Thinning algorithms based on sufficient conditions for topology preservation

Key members: Kálmán Palágyi [1]
Péter Kardos [2]
Gábor Németh [3]

Founded by: TAMOP-4.2.2/08/1/2008-0008 program of the Hungarian National Development Agency [4]

Related projects:


Lifetime from: 2008
Lifetime to: 2012

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).

Topology preserving 2-subfield 3D thinning algorithms [14], Németh, Gábor [11], Kardos Péter [13], and Palágyi Kálmán [9], Proceedings of the International Conference on Signal Processing, Pattern
A family of topology-preserving 3d parallel 6-subiteration thinning algorithms [16], Németh, Gábor [11], Kardos Péter [13], and Palágyi Kálmán [9], Combinatorial Image Analysis (IWCA), May 2011, Number 6636, Madrid, Spain, p.17 - 30, (2011)  
2D parallel thinning and shrinking based on sufficient conditions for topology preservation [18], Németh, Gábor [11], Kardos Péter [13], and Palágyi Kálmán [9], ACTA CYBERNETICA-SZEGED, 2011, Volume 20, Issue 1, Szeged, p.125 - 144, (2011)  
On topology preservation for hexagonal parallel thinning algorithms [19], Kardos, Péter [13], and Palágyi Kálmán [9], Combinatorial Image Analysis (IWCA), May 2011, Number 6636, Madrid, Spain, p.31 - 42, (2011)  
Isthmus-based Order-Independent Sequential Thinning [22], Kardos, Péter [13], and Palágyi Kálmán [9], IASTED International Conference on Signal Processing, Pattern Recognition and Applications (SPPRA), June 2012, Crete, Greek, p.28 - 34, (2012)  
On topology preservation for triangular thinning algorithms [23], Kardos, Péter [13], and Palágyi Kálmán [9], Combinatorial Image Analysis (IWCA), Nov 2012, Number 7655, Austin, TX, USA, p.128 - 142, (2012)  
Kategória: Skeletonization  

Source URL (retrieved on 2018-01-28 20:48):  
http://www.inf.u-szeged.hu/ipcg/projects/Topology_preserving_thinning  

Links:  

Felvételizőknek | Hallgatóknak | Munkatársaknak | Érdeklődőknek  
Rólunk | Oktatás | Kutatás | Együttműködés  
Felhasználói bíróságok
Thinning algorithms based on sufficient conditions for topology preservation
Published on Informatikai Intézet (http://www.inf.u-szeged.hu)