Computer Science Seminar Fall 2009

12/04/09; PGH 200; 2:00 PM

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Title:
Quadratic Markov Measure Fields: a quadratic programming based method for image segmentation

Abstract:
We introduce the Quadratic Measure Field models (QMMFs), an efficient and accurate strategy for image segmentation. QMMFs are a probabilistic multiclass image segmentation method that, instead of directly estimate a label map (combinatorial problem), computes the probability that a given observation (pixel value) could be generated with a particular model (memberships). This framework produces more accurate segmentations and computationally more efficient algorithms than if one opt of a hard segmentation approach. In the first part of the talk we presents the mathematical derivation of the QMMFs. Then, in the second part, we present applications that demonstrate the flexibility and potential of the QMMFs. Among the applications we review: image segmentation of medical images, optical flow, denoising, analysis of diffusion weighted MR images, (re)colorization, background subtraction and 3D planar reconstruction. As well, we discuss its adaptation for interactive segmentation approaches.

SHORT BIO:
Mariano Rivera received the B.E. degree in electronics from the Durango Institute of Technology, Mexico, in 1989, the M.Sc. degree in electronics from the Chihuahua Institute of Technology, Mexico, in 1993, and the D.Sc. degree in optics from the Center for Research in Optics (CIO), Leon, Mexico, in 1997. Since 1997, he has been with the Computer Science Department, Center for Research in Mathematics (CIMAT), Guanajuato, Mexico. His current interests include computer vision, image processing, machine learning, and Diffusion Weighted MR image analysis. He had a postdoctoral position at the University of Pennsylvania (PENN, 2001/02) and was Visiting Professor at the Florida State University (FSU, 2008/09). His research is summarized in more than 40 papers in scientific journals and conference proceedings. Dr. Rivera is Fellow of the National Researcher System (SNI) of the Mexican Government.