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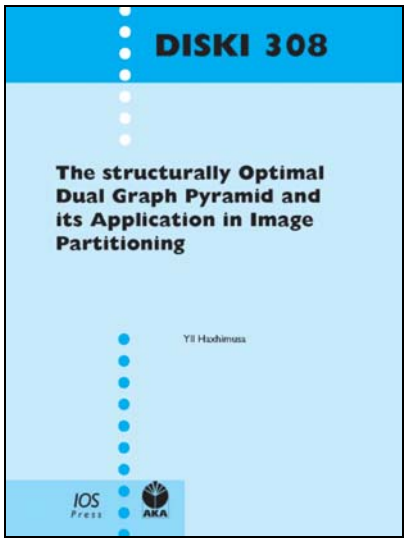

The Structurally Optimal Dual Graph Pyramid and its Application in Image Partitioning

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A widely used hierarchical representation in many areas of computer vision and pattern recognition is the (regular) image pyramid, which employs both coarse to fine and fine to coarse processing strategies. Regular pyramids rapidly compute global information in a recursive manner, because their height is logarithmically bounded by the size of the input. Regular image pyramids lack shift invariance as a result of the fixed inter-level neighborhood. Irregular hierarchical structures (irregular pyramids) overcome shift invariance, among others. However, their logarithmic height cannot be guaranteed in general, as well as the computational efficiency. Main topics of this work are irregular graph pyramids and their application in image partitioning.We introduce two new decimationconcepts, maximal independent edge set (MIES) and maximal independent directed edge set (MIDES), both based on the maximal independent set principle.We show that the construction of stochastic irregular pyramids boundslogarithmically the height of the pyramid.Within this irregular graph pyramid framework, we introduce a time efficient image partitioning method based on the minimum spanning tree principle.

Contents:

Introduction

Basics of Graph Theory

Image Pyramid

Irregular Dual Graph Pyramids

Optimizing the Pyramid Structure

Irregular Graph Image Partitioning

Evaluation of Segmentation Methods

Epilogue