濃淡画像のハーフトーニングの最適化問題としての定式化と計算複雑度解析

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2000 Fiscal Year Final Research Report Summary

Formulating Digital Halftoning of Continuous-tone Images As Optimization Problem with Analysis of its Computational Complexity

Research Project

Project/Area Number

10680344

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

計算機科学

Research Institution

Japan Advance Institute of Science and Technology

Principal Investigator

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Keywords

Algorithm / Optimization problem / Halftoning / Network flow / Computer experiments

Research Abstract

In this study we have formulated the problem of digital halftoning to convert a continuous-tone image into a binary image as a combinatorial problem and analyzed it inherent computational complexity under some reasonable mathematical criterion. We obtained a conclusion that there is no efficient algorithm for solving the problem. This result is presented in an international conference with high evaluation. To merge theory and practice we have investigated traditional studies and coded most of them for comparison with our new algorithm. We also found that this problem is closely related to the problem of discrepancy and developed an algorithm with its performance guaranteed. We also found a new algorithm for finding an optimal solution under somewhat relaxed criterion based on a network flow algorithm and made experiments on many image data. The results are quite promising.

Research Products (23 results)

All Other

All Publications

[Publications] T.Asano,K.Obokata,T.Tokuyama: "On Detecting Digital Line Components in a Binary Image."Trans. of IEICE of Japan,. (採録決定).

[Publications] S.C.Nandy,T.Harayama,T.Asano: "Dynamically Maintaining the widest K-dense Corridor."Theoretical Computer Science . (採録決定).

[Publications] T.Asano,N.Katoh,T.Tokuyama: "A Unified Scheme for Detecting Fundamental Curves in Binary Edge Imaged"Computational Geometry Theory and Applications,. (採録決定).

[Publications] T.Asano,D.Z.Chen,N.Katoh,T.Tokuyama: "Efficient Algorithms for Optimization-Based Region Sogmentation"International Journal of Computational Geometry and Applications.. (採録決定).

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[Publications] T.Asano,T.Matsui,T.Tokuyama: "Optical Roundings of Sequences of Matrices"Nordic Journal of Computing. 17,3. 241-256 (2000)

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[Publications] 浅野,河村.: "ディジタル直線検出問題の計算量に関するアルゴリズム論的考察"電子情報通信学会論文誌. J83-D-I. 80-89 (2000)

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[Publications] T.Asano, K.Obokata, and T.Tokuyama: "On Detecting Digital Line Components in a Binary Image"Trans.of IEICE of Japan. (accepted.).

[Publications] S.C.Nandy, T.Harayama, and T.Asano: "Dynamically Maintaining the Widest k-dense Corridor"Theoretical Computer Science. (accepted.).

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