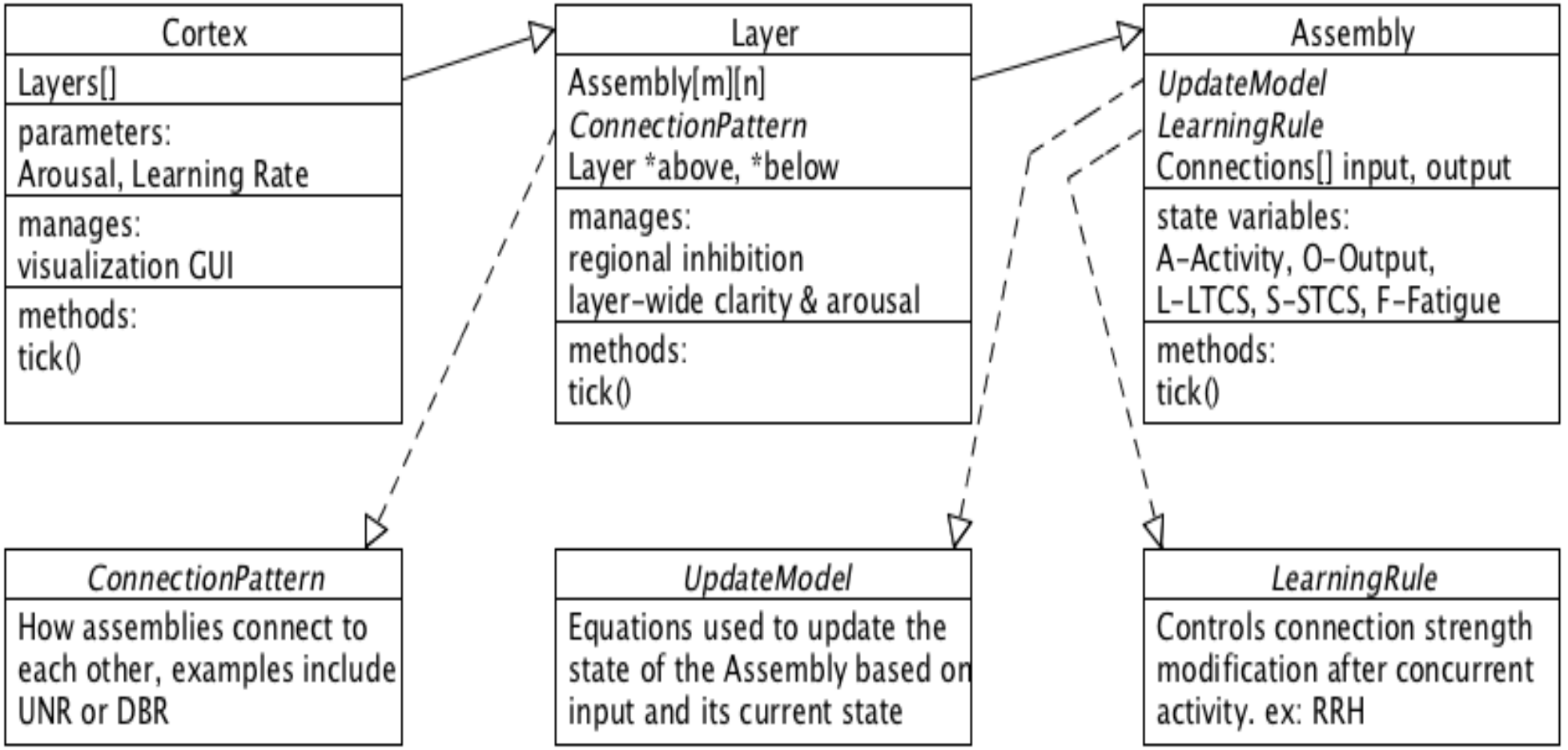
The multiTRACE Network



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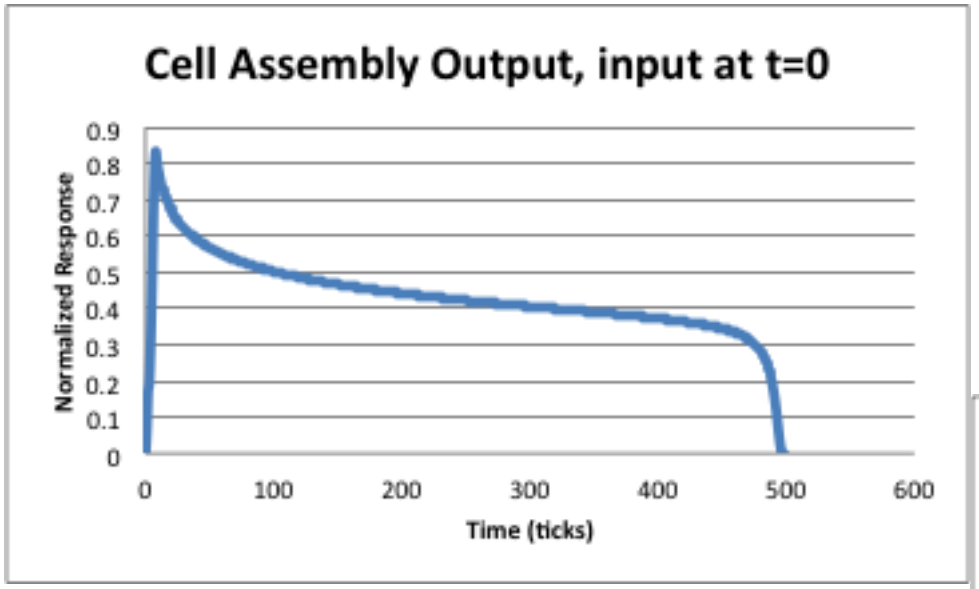
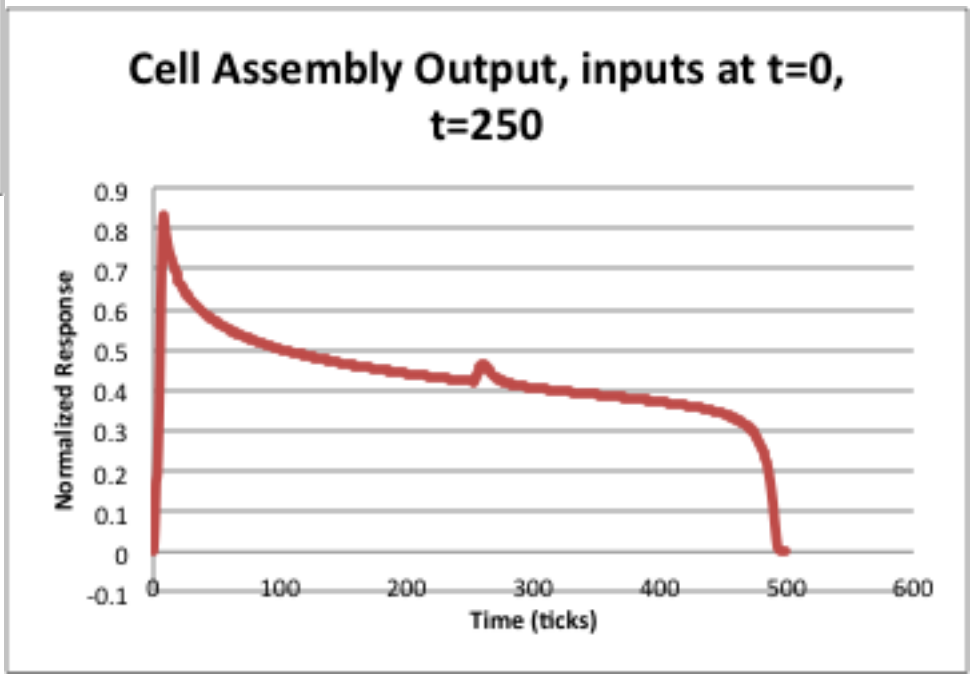
Single Cell Assembly Output



A single input at t=0 is enough to cause complete activation of the Assembly

The Assembly maintains weak activity – the network's correlate of primary memory

Additional input does cause an increase in activity, but it is difficult to get an Assembly back above its threshold for full activation



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SIFT Key Points

SIFT is a Scale-Invariant Feature Transform

From Lesperance RM-K (1990)

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