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

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

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10680344

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Allocation Type

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Section

一般

Research Field

計算機科学

Research Institution

Japan Advance Institute of Science and Technology

Principal Investigator

ASANO Tetsuo　　　Japan Advance Institute of Science and Technology, School of Information Science, Professor, 情報科学研究科, 教授 (90113133)

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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

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).

[Publications] T.Asano,N.Kato,K.Kawashima: "A New Approximation Algorithm for Capacitated Vehicle Routing Problem on a Tree"Journal of Combinatorial Optimization. (採録決定).

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

[Publications] T.Asano: "Effective Use of Geometric Information for Clustering and Related Topics"IEICE Trans on Fundamentals. E83-D. 418-427 (2000)

[Publications] T.Asano: "Digital Halftoning Algorithm Based on Random Space-Filling Curve"IEICE Trans. on Fundamentals. E82-A. 553-556 (1999)

[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.).

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

[Publications] T.Asano, D.Z.Chen, N.Katoh, and T.Tokuyama: "Efficient Algorithms for Optimization- Based Region Segmentation"International J.of Computational Geometry and Applications. (accepted.).

[Publications] T.Asano, N.Katoh, and K.Kawashima: "A New Approximation Algorithm for the Capacitated Vehicle Routing Problem on a Tree"Journal of Combinatorial Optimization. (accepted.).

[Publications] T.Asano, T.Matsui, and T.Tokuyama: "Optimal Roundings of Sequences and Matrices"Nordic Journal of Computing. Vol.7, No.3. 241-256 (2000)

[Publications] T.Asano: "Effective Use of Geometric Information for Clustering and Related Topics"IEICE Trans.on Fundamentals. Vol.E83-D, No.3. 418-427 (2000)

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