Anas Zainul Abidin

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EDUCATION

Ph.D. in **Biomedical Engineering**, Medical Image Analysis — August 2013 - Present
Hajim School of Engineering and Applied Sciences at University of Rochester, Rochester, NY
Thesis: A computational framework for development of imaging-derived biomarkers for HIV Associated Neurocognitive Disorders using functional-MRI

Masters in Science in **Biomedical Engineering** — August 2013 – April 2015
Hajim School of Engineering and Applied Sciences at University of Rochester, Rochester, NY

Bachelors of Engineering in **Biomedical Engineering** — August 2006 - June 2010
Manipal Institute of Technology, Manipal, India

RESEARCH PROJECTS

Time-Series Analysis and Statistics (MATLAB, FSL, Shell Scripting)

- **Quantitative Imaging biomarkers for neurological disorders using functional MRI**
  - *Conceptualized and developed* end-to-end software framework for *non-linear functional connectivity* estimation from resting state fMRI data.
  - Developed tools for *graph theoretic* and *statistical analysis* of brain *network* data.

Image Characterization and Machine Learning (Python - Numpy, Pandas, sci-kit learn, Pytorch etc.)

- **Phase Contrast CT image classification**
  - Developed methods for patellar cartilage *characterization* from Phase-contrast CT images and their subsequent *classification* of osteoarthritic samples using *machine learning*.
- **Localization and heterogeneity characterization of brain tumors**
  - Developed a system for localization and segmentation of glioblastomas (BRATS 2017 Challenge).
  - Implemented tools for identifying quantitative prognostic phenotypes of different brain tumors (metastatic vs glioblastomas).
- **Multi-class chest pathology classification from X-ray imaging**
  - Implemented a deep-learning based framework with parametric modifications for enhanced training, producing state-of-the-art results for multiple pathologies.
- **Natural language processing of radiology reports**
  - Ongoing project for developing a recurrent neural network based approach for language modelling of radiology reports for predicting positive/negative findings.

WORK EXPERIENCE

Philips Electronics India Ltd. - Field Service Engineer — September 2010 - April 2013

- Radiology Imaging Systems Engineer with specialization in Magnetic Resonance Imaging (MRI)
- Technical Training in MRI Systems ACHIEVA R2/3, Part 1 at SLC, Singapore
- Lead Engineer for installation of 5 MRI systems

PUBLICATIONS

Journals

- **Abidin AZ**, DSouza AM, Nagarajan MB, Qiu X, Schifitto G, Wismüller A. Alteration of brain network topology in HIV-associated neurocognitive disorder: A novel functional connectivity perspective. NeuroImage: Clinical. 2018;17:768-77.
- **Abidin AZ**, Deng B, DSouza AM, Nagarajan MB, Coan P, Wismüller A. Deep transfer learning for characterizing chondrocyte patterns in phase contrast X-Ray computed tomography images of the human patellar cartilage. Computers in biology and medicine. 2018;95:24-33.
- DSouza AM, **Abidin, AZ**, Chockanathan U., Schifitto G., Wismüller A. Mutual connectivity analysis of resting-state functional MRI data with local models. NeuroImage. 2018; 178:210-223.
- DSouza AM, **Abidin AZ**, Leistritz L, Wismueller A. Exploring connectivity with large-scale Granger causality on resting-state functional MRI. Journal of neuroscience methods . 2017;287:68-79.

Peer-Reviewed Conferences

- **Abidin AZ,** D'Souza AM, Chockanathan U, Schifitto G, Wismüller A. Investigating directed functional connectivity between the resting state networks of the human brain using mutual connectivity analysis. Medical Imaging 2018:

Biomedical Applications in Molecular, Structural, and Functional Imaging; 2018: International Society for Optics and Photonics.

- **Abidin AZ**, Jameson J, Molthen R, Wismüller A. Classification of micro-CT images using 3D characterization of bone canal patterns in human osteogenesis imperfecta. Medical Imaging 2017: Computer-Aided Diagnosis; 2017: International Society for Optics and Photonics.
- **Abidin AZ**, Chockanathan U, DSouza AM, Inglese M, Wismüller A. Using large-scale Granger causality to study changes in brain network properties in the Clinically Isolated Syndrome (CIS) stage of multiple sclerosis. Medical Imaging 2017: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2017: International Society for Optics and Photonics.
- **Abidin AZ**, D'Souza AM, Nagarajan MB, Wismüller A. Detecting Altered connectivity patterns in HIV associated neurocognitive impairment using Mutual Connectivity Analysis. Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- **Abidin AZ**, D'Souza AM, Nagarajan MB, Wismüller A. Investigating changes in brain network properties in HIV-associated neurocognitive disease (HAND) using mutual connectivity analysis (MCA). Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- **Abidin AZ**, Nagarajan MB, Checefsky WA, Coan P, Diemoz PC, Hobbs SK, et al.. Volumetric characterization of human patellar cartilage matrix on phase contrast x-ray computed tomography. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.
- **Abidin AZ**, Agarwal S, Chattopadhyay S, Poddar A, Ganesh B. A study on portable functional electrical device for small muscles. Students' Technology Symposium (TechSym), 2010 IEEE; 2010: IEEE.
- Wang X, Nagarajan MB, **Abidin AZ**, DSouza A, Hobbs SK, Wismüller A. Investigating the use of mutual information and non-metric clustering for functional connectivity analysis on resting-state functional MRI. Medical Imaging 2015: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2015: International Society for Optics and Photonics.
- Wismüller A, **Abidin AZ**, DSouza AM, Nagarajan MB. Mutual connectivity analysis (MCA) for nonlinear functional connectivity network recovery in the human brain using convergent cross-mapping and non-metric clustering. Advances in Self-Organizing Maps and Learning Vector Quantization: Springer, Cham; 2016. p. 217-26.
- Chen L, Wu Y, DSouza AM, **Abidin AZ**, Wismüller A, Xu C. MRI tumor segmentation with densely connected 3D CNN. Medical Imaging 2018: Image Processing; 2018: International Society for Optics and Photonics.
- D'Souza AM, **Abidin AZ**, Nagarajan MB, Wismüller A. Mutual connectivity analysis (MCA) using generalized radial basis function neural networks for nonlinear functional connectivity network recovery in resting-state functional MRI. Medical Imaging 2016: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2016: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Chockanathan U, Wismüller A. Regional autonomy changes in resting-state functional MRI in patients with HIV associated neurocognitive disorder. Medical Imaging 2018: Image Processing; 2018: International Society for Optics and Photonics.
- Chockanathan U, DSouza AM, **Abidin AZ**, Schifitto G, Wismüller A. Identification and functional characterization of HIV-associated neurocognitive disorders with large-scale Granger causality analysis on resting-state functional MRI. Medical Imaging 2018: Computer-Aided Diagnosis; 2018: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Wismüller A. Investigating changes in resting-state connectivity from functional MRI data in patients with HIV associated neurocognitive disorder using MCA and machine learning. Medical Imaging 2017: Biomedical Applications in Molecular, Structural, and Functional Imaging; 2017: International Society for Optics and Photonics.
- DSouza AM, **Abidin AZ**, Leistritz L, Wismüller A. Identifying HIV associated neurocognitive disorder using large-scale Granger causality analysis on resting-state functional MRI. Medical Imaging 2017: Image Processing; 2017: International Society for Optics and Photonics.
- Deng B, **Abidin AZ**, D'Souza AM, Nagarajan MB, Coan P, Wismüller A. Characterizing cartilage microarchitecture on phase-contrast x-ray computed tomography using deep learning with convolutional neural networks. Medical Imaging 2017: Computer-Aided Diagnosis; 2017: International Society for Optics and Photonics.
- Checefsky WA, **Abidin AZ**, Nagarajan MB, Bauer JS, Baum T, Wismüller A. Assessing vertebral fracture risk on volumetric quantitative computed tomography by geometric characterization of trabecular bone structure. Medical Imaging 2016: Computer-Aided Diagnosis; 2016: International Society for Optics and Photonics.

TECHNICAL SKILLS AND INTERESTS

- Python (NumPy, scikit-learn, Pandas, PyTorch, Tensorflow), MATLAB, Shell-scripting, C, LabVIEW
- Deep Learning, Machine Learning, Image & Signal Processing, Statistical Analysis, MR Imaging, Graph Theory

- Languages: English, Urdu, Hindi, Arabic

HONOURS AND AWARDS

- **Best Poster Award** - Honorable mention, Biomedical, Structural and Functional Imaging SPIE Medical Imaging 2015
  - Investigating the use of mutual information and non-metric clustering for functional connectivity analysis on resting-state functional MRI.
- **Best Poster Award** - World AIDS Day Scientific Symposium organized by Centre for AIDS Research 2017.
  - Alteration of brain network topology in HIV-associated neurocognitive disorder: A novel connectivity perspective.
- **Best Teaching Assistant Award**, Department of Biomedical Engineering, for outstanding contribution in teaching as a Graduate Student 2014-2015
- **Winner**, Annual RocHackHealth Hackathon for developing a system to predict re-admissions of patients to the hospital within 30 days after discharge using medical records data, held at University of Rochester, April '16.
- **Finalist**, Three Minute Thesis (2016) inaugural competition at University of Rochester, Rochester, NY.
- Participant, Falling Walls Competition (2016 & 2017) at University of Rochester, Rochester, NY.
- University level travel grants for participating in Conference(s).
- **Multiple awards** (SPOT, YCC) for outstanding contribution during tenure at Philips Electronics India Ltd.

TEACHING EXPERIENCE

- Teaching Assistant – BME 502 – Analytic Foundations in BME (Graduate Course)
- Teaching Assistant – BME 221 – Biomedical Computation and Statistics (Undergraduate Course)

RELEVANT COURSEWORK

• Computer Vision • Machine Learning • Digital Image Processing • Medical Imaging - Theory and Implementation
• Digital Signal Processing • Cell and Molecular Biology • Cancer Biology • BME Proposal and Grant Writing
MOOC • *fastai* – Deep Learning • *Coursera* – Deep Learning Specialization • *Lynda* – Data Analysis with Python

LEADERSHIP AND ENTERPRENEURIAL EXPERIENCE

- Semifinalist in the Neuro Startup Challenge organized by The Center for Advancing Innovation – developed business and marketing plan for device which can be used for prospective motion correction during MR scanning.
- Member, Biomedical Engineering Graduate Student Council, organizing various student centric events throughout the academic year 2014-2015.
- Served as Team Lead/Representative at various levels throughout academic and professional career.

RESEARCH SUPERVISION

- Walter Checefsky - MS Electrical and Computer Engineering – September 2014 to February 2016
  - Project Title: Detecting the incidence of Clinically Isolated Syndrome (CIS) using functional connectivity analysis, graph theory and machine learning.
- Botao Deng - MS Electrical and Computer Engineering – May 2016 to May 2017
  - Deep Transfer Learning for Characterizing Chondrocyte Patterns in Phase Contrast X-Ray Computed Tomography Images of the Human Patellar Cartilage
- Uday Chockanathan – PhD Biophysics and Biochemistry – May 2016 to December 2017
  - Functional characterization of HIV-associated neurocognitive disorders using Granger causality analyses on resting-state functional MRI
- Hyeon Woo Lee - BS Biomedical Engineering – May 2017 to December 2017
  - Automated segmentation of brain tumors in multi-modal MR images.

INVITED TALKS

At University of Rochester: Invited by Dr. Kevin Parker for latest frontiers section of course ECE452 (Medical Imaging). Talk was titled "Computer Aided Diagnostics – A functional imaging perspective" December 2018.

PROFESSIONAL SERVICES

Reviewer – Medical Image Analysis, Neuroimage-Clinical, Magnetic Resonance Imaging, SPIE Journal of Medical Imaging, Proceedings of the National Academy of Sciences.