

Processing "movies" in neural nets using memory-strings

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Introduction: It may be of interest to study models of neural nets, which are based on other paradigms of learning than synaptical changes. Neural nets using memory-strings to process sequences of pictures shall be shown.

Methods: 450 chains, each with 5 neurons, cover a net with 20x20 neural columns. Randomly allocated, 5-6 neurons of different neural chains belong to each column(fig.1). Any pattern presented to the net will cause specific activity in the 5 neurons of the chains. Neuron 1 will get by projection from neuron to neuron step by step this sequence of activity. The temporal sequence of incoming activity will be recorded by neuron 1 in form of a memory-string, representing the engram of long-term memory and may be used to reproduce the pattern by reversing this procedure(1,2). 10 subsequent simple pictures with moving geometrical patterns("movies") are presented to and learnt by the net. Then 3 incomplete pictures of one "movie" are presented. The according memory-strings are formed and compared to those strings, learnt earlier. Any storage neuron will choose the best fitting string to reactivate its neural chain.

Results: The net is able to store, compare, recognize and reproduce sequences of changing patterns of in principle unlimited length quite efficiently(fig.1).

Conclusion: In a hypothetical biological model(1,2), particularly nucleic acids as engrams of long term memory might encode temporal sequences of activity, (each base triplet representing different degrees of activity). The demonstrated efficacy should justify further efforts to develop those nets and to prove their biological relevance.

(1)T Kromer, "New Neural Nets",Lecture Notes in Comp. Sci., 2001, Vol. 2206, 772-781

(2)T Kromer, "Tomography in Fractal Neural Nets",Lecture Notes in Comp. Sci., 2001, Vol. 2206, 917-923

