

February 27, 2007

Toward new sensors and features in computer vision

Prof. R. BENOSMAN
ISIR-Pierre&Marie CURIE University

ABSTRACT OF THE TALK

The talk presents the projects running at ISIR/UPMC on the idea of developing new visual sensors and the inquiry to extend the notion of image features in machine vision and camera networks.

Two approaches are mainly presented. The first one is a bio-inspired approach for extracting features from non linear sensors. It is highly inspired from the model of the mammals visual system. The retina contains many levels of neurones -bipolar, amacrine, horizontal and ganglion cells accurately organized from cones and rods to the optic nerve. This structure eases (by low level processing) the visual cortex and other brain areas tasks in preprocessing the visual information. The presentation focuses on the the presentation of these specific structures, relying on a bottom up approach to propose a comprehensive mathematical model to the low level image processing tasks performed within the eye. The presented system takes into account the foveolar structure of the retina to produce a low-resolution representation of observed images by decomposing them into a local summation of elementary gaussian color histograms. This representation provides reliable features for scenes recognition and can perform efficient and implicit segmentation of observed scenes. The second method investigates thru the task of visual Localization of a mobile platform a new sampling adaptive bag- of-features patches techniques. The method is specifically developed for the navigation of robots. It is based on the idea of an adaptive dense sampling of images using an optimal multilayer quadtree decomposition of the image driven by the quantity and homogeneity of the information contained within subpatches. Extracted patches will be of different sizes according to the covered zones in the image.



Ryad Benosman is Associate professor at the University Pierre and Marie Curie, he has been trained in applied mathematics and computer science. He received the Ph.D in Robotics from the UPMC in 1997. His research focuses on machine vision, robotics and bioinspired techniques. He has coedited the book: "Panoramic Vision: Sensors, Theory, and Applications" (with Sing Bing Kang at Microsoft Research). His work concerns the study of Computer Vision more specifically Omnidirectional Vision and Camera Networks and also Navigation and Localization of Mobile Robots. He also studies bio inspired vision methods for computer vision including feature extraction and sensor conception.