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Computer Simulation of Olfactory Cortex with Functional Implications for Storage and Retrieval of Olfactory Infor

Authors:

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Abstract:

Based on anatomical and physiological data, we have developed a computer simulation of piri(cid:173) form (olfactory) cortex which is capable

of reproducing spatial and temporal patterns of actual cortical activity under a variety of conditions. Using a simple Hebb-type learning

rule in conjunc(cid:173) tion with the cortical dynamics which emerge from the anatomical and physiological organiza(cid:173) tion of the model,

the simulations are capable of establishing cortical representations for differ(cid:173) ent input patterns. The basis of these representations lies in

the interaction of sparsely distribut(cid:173) ed, highly divergent/convergent interconnections between modeled neurons. We have shown that different representations can be

stored with minimal interference. and that following learning these representations are resistant to input degradation, allowing reconstruction of a representa(cid:173)

tion following only a partial presentation of an original training stimulus. Further, we have demonstrated that the degree of overlap

of cortical representations for different stimuli can also be modulated. For instance similar input patterns can be induced to generate

distinct cortical representations (discrimination). while dissimilar inputs can be induced to generate overlapping representations (accommodation). Both features are presumably important

in classifying olfacto(cid:173) ry stimuli.

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