

Saad Nadeem

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Research Interests Medical image analysis, computer vision, computer graphics, visualization, data science, visual analytics, image processing, bioinformatics, crowdsourcing, machine learning

Education **Stony Brook University** **Stony Brook, NY, USA**
PhD in Computer Science, GPA: 3.8/4.0 *Aug 2017*
Thesis: Mapping Analytics for Medical Imaging
Advisor: Dr. Arie Kaufman

School of Science and Engineering (SSE), LUMS **Lahore, Pakistan**
BSc Hons in Computer Science & Mathematics, GPA: 3.8/4.0 *Jun 2009*
Thesis: MAC Rate Adaptation and Cross Layer Behavior for Vehicular WiFi Access
Advisor: Dr. Zartash Afzal Uzmi

Academic Experience Adjunct Assistant Professor, Department of Applied Mathematics and Statistics, Stony Brook University (*Jun 2018 - Present*)

Research Scholar, Memorial Sloan Kettering Cancer Center (*Sep 2017-Present*)

- Developing algorithms for (1) studying tumor vascularization in breast, head and neck cancers, (2) longitudinal deformation analysis for adaptive radiotherapy of breast, lung, head and neck cancers, (3) studying glymphatic pathways associated with neurodegenerative diseases, such as Alzheimer's Diseases, and (4) visualizing bioinformatics data.

Research Assistant, Stony Brook University (*2012-2017*)

- Developed algorithms for more effective biomedical visualization of brain, colon, lung, prostate, pancreas, and molecular data using differential geometry, computational topology, machine learning, computer vision and graphics techniques

Research Assistant, SSE, LUMS (*2008-2010*)

- Implemented and evaluated rate adaptation algorithms and their interaction with higher layer protocols in outdoor vehicular settings through real testbed experimentation and ns2 simulations

Journal Papers **Saad Nadeem**, Xianfeng Gu, and Arie Kaufman. "LMap: Shape-Preserving Local Mappings for Biomedical Visualization." *IEEE Transactions on Visualization and Computer Graphics*, 24(12):3111-3122, 2018.

Shreeraj Jadhav, **Saad Nadeem**, and Arie Kaufman. "FeatureLego: Volume Exploration Using Exhaustive Clustering of Super-Voxels." *IEEE Transactions on Visualization and Computer Graphics*, PP(99):1-12, 2018.

Liang Shen, Dengming Zhu, **Saad Nadeem**, Zhaoqi Wang, and Arie Kaufman. "Radiative Transport Based Flame Volume Reconstruction from Videos." *IEEE Transactions on Visualization and Computer Graphics*, 24(7):2209-2222, 2018.

Ji Hwan Park, **Saad Nadeem**, and Arie Kaufman. "GeoBrick: Exploration of Spatio-Temporal Data." *The Visual Computer*, 1-14, 2017.

Saad Nadeem, Zhengyu Su, Wei Zeng, Arie Kaufman, and Xianfeng Gu. "Spherical Parameterization Balancing Angle and Area Distortions." *IEEE Transactions on Visualization and Computer Graphics*, 23(6):1663–1676, 2017.

Saad Nadeem, Joseph Marino, Xianfeng Gu, and Arie Kaufman. "Corresponding Supine and Prone Colon Visualization Using Eigenfunction Analysis and Fold Modeling." *IEEE Transactions on Visualization and Computer Graphics*, 23(1): 751-760, 2017.

Saad Nadeem, Pengpeng Zhang, Andreas Rimner, Jan-Jakob Sonke, Joseph O. Deasy, and Allen Tannenbaum. "LDeform: Longitudinal Deformation Analysis for Adaptive Radiotherapy of Lung Cancer." *Physics in Medicine and Biology*, (Under Review, 2018).

Saad Nadeem*, Wookjin Choi*, Sadegh Riyahi, Wei Lu, Joseph O. Deasy, and Allen Tannenbaum. "Interpretable Nodule Spiculation Quantification for Lung Cancer Screening." *Medical Image Analysis*, (Under Review, 2018) *Equal Contribution

James C. Mathews, **Saad Nadeem**, Maryam Pouryahya, Joseph O. Deasy, and Allen Tannenbaum. "Topological Data Analysis of PAM50 and 21-Gene Breast Cancer Assays." *Nature Breast Cancer* (Under Review, 2018).

Ji Hwan Park, **Saad Nadeem**, Saeed Boorboor, Joseph Marino, and Arie Kaufman. "CMed: Crowd Analytics for Medical Imaging Data." *IEEE Transactions on Visualization and Computer Graphics*, (Under Review, 2018).

Sadegh Riyahi, Wookjin Choi, Chia-Ju Liu, **Saad Nadeem**, Shan Tan, Hualiang Zhong, Wengen Chen, Abraham J. Wu, James G. Mechalakos, Wolfgang Weber, Joseph O. Deasy, and Wei Lu. "Quantification of Local

Metabolic Tumor Volume Changes by Registering Blended ^{18}F -FDG PET-CT Images for Prediction of Pathologic Tumor Response.” *Journal of Nuclear Medicine* (Under Review, 2018).

Saad Nadeem*, Rena Elkin*, Eve LoCastro, Ramesh Paudyal, Amita Dave, Nancy Lee, Joseph O. Deasy and Allen Tannenbaum. “Optimal Transport Flowmetry for Improved Kinetic Modeling of Tumor DCE-MRI Data.” (Under Preparation, 2018) *Equal Contribution

Conference Proceedings

Rena Elkin, **Saad Nadeem**, Eldad Haber, Klara Steklova, Hedok Lee, Helene Benveniste, and Allen Tannenbaum. “GlymphVIS: Visualizing Glymphatic Transport Pathways Using Regularized Optimal Transport.” *International Conference on Medical Imaging Computing and Computer Assisted Intervention (MICCAI)*, 2018.

Saad Nadeem*, Wookjin Choi*, Sadegh Riyahi, Wei Lu, Joseph O. Deasy, and Allen Tannenbaum. “Interpretable Spiculation Quantification for Lung Cancer Screening.” *International Conference on Medical Imaging Computing and Computer Assisted Intervention (MICCAI) Workshop: Shape in Medical Imaging*, 2018. *Equal Contribution (Oral Presentation)

Sadegh Riyahi, Wookjin Choi, Chia-Ju Liu, **Saad Nadeem**, Shan Tan, Hualiang Zhong, Wengen Chen, Abraham J. Wu, James G. Mechalakos, Joseph O. Deasy, and Wei Lu. “Quantification of Local Metabolic Tumor Volume Changes by Registering Blended PET-CT Images for Prediction of Pathologic Tumor Response.” *International Conference on Medical Imaging Computing and Computer Assisted Intervention (MICCAI) Workshop: Data-Driven Treatment Response Assessment*, 2018. (Oral Presentation) – **Best Paper Award**

Saad Nadeem, Xianfeng Gu, and Arie Kaufman. “Sulcal Pits Extraction Using Eigenfunction Analysis.” *SPIE Medical Imaging*, 105790–105790-7, 2018. (Oral Presentation)

Ji Hwan Park, **Saad Nadeem**, Joseph Marino, Kevin Baker, Matthew Barish, and Arie Kaufman. “Crowd-Assisted Polyp Annotation of Virtual Colonoscopy Videos.” *SPIE Medical Imaging*, 105790–105790-7, 2018. (Oral Presentation)

Saeed Boorboor, **Saad Nadeem**, Ji Hwan Park, Kevin Baker, and Arie Kaufman. “Crowdsourcing Lung Nodules Detection and Annotation.” *SPIE Medical Imaging*, 105790–105790-7, 2018.

Ji Hwan Park, Seyedkoosha Mirhosseini, **Saad Nadeem**, Joseph Marino, Arie Kaufman, Kevin Baker, and Matthew Barish. “Crowdsourcing for

Identification of Polyp-Free Segments in Virtual Colonoscopy Videos.” *Proceedings of SPIE Medical Imaging*, 101380V–101380V-7, 2017. (Oral Presentation)

Ji Hwan Park, **Saad Nadeem**, Seyedkoosha Mirhosseini, and Arie Kaufman. “C²A: Crowd Consensus Analytics for Virtual Colonoscopy.” *Proceedings of IEEE Visualization (VAST)*, 21-30, 2016.

Saad Nadeem and Arie Kaufman. “Multimodal Brain Visualization.” *Proceedings of SPIE Medical Imaging*, pp. 97881Y–97881Y-8, 2016.

Saad Nadeem and Arie Kaufman. “Computer-Aided Detection of Polyps in Optical Colonoscopy Images.” *Proceedings of SPIE Medical Imaging*, pp. 978525–978525-12, 2016.

Saad Nadeem and Arie Kaufman. “Visualization Framework for Colonoscopy Videos.” *Proceedings of SPIE Medical Imaging*, pp. 97861T–97861T-8, 2016.

Saad Nadeem and Arie Kaufman. “Shape-based Multifeature Brain Parcellation.” *Proceedings of SPIE Medical Imaging*, pp. 978430–978430-6, 2016.

Konstantin Dmitriev, Ievgeniia Gutenko, **Saad Nadeem**, and Arie Kaufman. “Pancreas and Cyst Segmentation.” *Proceedings of SPIE Medical Imaging*, pp. 97842C–97842C-8, 2016.

Ming Ma, Joseph Marino, **Saad Nadeem**, and Xianfeng Gu. *Anonymous*, (Under Review, 2018).

Rena Elkin, **Saad Nadeem**, Hedok Lee, Helene Benveniste, and Allen Tannenbaum. *Anonymous*, (Under Review, 2018).

Technical Reports and Posters

Saad Nadeem, Rui Shi, Joseph Marino, Wei Zeng, Xianfeng Gu, and Arie Kaufman. “Registration of Volumetric Prostate Scans using Curvature Flow.” *arXiv:1608.00921*, 2016.

Zafar Ayyub Qazi, **Saad Nadeem**, and Zartash Afzal Uzmi. “MAC Rate Adaptation and Cross Layer Behavior for Vehicular WiFi Access: An Experimental Study.” *arXiv:1610.03834*, 2010.

Seyedkoosha Mirhosseini, **Saad Nadeem**, and Arie Kaufman. “Brain Parcellation using Learned Shape Features.” *CEWIT International Conference & Expo on Emerging Technologies for a Smarter World, 2013 (Best Poster Award)*.

Invited Talks

“Network Curvature as a Hallmark of Brain Structural Connectivity.” *Department of Electrical Engineering, Duke University, NC, USA, 2018.*

“Multimodal Brain Visualizations for Studying Neurodegenerative Diseases.” *Department of Anesthesiology, Yale School of Medicine, CT, USA, 2018.*

“Optimal Transport: Theory and Applications in Medical Imaging.” *Courant Institute of Mathematical Sciences, New York University, NY, USA, 2018.*

“Longitudinal Deformation Analysis for Adaptive Chemo-radiotherapy of Lung and Breast Cancer.” *Department of Medical Physics, Memorial Sloan Kettering Cancer Center, NY, USA, 2018.*

“Augmented Colonoscopy.” *Medical Image Display and Analysis Group, University of North Carolina at Chapel Hill, NC, USA, 2018.*

“Mathematical Methods for Medical Imaging.” *Department of Systems Biology and Biomedical Informatics, Columbia University, NY, USA, 2018.*

“Lung Tumor Motion Management and Shrinkage/Growth Prediction Modeling” *Department of Medical Physics, Memorial Sloan Kettering Cancer Center, NY, USA, 2017.*

“Mapping Analytics for Medical Imaging.” *Department of Computer Science, Stony Brook University, Stony Brook, NY, USA, 2017.*

“Mapping Analytics for Medical Imaging”. *Computational Radiology Laboratory, Boston’s Children’s Hospital and Harvard Medical School, MA, USA, 2017.*

“Mapping Analytics for Medical Imaging”. *Department of Medical Physics, Memorial Sloan Kettering Cancer Center, NY, USA, 2017.*

“Multimodal Brain Visualization”. *Brain Imaging Center, Icahn School of Medicine at Mount Sinai, NY, USA, 2017.*

“Multimodal Brain Visualization”. *Center for Biomedical Image Computing and Analytics, University of Pennsylvania, PA, USA, 2017.*

“Mapping Analytics for Medical Imaging”. *Medical Image Computing and Analysis Laboratory, John Hopkins University School of Medicine, MD, USA, 2017.*

Conference Talks	<p>“Spherical Parameterization Balancing Angle and Area Distortions.” <i>International Conference on Geometric Modeling and Processing</i>, Aachen, Germany, 2018. (Invited talk)</p> <p>“Spherical Parameterization Balancing Angle and Area Distortions.” <i>International Conference on Computer Graphics and Interactive Techniques</i>, Victoria, BC, Canada, 2016. (Invited talk)</p> <p>“Sulcal Pits Extraction Using Eigenfunction Analysis.” <i>SPIE Medical Imaging</i>, Houston, TX, USA, 2018.</p> <p>“Corresponding Supine and Prone Colon Visualization Using Eigenfunction Analysis and Fold Modeling.” <i>IEEE Visualization (Scientific Visualization)</i>, Baltimore, MD, USA, 2016.</p> <p>“C²A: Crowd Consensus Analytics for Virtual Colonoscopy.” <i>IEEE Visualization (VAST)</i>, Baltimore, MD, USA, 2016.</p> <p>“Multimodal Brain Visualization.” <i>SPIE Medical Imaging</i>, San Diego, CA, USA, 2016.</p> <p>“Computer-Aided Detection of Polyps in Optical Colonoscopy Images.” <i>SPIE Medical Imaging</i>, San Diego, CA, USA, 2016.</p>
Grants	<p>“Virtual Pancreatography,” Marcus Foundation, \$1M, <i>Funded</i> (2014-2018). Contributed to formulating the ideas and writing the grant proposal. PIs: Arie Kaufman (Stony Brook University) and Ralph Hruban (Johns Hopkins Medical Center). A follow-up to this grant is <i>Under Preparation</i> for NIH and Marcus Foundation.</p>
Awards	<p>Graduate Student Organization Travel Grant (2016)</p> <p>Top Ranked Graduate Teaching Assistant Award (2011)</p> <p>Stony Brook Computer Science Scholarship (2010-2011)</p> <p>Dean’s Honor List Award (2005-2009)</p> <p>Fulbright Scholarship Award, Morrisville State University of New York (Aug-Dec 2007)</p> <p>Best Academic Performance award for Straight ‘A’ grades in the Advanced Level Examinations (A-Level) conducted by the University of Cambridge, England (2005)</p>
Professional Activities	<p>Organizer, Computer Graphics and Visualization Seminar, Stony Brook University (2014-2017)</p> <p>Reviewer, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (2019)</p> <p>Reviewer, Pacific Graphics (2018)</p> <p>Reviewer, Graphical Models (2018)</p>

Reviewer, Medical Imaging Computing and Computer Assisted Intervention (MICCAI) conference (2017-2018)
Reviewer, IEEE EuroVis Conference (2017-2018)
Reviewer, IEEE Pacific Visualization Conference (2017)
Reviewer, IEEE Virtual Reality Conference (2017-2018)
Reviewer, ACM CHI Conference on Human Factors in Computing Systems (2017-2018)
Reviewer, IEEE Transactions on Visualization and Computer Graphics (2016, 2018)
Reviewer, IEEE Transactions on Medical Imaging (2016, 2018)
Reviewer, Medical Image Analysis (2015-2017)
Reviewer, IEEE Visualization (SciVis, InfoVis, VAST) Conference (2015-2018)
Reviewer, ACM Symposium on Virtual Reality Software and Technology (VRST) (2016)
Judge, Nassau County Science Competition (2017)
Student Member, IEEE and ACM
Member, The New York Academy of Sciences
Member, United Nations Association for United States of America
Member, Fulbright Alumni Association

Industry Experience

Software Engineering Intern, CA Technologies, Islandia, NY (Jun-Aug 2011)

- Developed Installer using InstallAnywhere for platform-independent installation
- Created trigger processing engine, using spring framework

Software Engineer, Media Network, Lahore, Pakistan (Jun 2008-Jun 2010)

- Developed a complete financial auditing software using Java and MySQL

Skills

C/C++, Python, Java, ITK/VTK, Matlab, OpenGL, CUDA, Javascript

Teaching Experience

Stony Brook University

Spring 2012: Graduate Network Programming

- Conducted bi-weekly recitation sessions on socket programming
- Created problem sets, exam questions, and a class project

Fall 2011: Graduate Artificial Intelligence

- Conducted biweekly recitation sessions on the application of various machine learning approaches
- Graded weekly assignments and final exams

Spring 2011, Undergraduate Systems Level Programming

- Conducted weekly recitation sessions on programming in low-level assembly languages

Fall 2010, Undergraduate Operating Systems

- Conducted weekly recitation sessions on creating modules for Nachos OS
- Graded biweekly assignments and held weekly office hours

SSE, LUMS

Spring 2007, Undergraduate Discrete Mathematics

- Conducted weekly tutorial sessions on solving different discrete mathematics problems

Mentoring

Co-advising Rena Elkin (AMS PhD, Stony Brook University, Co-advisor: Allen Tannenbaum) in visualizing glymphatic pathways using regularized optimal transport. A MICCAI paper was published and a CVPR paper is under review. A project is also underway to study tumor vascularization in breast, head and neck cancers using this optimal transport formulation.

Co-advising Stanley Tuznik (AMS PhD, Stony Brook University, Co-advisor: Allen Tannenbaum) in creating an interpretable 3D deep learning analogue using convolutional sparse coding. A deep learning physics-simulated data augmentation tool using optimal transport is also under preparation.

Co-advising Xinan Chen (AMS PhD, Stony Brook University, Co-advisor: Allen Tannenbaum) in creating a tumor deformation analysis tool using regularized optimal transport and deep learning for various imaging modalities (such as CT, MRI, PET) and for different cancer sites (breast, lung, head and neck).

Co-advising Shawn Matthews (CS PhD, Stony Brook University, Co-advisor: Arie Kaufman) for creating a realtime augmented colonoscopy deep learning framework to assist gastroenterologists during colonoscopies in assessing missed colon surface as well as any tumors, inflammation, and blood clots.

Supervised and assisted Liang Shen (Visiting CS PhD Student, Chinese Academy of Sciences, Beijing, Advisor: Dengming Zhu) in implementing flame volume reconstruction and rendering in augmented reality settings. A TVCG journal paper was published.

Mentored and assisted Ji Hwan Park (CS PhD, Stony Brook University, Advisor: Arie Kaufman) in developing visual analytics frameworks for spatio-temporal geographic and crowdsourced medical imaging data. Several conference and journal papers were published.

Mentoring Shreeraj Jadhav (CS PhD, Stony Brook University, Advisor: Arie Kaufman) in creating a general volume exploration framework using exhaustive clustering of super-voxels. A TVCG journal paper was published.

Mentored Konstantin Dmitriev (CS PhD, Stony Brook University, Advisor: Arie Kaufman) in developing semi-automatic algorithm for segmenting pancreas and cysts from CT data. A SPIE medical imaging conference paper was published.

Supervised Saeed Boorboor (CS PhD, Stony Brook University, Advisor: Arie Kaufman) in developing crowdsourcing approach for lung nodules detection and annotation. A SPIE medical imaging conference paper was published and a TVCG journal paper is under review.

**PhD Thesis
Committee**

Rena Elkin, Department of Applied Mathematics and Statistics, Stony Brook University, NY, USA

Stanley Tuznik, Department of Applied Mathematics and Statistics, Stony Brook University, NY, USA

Xinan Chen, Department of Applied Mathematics and Statistics, Stony Brook University, NY, USA

Shawn Mathews, Department of Computer Science, Stony Brook University, NY, USA

References

Available upon request