Baidya Nath Saha

CONTACT INFORMATION

401 South Sunset Drive, Apt # 2   *Cell:* +1 336 831 7068
Winston-Salem, NC, USA, 27103   *Email:* baidyasaha@gmail.com

CURRENT AFFILIATION

Post-doctoral Research Fellow, Wake Forest University School of Medicine, North Carolina, USA

RESEARCH INTERESTS

- Areas: Computer Vision, Image Processing, Machine Learning, Pattern Recognition
- Keywords: Magnetic Resonance Imaging, Visual Surveillance, Cell Segmentation, Infrared Imaging, Oil sand particle delineation, Alzheimer disease detection, Brain age prediction, Active Contour or Snake, Level Set, Graph Cut, Markov Random Field, Boosting, Super- Resolution, Regression

COMPUTER PROGRAMMING

C, C++, Open CV, Matlab with Mex programming

SUMMARY OF QUALIFICATIONS

- Proficient in image processing and computer vision algorithm development including segmentation, filtering, object detection, object recognition, object tracking and so on
- Broad technical knowledge obtained through pursuing PhD degree in Computing Science, two Master degrees in Computer Science and Quality, Reliability and Operations Research (QROR) as well as 8 years of research experience in image processing and 2 years of work experience in statistical data mining, machine learning, pattern recognition and image processing
- Effective report and technical writing skills achieved by publishing 9 research papers in international conferences (ACCV, ICIP, ICASSP, ICVGIP etc.) and journals (Pattern Recognition, IEEE Signal Processing Letters) in the area of image processing as well as winning three research proposals
- Excellent communication skills developed by working effectively with a diverse range of professionals, students and successful handling of multidisciplinary projects
- Strong time management gained by pursuing graduate study, industrial internship, volunteering activities as well as maintaining healthy family life simultaneously
- Good public speaking skills accomplished by delivering lectures in the international conferences, presenting tutorials to the university students working as a TA as well as to junior school students

EDUCATION

University of Alberta,Edmonton, Canada

Ph.D. in computer science, 2006 - 2011.
- Thesis Title: "The Evolution of Snake toward Automation for Multiple Blob-Object Detection"

Indian Statistical Institute, Kolkata, India

Master of Technology (M. Tech.), Computer Science, 2004–2006.
- Thesis Title: "A Regression based Approach for Leukocyte Cell Tracking".

Master of Technology (M. Tech.), Quality, Reliability and Operations Research, 2002-2004.
- Thesis Title: "Advanced Statistical Analysis for Software Effort Estimation".

Jadavpur University, Kolkata, India

Bachelor of Engineering (B. E.), Mechanical Engineering, 1998-2002.
- Thesis Title: "Smulation of a Gear Box Design Using 3D Studio Max".

PUBLICATIONS

Book:
1. **B. N. Saha**.The Evolution of Snake toward Automation for Multiple Blob-Object Detection. ISBN 978-3-659-25963-0.Lambert Academic Publishing., 2012.

Submitted/In Preparation:

1. J. A. Maldjian, C. T. Whitlow, **B. N. Saha**, G. Kota, , E. M. Davenport, J. Divers, B. I. Freedman and D. W. Bowden. Automated White Matter Total Lesion Volume Segmentation in Diabetes. Submitted in jounrnal of Radiology, 2012.

2. S. Natarajan, S. Joshi, **B. N. Saha**, A. Edwards, T. Khot, E. Moody, , K. Kersting, C. T. Whitlow and J. A. Maldjian. Can Relational Learning help in Three-way Classification of Alzheimer Patients from Structural Magnetic Resonance Images of the Brain? Submitted in International Journal of Machine Learning and Cybernatics.

3. **B. N. Saha**, S. Natarajan, G. Kota, C. T. Whitlow and J. A. Maldjian. Adaptive Regularized Boosting(AR-Boost): A novel boosting algorithm for Magnetic Resonace Images classification. In preparation.

4. **B. N. Saha**, S. Natarajan, G. Kota, C. T. Whitlow, D. Bowden, J. Divers, B. I. Freedman and J. A. Maldjian. A novel hierarchical level set with Adaptive Regularized Boosting for White Matter Lesion Segmentation in Diabetes. In preparation.

5. **B. N. Saha** and N. Ray. A Dynamic Programming Based Snake Evolution Framework for Multiple Blob-Object Detection in Cluttered Environment. In preparation.

6. **B. N. Saha**, N. Ray and H. Zhang. Automated Snake-based Segmentation Technique for Multiple Blob-Object Detection. In preparation.

Journals:
1. **B. N. Saha**, N. Ray, R. Greiner, A. Murtha and H. Zhang. Quick detection of brain tumors and edemas: A bounding box method using symmetry. Computerized Medical Imaging and Graphics, 2011.

2. **B. N. Saha**, N. Ray, and Hong Zhang. Snake validation: A PCA-based outlier detection method. IEEE Signal Processing Letters, vol. 16, issue 6, pp. 549-552, 2009.

3. **B. N. Saha** and N. Ray,, Image thresholding by variational minimax optimization. Pattern Recognition, Volume 42, Issue 5, Pages 843-856, May 2009.

Reviewed conference papers:
1. **B. N. Saha**, S. Natarajan, G. Kota, C. T. Whitlow, D. Bowden, J. Divers, B. I. Freedman and J. A. Maldjian. A Novel Hierarchical Level Set with AR-Boost for White Matter Lesion Segmentation in Diabetes. Accepted in International Conference on Machine Learning and Applications (ICMLA) 2012.

2. S. Natarajan, S. Joshi, **B. N. Saha**, A. Edwards, E. Moody, T. Khot, K. Kersting, C. T. Whitlow and J. A. Maldjian. A Machine Learning Pipeline for Three-way Classification of Alzheimer Patients from Structural Magnetic Resonance Images of the Brain. Accepted in International Conference on Machine Learning and Applications (ICMLA) 2012.

3. S. Mukherjee, **B. N. Saha**, I. Jamal, R. Leclerc and N. Ray. A Novel Framework For Automatic Passenger Counting. IEEE International Conference of Image Processing (ICIP), 2011. acceptance rate ˜40%.

4. **B. N. Saha**, N. Ray, and H. Zhang. Automating Snakes for Multiple Objects Detection. Proceedings of the 10th Asian Conference On Computer Vision (ACCV), Volume 6494/2011, Part III, pp. 39 -51, 2010. acceptance rate ˜29.5%.

5. N. Ray, **B. N. Saha**, and H. Zhang. Change detection and object segmentation: A histogram of features- based energy minimization approach. IEEE ICVGIP, 2008. acceptance rate ˜29%.

6. N. Ray, **B. N. Saha**, S.T. Acton. Oil sand image segmentation using the inclusion filter. Proceedings of IEEE International Conference of Image Processing, Pages 2188-2191, 2008. acceptance rate ˜45%.

7. **B. N. Saha**, N. Ray, and H. Zhang. Computing oil sand particle size distribution by snake-PCA algorithm. Proceedings of IEEE ICASSP, Pages 977-980, 2008. acceptance rate ˜48%.

8. N. Ray and **B. N. Saha**. Deformable Object Tracking: A Kernel Density Estimation Approach Via Level Set Function Evolution. Proceedings of International Conference on Pattern Recognition and Machine Intelligence (PReMI), Pages 624-631, 2007. acceptance rate ˜25%.

9. N. Ray and **B. N. Saha**. Edge Sensitive Variational Image Thresholding. Proceedings of IEEE International Conference of Image Processing (ICIP), Volume 6, Pages 37-40, 2007. acceptance rate ˜45%.

10. N. Ray, **B. N. Saha**, and M. Brown. Locating brain tumor from MR imagery using symmetry. Proceedings of Asilomar conf. on signals, systems, and computers, Pages 224-228, 2007. acceptance rate ~40 - 50%.

Reviewed conference Abstracts:
1. **B. N. Saha**, C. T. Whitlow, G. Kota, , E. Moody, S. Natarajan, D. Bowden, J. Divers, B. I. Freedman and J. A. Maldjian. Hierarchical Level Sets with Boosting for White Matter Lesion Segmentation in Diabetes. Accepted in Radiological Society of North America Annual Meeting, 2012.
2. J. A. Maldjian, C. T. Whitlow, **B. N. Saha**, G. Kota, , E. Moody, D. Bowden, J. Divers and B. I. Freedman. Evaluation of Automated White Matter Lesion Segmentation in Diabetes. Accepted in Radiological Society of North America Annual Meeting, 2012.

EMPLOYMENT

Wake Forest University School of Medicine

Post-doctoral Research Fellow, November 2011 - present
• White matter lesion segmentation from brain MRI for Diabetes.
• Three way (Alzheimer, Mild Cognitive Impairment and Cognitively Normal) classification for Alzheimer Disease Detection from brain MRI.
• Prediction of brain age from pediatric brain MRI.
• Applied machine learning tools on automatic detection of tumor from brain MRI.

University of Alberta, Centre for Intelligent Mining Systems

Research Assistant, September 2011 - October 2011
• Online Detection of Missing Teeth of the Crusher through Space-Time Super-Resolution Technique.

AQL Management Consulting Inc.

Summer Intern, May 2010 - December 2010
• Developed an autonomous passenger counting system for LRT (Light Railway Transit) governed by City of Edmonton.
Summer Intern, May 2009 - August 2009
• Conducted several image processing research projects including

  • Built an automated tool to analyze chickens behavior monitoring.

  • Early disease detection of flocks using infrared imaging.

  • Automatic assessment of feather cover of laying hens by infrared thermography.

University of Alberta, Department of Computing Science

Teaching and Research Assistant, 2006 - 2011
• Conducted several image processing research projects including

  • Developed novel techniques to automatically compute oil sand particle size distribution at various stages of oil sand fragmentation process that facilitate

    – to measure screen efficiency
    – to evaluate crusher performance
    – to improve performance of the surface mining process

  • Detected Brain Tumor and Edema from T1C and T2 modalities of brain MRI quickly which facilitate indexing of the MRI databases based on tumor size, shape and so on; this indexing helps medical practitioner to diagnose the disease and consequently improves brain cancer treatment

  • Automatic detection and velocity measurement of leukocyte: an important measure in the study of inflammation.

  • Obtained thorough Knowledge of image processing, robotics especially visual slam, graph algorithm, numerical methods, machine learning and robotics from course work.

  • Obtained Teaching Knowledge on Numerical Analysis and Programming Language from TA work.

  • Presented tutorials and lab sessions as a Teaching Assistant for four semesters; Developed communication skills by conducting course seminars, lab tutorials and office hour consultation.

Indian Statistical Institute, Department of Computer Science

Research Assistant, 2004 - 2006
• Developed novel methods for the automatic detection and counting of rolling leukocytes of a vivo (mouse) cremaster muscle which is imperative in the study of inflammation as well as in the design of anti-/pro-inflammatory drugs.

Cognizant Technology Solutions

Summer Intern, May 2005 - July 2005
• Developed a game theory based Economic Modelling of Optimal Bidding in one client, multiple vendors scenario in a win-win condition.

Usha Martin Limited

Summer Intern, June 2004 - July 2004
• Developed Software tool to facilitate Supply Chain Management System.

ITC Infotech India Limited

Summer Intern, March 2004 - June 2004
• Conducted several statistical software quality projects including
  • A Bayesian approach to evaluate methodology followed to establish baselines of build Efforts on the basis of SAC (Simple/Average/Complex) methodology.
  • Developed software defect management system.

Robert Bosch India Limited

Summer Intern, May 2003 - July 2003
• Conducted several statistical data analysis & operations research projects including
  • Estimated the efforts required to fix the number of bugs reported by the customer.
  • Developed methodology for managing project schedule whenever it overruns.
  • Conducted statistical analysis of Customer Survey Data and Developing a novel methodology for measuring Customer satisfaction index.

VOLUNTEERING
EXPERIENCE

• **Reviewer**: Obtained detailed knowledge of cutting edge image processing, pattern recognition and machine learning tools and methods by serving in various notable peer-reviewed international conferences and journals as a reviewer.
• **Public Speaker**: Enriched communication, management and public speaking skills by delivering lecture regarding Indian culture and life at several junior schools in Edmonton through University of Alberta Outreach Program.
• **Fitness room volunteer**: Maintained regular schedule for physical exercise by volunteering in the community fitness center.

AWARDS &
SCHOLARSHIPS

• **Postdoctoral Research Fellowship**, *Wake Forest University School of Medicine*, North Carolina, USA, 2011 - 2013.
• **Postdoctoral Research Fellowship**, *Mayo Clinic*, Arizona, USA, 2011 - 2013.
• **Mitacs Industrial Internship Award**, *AQL Management Consulting Inc.*, Edmonton,Canada, 2009 - 2010.
• **Teaching and Research Assistantship**, *University of Alberta*, Edmonton,Canada, 2006 - 2011.
• **Mary Louise Imrie and J. Gordin Kaplan Graduate Sudent Travel Award**, *University of Alberta*, Edmonton,Canada, 2007.
• **Industrial Internship Award**, *ITC Infotech India Limited*, Bangalore,India, 2004.
• **Industrial Internship Award**, *Robert Bosch India Limited*, Bangalore,India, 2003.
• **Research Assistantship**, *Indian Statistical Institute*, Kolkata, India, 2002 - 2006.