Thinning algorithms based on sufficient conditions for topology preservation

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Short description: Thinning is a widely used pre-processing step in digital image processing and pattern recognition. It is an iterative layer by layer erosion until only the "skeletons" of the objects are left. We proposed some parallel thinning algorithms that are based on some sufficient conditions for topology preservation.

Description:
Thinning is a widely used pre-processing step in digital image processing and pattern recognition. It is an iterative layer by layer erosion until only the "skeletons" of the objects are left. Thinning algorithms are generally constructed in the following way: first the thinning strategy and the deletion rules are figured out, then the topological correctness is proved. In the case of the proposed algorithms we used the converse way: first we considered some sufficient conditions for parallel reduction operators to preserve topology, then the deletion rules were accommodated to them. In our algorithms, the correctness is predestinated, hence no complex proof-part is needed. In 2D, we applied Ronse's sufficient conditions for topology preservation (C. Ronse: Minimal test patterns for connectivity preservation in parallel thinning algorithms for binary digital images. Discrete Applied Mathematics 21, 67-79, 1988); our 3D thinning algorithms are based on conditions proposed by Palágyi and Kuba (K. Palágyi, A. Kuba: A parallel 3D 12-subiteration thinning algorithm. Graphical Models and Image Processing 61, 1999, 199–221).

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