

Samarjit Das

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OBJECTIVE

I am looking for a full-time position in a research laboratory

RESEARCH INTERESTS

- Computer Vision and Image Processing
- Statistical Signal Processing
- Pattern Recognition and Machine Learning

EDUCATION

PhD, Electrical and Computer Engineering August 2006 - Present
Iowa State University, Ames IA USA

- GPA : 3.97/4.00
- Major : Electrical Engineering (PhD candidate, expected graduation in Spring 2010)

B.Tech, Electronics and Communication Engineering August 2002 - May 2006
Indian Institute of Technology (IIT) Guwahati INDIA

- GPA: 8.33/10.00
- Major: Electronics and Communication Engineering

ACADEMIC AND PROFESSIONAL EXPERIENCE

Research Intern

May 2009 - Aug 2009

Mitsubishi Electric Research Labs (MERL), Cambridge, MA

- **Information Hiding in Structured Shapes:** Worked with Adaptively Sampled Distance Fields (ADF) to perform imperceptible modifications of structured shapes for binary data hiding. Decoding was performed using statistical shape analysis techniques. (Details omitted. Two Patents are expected to be filed later this year)

Research Collaboration

Aug 2009 - Present

Harvard-MIT Division of Health Sciences and Technology (HST), Charlestown, MA

- **Physiological Modeling for Functional Neuroimaging:** This is an ongoing research collaborating with the Photon Migration Lab at the HST Martinos Center for Biomedical Imaging (Harvard Medical School, Massachusetts General Hospital). Working on developing a dynamical model for tracking physiological interferences associated with Diffused Optical Tomography (DOT). The goal is to capture the functional hemodynamic responses in the brain subject to external stimuli. We are exploring the possibility of using nonlinear stochastic filtering techniques like Particle Filtering for tracking neuronal physiological responses.

Graduate Research Assistant

Aug 2006 - Present

Department of Electrical and Computer Engineering, Iowa State University, Ames IA

- **Stochastic Shape Deformation Models for Motion Activities:** Developed dynamical models for nonstationary deformations of 2D/3D landmark shapes with improved performances over existing models such as Active Shape Models. Applications include motion activity modeling, tracking and recognition for machine vision. Based on the nonstationary shape deformation model, we also developed an efficient compression algorithm for storing large volumes 2D and 3D landmark shape data, especially for biomedical applications.

- **Efficient Particle Filter for Enhanced Visual Tracking:** Developed efficient Particle Filtering algorithms in order to deal with large dimensional state-space and multimodality of the observation likelihood. Applications included – a) Tracking nonstationary shape deformations under noisy and cluttered observations. This led to automatic landmark extraction and motion activity tracking in real-life surveillance videos under clutter and occlusion. b) Temperature tracking within a sensor network with sensor failures scenarios and c) Abnormal activity or change detection for developing intelligent visual tracking system capable of spotting motion activity change

- **Target Tracking with Illumination Changes** (collaboration with *Siemens Research Labs*): Developed low dimensional multiplicative model for illumination changes under a template matching based visual tracking framework. Dynamical model in the illumination space enabled us to model the dynamics of appearance change of the template. Due to the large dimensionality of the state vector in this problem, we used a Particle Filter with Mode-Tracker (PF-MT) to perform tracking over a joint motion-illumination space. PF-MT enables the system to run efficiently with much lesser number of particles compared to the traditional particle filter.

Research Intern

May 2005 - July 2005

DSP and Speech Technology Laboratory, The Chinese University of Hong Kong, HONG KONG

Hidden Markov Model based Keyword Spotter: Worked on Hidden Markov Model (HMM) based speech recognition systems; especially, keyword spotters. Used unconstrained grammar network based Viterbi decoding for detecting keywords. We developed and implemented a foreign language keyword spotter in unconstrained English speech under HTK platform.

Undergraduate Research

May 2005 - May 2006

Department of Electronics and Communications Engineering, IIT Guwahati, INDIA

PCA based Analysis of Handwritten Scripts: Performed Principal Component Analysis (PCA) on handwritten scripts for word model based writer identification. We compared the recognition performance with the character model based approaches. Statistical classifiers were used in the recognition phase.

AWARDS AND HONORS

- Iowa State University Teaching Excellence Award (Fall 2007). Awarded to the graduate student who has shown outstanding achievements in undergraduate teaching and academics.
- Undergraduate summer research fellowship from the department of Electronic Engineering, the Chinese University of Hong Kong, Sha Tin, Hong Kong (May 2005)
- Doctoral scholarship (full financial support) from the Dept. of Electrical and Computer Engineering, Iowa State University (Fall 2006 – Present)
- Ranked 3rd in the department of Electronics and Communications engineering at IIT Guwahati during the junior year (Academic year 2004-05)
- Ranked 8th in the state in 12th grade board examination taken by nearly 100,000 high school seniors (2002)

JOURNAL PAPERS

- Samarjit Das and Namrata Vaswani, "Nonstationary Shape Activities: Dynamic Models for Landmark Shape Change and Applications", IEEE Transactions on Pattern Analysis and Machine Intelligence (Accepted, to appear in Dec'09)
- Samarjit Das and Namrata Vaswani, "Model-based Compression of 2D and 3D Nonstationary Landmark Shape Sequences", IEEE Transactions on Image Processing (under review)
- Samarjit Das, Amit Kale and Namrata Vaswani, "Particle Filter with Mode Tracking (PF-MT) for Tracking Across Illumination Changes", IEEE Transaction on Pattern Analysis and Machine Intelligence (to be submitted)

CONFERENCE PAPERS

- Samarjit Das, Shantanu Rane and Anthony Vetro, "Hiding Information inside Structured Shapes", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2010 (under review)
- Samarjit Das and Namrata Vaswani, "Efficient importance sampling techniques for large dimensional and multimodal posterior computations", IEEE Digital Signal Processing/SPE Workshop, Miami FL, Jan 2009
- Samarjit Das and Namrata Vaswani, "Model based Compression of Nonstationary Landmark Shape Sequences", IEEE International Conference on Image Processing (ICIP), San Diego CA, October 2008
- Namrata Vaswani and Samarjit Das, "Particle Filter with Efficient Importance Sampling and Mode Tracking (PF-EIS-MT) and its Application to Landmark Shape Tracking", IEEE Signal Processing Society Asilomar conference, Pacific Grove CA, October 2007
- A. Subramanian, Samarjit Das and S.R.M Prasanna, "Identification of Writers from Word Models using Principal Component Analysis", Workshop on Computer Vision, Graphics and Image Processing, Hyderabad India, 2006

UNPUBLISHED RESEARCH ARTICLES

- Samarjit Das, "Hidden Markov Model based foreign language Keyword Spotting in Unconstrained English Speech", Submitted to the Department of Electronic Engineering, The Chinese University of Hong Kong (CUHK), Hong Kong, July 2005
- Samarjit Das, "Sequential Monte Carlo Techniques and Bayesian Filtering : Applications in Tracking", Submitted to the Department Computer Science, Iowa State University December 2008

COMPUTER SKILLS

- Languages: C/C++, ADSP 2181 Assembly
- Platforms: Windows, Linux
- Software: Matlab/Simulink, Latex, HTK, OpenCV

TEACHING EXPERIENCE

- Taught EE 224 lab (Signals and Systems - I) and EE 324 lab (Signals and Systems - II) during fall 2006 and fall 2007 respectively. Responsibilities included teaching the laboratory experiments as well as their evaluation.
- Taught Computer Vision topics at graduate level (Digital Image Processing (EE 528) at ISU, Fall 2009)

RELEVANT COURSEWORK

Digital Signal Processing
Random Processes
Machine Learning
Convex Optimization

Advanced Communications
Detection and Estimation Theory
Time Series Analysis
Computer Vision and Robotics

Digital Image Processing
Linear Control Systems
Information Theory
Compressive Sensing

PROFESSIONAL MEMBERSHIP AND ACTIVITIES

- Institute of Electrical and Electronics Engineers (IEEE), Student Member
- Conference review: International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2009, International Conference on Image Processing (ICIP) 2009

REFERENCES

- Dr. Namrata Vaswani

Assistant Professor

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- Dr. Shantanu Rane

Research Scientist

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- Dr. Yan-bin Jia

Associate Professor

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