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Report on Mgr. Stanislav Mikeš

The submitted thesis of Mgr. Stanislav Mikeš contains his image segmentation achievements during period 2002-2009 in ÚTIA AS CR. The image segmentation and particularly unsupervised image segmentation is closely related to the image modelling and pattern recognition research pursued in the Pattern Recognition department of ÚTIA AS CR and closely match the basic research direction of ÚTIA AS CR.

Image segmentation is a fundamental part in low level computer vision processing. It has an essential influence on the subsequent higher level visual scene interpretation for a wide range of applications. Unsupervised image segmentation is a difficult ill-defined problem and thus cannot be optimally solved in general.

The aim of his work was to study mathematical Markovian model-based unsupervised image segmentation methods and to propose and build their appropriate verification environment. This assumes to find an efficient descriptive image data representation, to find optimal contextual support set of such multidimensional stochastic model, and to estimate and compress its parameters. The solutions of these single subproblems are contained in the thesis. Important results are also three developed unsupervised Markovian segmenters, two unsupervised multisegmenters, mammogram segmenter and a unique web based service designed to mutually compare and rank different texture segmenters, and to support new segmentation and classification methods development. Markov random field analysis is numerically very demanding thus the thesis studies several exceptional models which can be solved analytically using numerically efficient algorithms.

Mgr. Stanislav Mikeš has been working in the Pattern Recognition department of ÚTIA since October 2002 studying the unsupervised image segmentation problem. The candidate has learned this demanding research subject and has successfully contributed into solution of two large international EU research projects (IST-2001-34744 RealReflect, FP6-507752 MUS-CLE), several Czech research grants GAČR 102/00/0030 Texture Modelling, 1ET40075040 GAAV and MŠMT project 1M6798555601 DAR. His research resulted in 14 publications,

acquired 18 citations and another 2 journal and conference papers are currently under preparation. Besides mentioned theoretical results the candidate has learned a basic knowledge from the computer graphics area and did some useful experimental work here as well.

The results of Stanislav Mikeš summarised in the thesis open new research possibilities for further advances in image or video segmentation.

Altogether I can evaluate Mgr. Stanislav Mikeš as hard working researcher with creative and imaginative approach to problem solving. These results gained him also a working contract in the institute.

I do recommend the thesis for presentation with the aim of receiving the Degree of PhD.

Praha, 16th February 2010

Doc. Ing. M. Haindl, DrSc.
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