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Temporal analysis and modeling of the visual circuitry
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The concepts of multiple processing pathways and multiple specific visual areas seem well
accepted. Clues indicate that certain areas are more sensitive to global spatial information,
whereas others respond to specific details. A relationship between global perception and
sensitivity to strong local discontinuities has also been shown. In addition, the temporal
precedence of global features has been demonstrated. Based on these findings we may conceive
of hierarchical neural networks that have a strong temporal aspect, linking both global and local
perception. In this scheme, the assumptions are made that (i) each node is modeled by an
electrical circuit, and (ii) node configurations constitute geometrical alphabets of primitive
elements, with complexity increasing with ascending hierarchical level. Net entries are frequen-
cies corresponding to edge amplitudes. At each level, an asymptotic analysis yields cells whose
potential reaches the critical firing threshold. Groups of fired cells then compete in order to
select the winning configuration. This configuration later propagates higher up in the hierarchy,
the final goal being a partial description of the scene.

Key words: computer vision, human visual system, temporal analysis, global–local information,
geometrical alphabet of primitives, scene description, neural network