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Abrar Faiyaz

Postdoctoral Researcher, Department of Neurology, URMC

Education

PhD (Electrical & Computer Engineering) May, 2024
***University of Rochester**, United States*
Specialization: **Neuroimaging, Artificial Intelligence**

MS (Electrical & Computer Engineering) 05/13/2022
***University of Rochester**, United States*
Specialization: **Data Science, Medical Imaging**

BSc (Computer Science and Engineering) 08/2012 - 11/2016
First class with Honors (**Ranked 1st**),
Islamic University of Technology, Bangladesh. **CGPA: 4.0/4.0**
Specialization: **Machine Learning, Ultrasound**

Professional Experience

Postdoctoral Researcher, May, 2024 - *Present*
Department of *Neurology*,
University of Rochester Medical Center, Rochester, NY

Research Assistant & Teaching Assistant, 01/2018 - 05/2024
Department of *Electrical and Computer Engineering*,
University of Rochester, Rochester, NY

Journal Article Reviewer, 03/2022 - *Present*
NMR in Biomedicine, **Frontiers in Neurology**, **PLOS ONE**

Lecturer, Department of *Computer Science and Engineering*, 01/2017 - 01/2018
Courses:

- CSE4503- Microprocessor and Assembly Language,
- CSE4673- Operating System and System Programming,
- CSE4607- Computer Graphics & Multimedia Systems,
- CSE4885- Human Computer Interaction

Islamic University of Technology, Dhaka, Bangladesh

Paid Co-op Internship, Software Solutions Department 10/2015 - 01/2016
Samsung R&D Institute, Bangladesh, Dhaka, Bangladesh

Awards & Achievements

***Champion** in the **MICCAI Challenge 2022**,* *09/2022*
*International Competition on **Artificial Intelligence in diffusion MRI** organized by CDMRI & MICCAI Society.* [Challenge Results] [Details]

*Received **OIC Gold Medal 2016** award for academic excellence in BSc.,* *11/2016*
*International Award recognised by **Organisation of Islamic Cooperation**, Jeddah, Kingdom of Saudi Arabia*

🎓 *Awarded **Educational Stipend** in the **ISMRM Conference**, **International Society for Magnetic Resonance in Medicine.*** *2020, 2021, 2022*

🏆 *First Runners Up at **16th IUT Programming Contest 2015**.,* *11/2015*
*Programming contest organized by **Islamic University of Technology**, Dhaka, Bangladesh*

Research Publications

Journal Articles (Peer Reviewed)

J1. Aja-Fernández, S., Martín-Martín, C., Planchuelo-Gómez, Á., **Faiyaz, A.**, Uddin, M. N., Schifitto, G., et, al, "Validation of deep learning techniques for quality augmentation in diffusion MRI for clinical studies," *NeuroImage: Clinical*, vol. 39, p. 103 483, Jan. 2023.

J2. **Faiyaz, A.**, Doyley, M. M., Schifitto, G., Uddin, M. N., "Artificial intelligence for diffusion mri-based tissue microstructure estimation in the human brain: An overview," *Frontiers in Neurology*, vol. 14, p. 1 168 833, 2023.

J3. **Faiyaz, A.**, Doyley, M., Schifitto, G., Zhong, J., Uddin, M. N., "Single-shell noddi using dictionary-learner-estimated isotropic volume fraction," *NMR in Biomedicine*, vol. 35, no. 2, e4628, 2022.

J4. Finkelstein, A., **Faiyaz, A.**, Weber, M. T., Qiu, X., Uddin, M. N., Zhong, J., Schifitto, G., "Fixel-based analysis and free water corrected dti evaluation of hiv associated neurocognitive disorders," *Frontiers in Neurology; https://doi.org/10.3389/fneur.2021.725059*, 2021.

J5. Uddin, M. N., **Faiyaz, A.**, Wang, L., Zhuang, Y., Murray, K. D., Descoteaux, M., Tivarus, M. E., Weber, M. T., Zhong, J., Qiu, X., "A longitudinal analysis of brain extracellular free water in hiv infected individuals," *Scientific reports*, vol. 11, no. 1, pp. 1–12, 2021.

J6. Diba, T., **Faiyaz, A.**, Akhlagi, N., Doyley, M., Alam, S. K., Zara, J., Garra, B., "Elastic modulus quantification from strain elastograms: Progress towards a low cost alternative to shear wave elastography," *Journal of Ultrasound in Medicine*, vol. 39, no. S1, S26–S31, 2020.

J7. Korshunov, V. A., Smolock, E. M., Wines-Samuelson, M. E., **Faiyaz, A.**, Mickelsen, D. M., Quinn, B., Pan, C., Dugbartey, G. J., Yan, C., Doyley, M. M., "Natriuretic peptide receptor 2 locus contributes to carotid remodeling," *Journal of the American Heart Association*, vol. 9, no. 10, e014257, 2020.

J8. Korshunov, V. A., Quinn, B., **Faiyaz, A.**, Ahmed, R., Sowden, M. P., Doyley, M. M., Berk, B. C., "Strain-selective efficacy of sacubitril/valsartan on carotid fibrosis in response to injury in two inbred mouse strains," *British Journal of Pharmacology*, vol. 176, no. 15, pp. 2795–2807, 2019.

Journal Articles (Under Preparation)

J9. **Faiyaz, A.**, Kabir, I., L, W., Doyley, M., Sack, I., Qiu, X., Uddin, M., Schifitto, G., *Magnetic resonance elastography investigation on hiv+ cohort with cerebral small vessel disease*.

J10. **Faiyaz, A.**, Uddin, M. N., Schifitto, G., *Angular upsampling in diffusion mri using contextual hemihex subsampling in q-space*.

J11. Uddin, M. N., **Faiyaz, A.**, Finkelstein, A., Tivarus, M., Zhong, J., Weber, M., Wang, L., Wang, H., Qiu, X., Schifitto, G., *Linking myelin heterogeneity index with cognitive performance among hiv infected individuals at risk of cerebral small vessel disease*.

Conference Proceedings (Peer Reviewed)

C1. **Faiyaz, A.**, Weber, M., Kabir, I., Doyley, M. M., Sack, I., Uddin, M. N., Schifitto, G., "Evaluating mre-tract integrity in hiv-csvd cohort: A comprehensive analysis with functionally defined atlases and neurocognitive assessment," in *Proc. Intl. Soc. Mag. Reson. Med. 32*, 2024.

C2. **Faiyaz, A.**, Hoang, N., Finkelstein, A., Zhong, J., Doyley, M., Wang, H., Uddin, M. N., Schifitto, G., "Bayestract: Automated machine learning based brain artery segmentation, anatomical prior annotation and feature-extraction in mr angiography," in *Proc. Intl. Soc. Mag. Reson. Med. 30*, 2022.

C3. Uddin, M. N., **Faiyaz, A.**, Finkelstein, A., Schifitto, G., "Myelin water imaging in an hiv population at risk of cerebral small vessel disease," in *Proc. Intl. Soc. Mag. Reson. Med. 30*, 2022.

C4. **Faiyaz, A.**, Doyley, M. M., Schifitto, G., Zhong, J., Uddin, M. N., "Deep learner estimated isotropic volume fraction enables reliable single-shell noddi reconstruction," in *Proc. Intl. Soc. Mag. Reson. Med. 29*, 2021.

C5. **Faiyaz, A.**, Kabir, I. E., Doyley, M. M., Sack, I., Uddin, M. N., Schifitto, G., "Preliminary mr elastography investigation on hiv+ cohort with cerebral small vessel disease," in *Proc. Intl. Soc. Mag. Reson. Med. 29*, 2021.

C6. Finkelstein, A., **Faiyaz, A.**, Uddin, M., Zhong, J., Schifitto, G., "Machine learning classification of hiv associated neurocognitive disorders (hand) based on fiber specific white matter change," in *27th Annual Meeting of the Organization for Human Brain Mapping*, 2021.

C7. Uddin, M. N., **Faiyaz, A.**, Schifitto, G., "Evaluation of white matter microstructure in an hiv population at risk of cerebral small vessel disease using microscopic fractional anisotropy," in *Proc. Intl. Soc. Mag. Reson. Med. 29*, 2021.

C8. **Faiyaz, A.**, Zhuang, Y., Doyley, M., Zhong, J., Descoteaux, M., MN, U., Schifitto, G., "Effect of free water correction in grey and white matter in cart treated hiv patients," in *26th Annual Meeting of the Organization for Human Brain Mapping*, 2020.

C9. Murray, K., **Faiyaz, A.**, Sahin, B., Tivarus, M., Uddin, M. N., Venkataraman, A., Wang, H., Zhuang, Y., Zhong, J., Maggirwar, S., "Tract-based spatial statistics of cerebral small vessel disease in an hiv population," in *26th Annual Meeting of the Organization for Human Brain Mapping*, 2020.

C10. Uddin, M. N., **Faiyaz, A.**, Zhuang, Y., Tivarus, M., Zhong, J., Descoteaux, M., Schifitto, G., "Relationship between free water and neuroinflammation/neurodegeneration markers in hiv before and after combination antiretroviral therapy," in *Proc. Intl. Soc. Mag. Reson. Med. 28*, 2020.

Graduate Thesis (Under Revision)

Abrar Faiyaz 2024, "Artificial Intelligence in Brain Micro-Architecture Investigation Using Clinical Diffusion MRI", University of Rochester, Rochester, NY, US
- Proposed a competitive approach for Q-space up-sampling problem in diffusion MRI.
- Enabled single-shell neurite characterization using AI initialized NODDI.
- Demonstrated application of the proposed approaches in the clinical data.

Academic Projects

Analyzing AlexNet Encodings: In a Computational Neuroscientist's Perspective
Course Instructor: Ralf Haefner *Spring 2021,* ***BCS451***

- o Reconstructed Neuronal Receptive Fields of AlexNet Convolution Layer Neurons.
- o Investigated alexnet tuning curves for comparison with neurons in human visual pathway.
- o Report/Presentation

Deep learning based Ultrasound Image Generation Beam forming alternative Limitations and Possibilities
Course Instructor Kevin J. Parker, ECE *Fall 2018,* ***ECE452***

- o Enabled Ultrasound Beam forming with trained Unet architecture.
- o Explored possibilities for Ultrasound Images with Deep Learner Applications.
- o Enabled characterizing Cysts with segmentation using raw US data without beam forming.
- o Report/Presentation

Undergraduate Thesis

Abrar Faiyaz, Md Samiul Bashar, et al. **2016**, "Strain Estimation and Detection of Cancerous Breast Lesion through

ultrasound imaging", Department of CSE, IUT, Dhaka, Bangladesh.
- Extracted and analyzed key features of malignant mammograms.
- Applied ML classifiers on optimized set of features to identify malignant and benign cases.
- Enabled early detection of malignant incidents.

Skills

Languages: C/ C++, Python, Keras, R, Bash, Matlab, LaTeX, Assembly (x86, MIPS), ImageJ, ANTS
Simulation Tools: COMSOL, Field-II, Paraview, Blender
Others: Git, High Performance computing, Cluster computing

Research Interest (Keywords)

Machine Learning, Deep Learning, Diffusion MRI, MR Elastography, MR Physics, Tissue Mechanics, Medical Image Processing, Computer Vision, Image Restoration, Ultrasound

References

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