Development of a general method for detecting a specified family of curves in a digital image

1995 Fiscal Year Final Research Report Summary

DEVELOPMENT OF A GENERAL METHOD FOR DETECTING A SPECIFIED FAMILY OF CURVES IN A DIGITAL IMAGE

Research Project

Project/Area Number

06680334

Research Category

Grant-in-Aid for General Scientific Research (C)

Allocation Type

Single-year Grants

Research Field

計算機科学

Research Institution

OSAKA ELECTRO-COMMUNICATION UNIVERSITY

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Keywords

Computational Geometry / Pattern recognition / Algorithms / Digital lines and curves / Hough transform

Research Abstract

The problem of detecting all digital line components contained in a black-white image is one of the most fundamental problems in pattern recognition. In this study we have developed efficient algorithms for detecting all of digital line components. We also developed space-efficient algorithms for detecting all of digital curve components. This is the first linear-space algorithm for the purpose for detecting curve components and in addition the first to define a family of digital curves using least possible number of parameters. More concretely, key ideas are duality transform between points and lines and efficient search in an arrangment of lines. One advantage of the proposed algorithms to be distinguished from the existing ones is that they can detect all possible line and curve components satisfying the conditions without missing one. We also analyzed the computational complexity of the problem itself and algorithms to establish the optimality of the proposed algorithms. Experimental results show the practical usefullness and effectiveness of the proposed methods.

Research Products (6 results)

All Other

All Publications

[Publications] T. Asano, L. J. Guibas T. Tokuyama: "Walking in a Arrangement Topologically" Int. J. an Computational Geometry and Applications. 4. 123-151 (1994)

[Publications] N. Kanamaru, T. Nishizeki, T. Asano: "Efficient Enumeration of Grid Points in a Convex Polygon and Its Applications to Integer Programming" Int. J. an Computational Geometry and Applications. 4. 69-86 (1994)

[Publications] 浅野: "計算幾何学的手法の画像処理への応用" 画像ラボ. 29-32 (1994)

[Publications] T. Asano, N. Katoh E. Lodi, T. Roos: "Optimal Approximation of a Curve by a Polygonal Chain with Vertices on a Grid" FORMA. 10. 133-144 (1995)

[Publications] T. Asano, N. Katoh: "Variants for the Hough Transform for Line Detection." Computational Geometry: Theory and Applications. (to appear).

[Publications] T. Roos, T. Asano, D. Ranjan E. Welzl, P. Widmayer: "Space Filling Curves and Their Use in the Design of Geometric Pata Structures" Theoretical Computer Science. (to appear).

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