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Graph-Based Representations in Pattern Recognition

5th IAPR International Workshop, GbRPR 2005
Poitiers, France, April 11-13, 2005
Proceedings



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Preface

Many vision problems have to deal with different entities (regions, lines, line junctions, etc.) and their relationships. These entities together with their relationships may be encoded using graphs or hypergraphs. The structural information encoded by graphs allows computer vision algorithms to address both the features of the different entities and the structural or topological relationships between them. Moreover, turning a computer vision problem into a graph problem allows one to access the full arsenal of graph algorithms developed in computer science.

The Technical Committee (TC15, <http://www.iapr.org/tcs.html>) of the IAPR (International Association for Pattern Recognition) has been funded in order to federate and to encourage research work in these fields. Among its activities, TC15 encourages the organization of special graph sessions at many computer vision conferences and organizes the biennial workshop GbR. While being designed within a specific framework, the graph algorithms developed for computer vision and pattern recognition tasks often share constraints and goals with those developed in other research fields such as data mining, robotics and discrete geometry. The TC15 community is thus not closed in its research fields but on the contrary is open to interchanges with other groups/communities. Within this framework, the TC15 community decided to organize the fifth edition of its workshop jointly with the international conference Discrete Geometry for Computer Imagery (DGCI) organized by TC18 of the IAPR. Indeed, within the pattern recognition field, many graph-based algorithms are used to analyze the structures of the underlying objects. On the other hand, many algorithms of discrete geometry aim at finding the structures of unstructured sets of pixels or voxels. From this point of view, both communities aim at studying the structures of discrete objects. Both conferences were held in Poitiers, during the same week, with a common session on Wednesday 13th of April.

This volume contains the papers presented at the 5th Workshop on Graph-Based Representations in Pattern Recognition (GbR) organized by the IAPR TC15. The workshop was held at the University of Poitiers, France during April 11–13, 2005. The previous workshops in the series were held in Lyon, France (1997), Haindorf, Austria (1999) [3], Ischia, Italy (2001) [2], and York, UK (2003) [1].

The papers presented during this workshop, while all based on graphs, cover a wide range of research fields related to image processing and understanding. Indeed, one paper presented by Alain Bretto and Luc Gillibert uses graphs for low image processing such as noise attenuation and edge detection. Then several papers present several segmentation methods based on graphs together with improved graph data structures to encode fine properties of the partitions. Graphs or hierarchical graph data structures may thus be used to encode fine proper-

ties of the image's content. However, graphs may also be used to encode shape information. Many papers presented during this workshop encode a shape using either its skeleton or a set of points characterizing it. Given a graph describing an object (a shape, an image, a graphic, etc.) the next step consists of determining a measure of similarity between these graphs in order to derive a similarity measure between the underlying objects. Several papers devoted to graph matching attack this difficult problem using either exact or inexact algorithms. Algorithms based on graph kernels and the heat kernel equations provide alternative and interesting approaches to graph matching. Graph-matching algorithms may be pushed one step further by studying not only the matching between two graphs but also the classification of a set of graphs or the analysis of a sequence of graphs. Several papers presented during the workshop present novel and interesting ideas on these topics.

The papers presented here have all been reviewed by two reviewers and revised by their authors. The 50 papers submitted to the GbR were written by authors coming from 20 different countries located on five different continents. Based on these 50 submitted papers the Program Committee selected 18 of them as full papers and 17 of them as posters. We would therefore like to thank the members of the Program Committee and the additional reviewers for their help in ensuring that the papers were given a thorough and critical evaluation. We would also like to thank our sponsors who provided the material and financial help for the organization of this workshop.

April 2005

Luc Brun
Mario Vento

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