

Development of Efficient and Accurate Feature Design, Object Localization, Segmentation and Detection for Automated Image Analysis

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Resumen:

Image Segmentation is a fundamental step of image processing and is one of the most challenging tasks till date. Noise, poor lighting condition and other unexpected causes lead to delineating actual objects boundaries a difficult task. In this talk, I will demonstrate novel methods for robust feature design, object localization, segmentation and detection that we have developed for automated image analysis. I will discuss two different object localization techniques (probabilistic quad tree and bounding box) that we have proposed in literature. Unfortunately, segmentation algorithms, even implemented locally within bounding box often produce under- and over- segmentation. We have proposed two object validation techniques: principal component analysis and adaptive regularized boosting to deal with under- and over-segmentation problem. We have also developed a pattern image that carries texture information (bright-to-dark transition) across the object edges which can detect objects accurately. They are computationally less expensive, more accurate and robust. I will also explain how the inherent mathematical model of two well-known active contour based segmentation techniques (Snake and Level Set) were modified to successfully implement them in different real world applications: oil sand imaging, leukocyte detection, brain tumor detection, white matter lesion segmentation, pediatric brain age prediction, and Alzheimer disease detection.

Reseña curricular:

Baidya Nath Saha is an Investigador Asociado at CIMAT, Monterrey. Prior to that, he completed his postdoctoral research at University of Calgary, Canada, and Wake Forest School of Medicine, USA. He received his PhD from University of Alberta, Canada and received M. Tech. in Computer Science, Quality, Reliability and Operations Research from Indian Statistical Institute, Kolkata, India. He completed Bachelor of Mechanical Engineering from Jadavpur University, Kolkata, India. He earned several industrial internship experiences in major Indian software industries like Cognizant Technology Solutions, ITC Infotech India Limited, Robert Bosch India Limited; Manufacturing industries like Usha Martin India Limited and AQL Management Consulting Inc., Canada. His research interests include Computer Vision, Image Processing, Machine Learning, Artificial Intelligence and Software Engineering.