

Suvadip Mukherjee

PhD Candidate,
Virginia Image & Video Processing Laboratory,
Department of Electrical and Computer Engineering,
University of Virginia,
Charlottesville, VA - 22904
Phone : (434)-218-8608
Email : sm5vp@virginia.edu
Webpage: [Homepage](#)

Objective

To pursue a career in research industry in biomedical & biological image analysis.

Education

- | | |
|---|---------------------------|
| Doctor of Philosophy,
Adviser: Dr. Scott T. Acton.
Virginia Image and Video Analysis Laboratory
Charles L. Brown Department of Electrical and Computer Engineering
University of Virginia, Charlottesville, USA.
GPA: 4.0/4.0 | 2011-Aug, 2015 (expected) |
| Masters in Computer Science,
Adviser: Dr. Bhabatosh Chanda
Department of Computer Science
Indian Statistical Institute, Kolkata, India.
Percentage: 82/100. | 2009-2011 |
| B.E. in Electrical Engineering,
Department of Electrical Engineering
Jadavpur University, Kolkata, India.
GPA: 8.7/10.0. | 2004 –2008 |

Research Interests

- Image, video and signal processing, computer vision and pattern recognition.
- Segmentation and tracking: Active contours (parametric/geometric), shape and motion constrained tracking, graph based approaches.
- Detection, enhancement and segmentation of vascular structures in medical and biological images (confocal microscopy, ultrasound etc.).
- Image and video analysis for biological and biomedical problems involving 2D/3D segmentation, object detection, classification and tracking.
- Large scale bio-image informatics: segmentation and identification of the morphological structures of neurons from 3D confocal microscopy.
- Machine learning/pattern recognition techniques for image analysis, including sparsity based methods (e.g. dictionary learning)
- Content based image retrieval and object classification.

Research Projects

3-D segmentation of *Drosophila* neurons **University of Virginia**

[Project Webpage](#)

A complete understanding of an organism's brain's functionality requires extensive study of the behavior of its neurons. This has motivated modern age researchers to invest in this new field of neuro-image analysis, where the goal is to model the functional behavior of an animal's brain by analyzing its neuronal morphology. In this collaborative effort between engineering and biology, we have developed two novel neuron segmentation tools (Tree2Tree and TuFF) to trace *Drosophila* neurons in 3D.

Region based segmentation in presence of intensity in-homogeneity University of Virginia

[Project Webpage](#)

Object segmentation has been traditionally performed by detecting the object boundaries or edges. However, in many imaging scenarios (viz. microscopy, ultrasound etc) where noise and clutter is predominant, an edge independent approach is preferred. This work involves development of an edge dependent framework for object segmentation. Our algorithm, *Legendre Level Set* generalizes the popular segmentation method due to Chan and Vese by using a set of smooth polynomial basis functions for low dimensional signal approximation.

Evaluation of concrete cracks using image analysis University of Virginia, Charlottesville, USA

Concrete bridge decks are a critical structural component in bridges and the characterization of their deteriorating condition remains an ongoing challenge for the Department of Transportation. Inspectors must identify and quantify deficiencies such as cracks, delaminations, and spalls. In this ongoing collaborative work with the dept. of Civil Engineering, we are developing novel image processing tools to detect and analyze the morphology of cracks on concrete structures.

Social behaviour analysis of the fruit-fly larva University of Virginia, Charlottesville, USA

This project involves tracking and analyzing the motion pattern and social behavior of *Drosophila* larvae. This study is an integral step in understanding the performance of the animal's visual system in social behavioral learning. From a computational point of view, it involves tracking a larvae in a video, followed by characterization of their motion patterns.

Human iris verification Indian Statistical Institute

Over the years, iris recognition has evolved as one of the more important methods of identifying humans. We have developed a technique to compute a novel set of robust features for human iris verification. The proposed method produced encouraging results with significant reduction in computation time.

Work Experience

Dept. of ECE, University of Virginia

Graduate researcher, 2011-present

Graduate researcher, working on image, signal and video analysis problems related to segmentation, classification and tracking.

Dept. of ECE, University of Virginia

Graduate teaching assistant, Spring 2013

Design of homework, bi-weekly office hours and tutorials and substitute lecturer for graduate course on Digital Image Processing

School of Computing, National University of Singapore.

Summer Intern, 2010

Worked on analyzing the program execution time (worst case execution time) on multi-core architectures. Developed and extended the **SimpleScalar** simulator to incorporate the effects of pre-emption on data and instruction caches.

Siemens Ltd., India

Graduate Engineer, 2008-2009

Worked as a trainee engineer in the Metals department of *Siemens*. Was inducted to the process control and automation of various Steel industry and power plants in eastern India.

Awards and Honors

Charles L. Brown Graduate scholarship for academic excellence

University of Virginia, 2012.

TCS innovation award for best M.Tech dissertation

Indian Statistical Institute, 2011.

Gold medal for securing highest grades in the M.Tech program

Indian Statistical Institute, 2011.

Publications

Journal publications

1. S. Mukherjee, B. Condon and S.T. Acton, "Tubularity Flow Field A Technique For Automatic Neuron Segmentation," *IEEE Transactions on Image Processing*, vol.24, no.1, pp.374,389, Jan. 2015

2. S. Mukherjee and S.T. Acton, "Region Based Segmentation in Presence of Intensity Inhomogeneity Using Legendre Polynomials," *IEEE Signal Processing Letters*, vol.22, no.3, pp.298,302, March 2015
3. R.Sarkar, S. Mukherjee and S.T. Acton, "Dictionary Learning Level Sets" *IEEE Signal Processing Letters* (*submitted*)
4. S. Mukherjee, L. Boulton and S.T. Acton, "Concrete crack detection using edge assisted Tubularity Flow Field with local directional evidence", *in preparation*.

Peer reviewed conference publications

1. S. Mukherjee and S.T. Acton, "Oriented Filters for Vessel Contrast Enhancement With Local Directional Evidence", *IEEE ISBI 2015*(accepted).
2. M. Consylman, S. Mukherjee, D.P. Mukherjee, B. Condrón and Scott T. Acton, "Social behavior analysis of Drosophila larvae via motion activity recognition", *IEEE SSIAI 2014*.
3. S. Mukherjee *et al.* "Neuron segmentation with level sets", *ACSSC 2013*:1078-1082
4. R. Sarkar, S. Mukherjee and S. T. Acton, "Shape descriptors based on compressed sensing with application to neuron matching", *ACSSC 2013*: 970-974
5. S. Mukherjee and S. T. Acton, "Vector field convolution medialness applied to neuron tracing," *ICIP 2013*: 665-669
6. S. Mukherjee, B. Condrón and S. T. Acton, "Chasing the neurome: Segmentation and comparison of neurons," *EUSIPCO 2013*: 1-4
7. S. Mukherjee *et al.*, "Tree2Tree2: Neuron tracing in 3D," *ISBI 2013*: 448-451
8. S. Mukherjee *et al.* "A geometric-statistical approach toward neuron matching", *ISBI 2012*: 772-775.

Additional Experience

Technical reviewer

IEEE Transactions on Image Processing
 IEEE Transactions on Medical Imaging
 IEEE Signal Processing Letters
 IEEE International Conference on Image Processing
 IEEE International Symposium on Biomedical Imaging
 Indian Conference on Computer Vision, Graphics and Image Processing

Technical Skills

Scientific Programming : MATLAB, OpenCV
General Purpose Language: Python, C/C++

References

Available on request.