Jay Shah

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*Research Objectives***:** Leveraging Deep Learning (DL) to develop novel techniques for biomarker discovery built for tackling few of the most common challenges in healthcare research (a) Small datasets (b) Noisy and imbalanced datasets (c) Lack of explainability of complex model predictions. Aim of my research is to build innovative Interpretable techniques that can help democratize use of AI within other fields.

I work with Dr. Teresa Wu and Dr. Baoxin Li on medical imaging projects relating to biomarker discovery for Post-Traumatic Headache (PTH) and Alzheimer's Disease (AD) using Deep Learning in joint collaborations with Mayo Clinic, Banner Alzheimer's Institute and Barrow Neurological Institute in Arizona, USA.

EDUCATION

Ph.D. in Computer Science, Arizona State University	05.2020 - Present
M.S. in Computer Science, Arizona State University	08.2018 – 05.2020
B.Tech in Information & Communication Technology,	08.2014 – 08.2018
Dhirubhai Ambani Institute of Information and Communication Technology	

WORK EXPERIENCE

Mayo Clinic and **Arizona State University**, *Tempe*   05.2020 - Present
Research Affiliate and Doctoral student

Arizona State University, *Tempe*   12.2018 – 05.2020
Worked with Frank Wilczek, Nobel Laureate and Professor of Physics, on using Machine Learning (ML) for Art Authentication & Teaching Assistant in Dept. of Computer Science

Philips Research Labs, *Cambridge*   06.2019 – 08.2019
Research & Development Intern, worked on contactless patient monitoring and vitals measurement tool using DL techniques

HackerRank, *Bangalore*   01.2018 – 05.2018
Machine Learning Engineer Intern, built real-time systems for platform and user feedback monitoring using ML and coding challenges for ML interviews

Nanyang Technological University, *Singapore*   05.2017 – 08.2017
Visiting Undergraduate Research Intern, worked with Professor Lin Weisi in exploring significance based large scale 3D point cloud compression and representation.

RESEARCH PROJECTS

Identifying biomarkers for Persistence of PTH using Deep Learning

Building multi-modal deep learning models to identify and predict mechanisms and signature to prevent persistence of PTH and Migraine using Vision-Transformers and CNN based techniques. Also exploring Shapley-Value based methods for delineating model predictions for better interpretation and clinical usage (*collaboration with ASU and Mayo Clinic, Arizona*)

Missing modality harmonization using Deep Learning for longitudinal studies in Alzheimer's

Harmonizing PET imaging data from different scanners and modalities to generate compatible imaging derived measurements using encoder-decoder architectures. Aim is to address tracer harmonization problem and support longitudinal studies in Alzheimer's research (*collaboration with ASU and Banner Alzheimer's Institute, Arizona*)

Personalized Diagnostics and Prognostics for Alzheimer's Disease using Machine Learning

DL based tools for brain age prediction, (AD) classification, conversion of mild cognitive impairment (MCI) to AD and building personalized diagnostics using multi-modal data from various sensors (*STTR grant with ASU and MS-Tech*)

JOURNAL PUBLICATIONS

1. (*Accepted, 12/21*) **Shah, J.**, Gao, F., Ghisays, V., Luo, J., Chen, Y., Lee, W., Zhou, Y., Li, B., Benzinger, T., Reiman, E., Chen, K., Su, Y., Wu, T., "Deep Residual Inception Encoder-Decoder Network for Amyloid PET Harmonization", *Alzheimer's and Dementia Journal*.
2. (*Ongoing revision*) Siddiquee, M., **Shah, J.**, Schwedt, T., Chong, C., Nikolova, S., Dumkrieger, Ross, K., Wu, T., "Using Deep Learning Ensembles to identify Imaging Biomarkers for Post-Traumatic Headache", *Cephalalgia Journal.*
3. (*Ongoing revision*) **Shah, J.**, Chen, K., Su, Y., Wu, T., "Transfer Learning based MCI to AD conversion prediction using Age-adjusted Deep Neural Network and APOE genotypes", *Alzheimer's and Dementia Journal*.

Conferences & Abstracts

1. (Abstract, *submitted*) **Shah, J.**, Ghisays, V., Chen, Y., Luo, J., Li, B., Reiman, E., Chen, K., Wu, T., Su, Y., "MRI signatures of Brain Age in the Alzheimer's Disease continuum", *Alzheimer's Association International Conference, 2022.*
2. (Abstract, *submitted*) **Shah, J.**, Chen, K., Reiman, E., Li, B., Wu, T., Su, Y., "Transfer Learning based Deep Encoder Decoder Network for Amyloid PET Harmonization with Small Datasets", *Alzheimer's Association International Conference, 2022.*
3. (Abstract, submitted) Siddiquee, M., **Shah, J.**, Schwedt, T., Chong, C., Nikolova, S., Dumkrieger, Ross, K., Wu, T., "Migraine Classification using Deep Learning on Structural Brain MRI data", *The American Headache Society Annual Scientific Meeting, 2022.*
4. (Abstract) **Shah, J.**, Ghisays, V., Luo, J., Chen, Y., Lee, W., Li B., Benzinger, T., Reiman, E., Chen, K., Su, Y., Wu, T., "Deep Residual Inception Encoded-Decoder Network for Amyloid PET Harmonization", *Arizona Alzheimer's Consortium, 2021.*
5. (Abstract) **Shah, J.**, Chong, C., Schwedt, T., Berisha, V., Li, J., Ross, K., Dumkrieger, G., Zhang, J., Gaw, N., Nikolova, S., Wu, T., "Interpreting Deep Learning Model Predictions using Shapley Values", *INFORMS Annual Meeting, 2021.*
6. [link] **Shah, J.**, Ghisays, V., Luo, J., Chen, Y., Lee, W., Li B., Benzinger, T., Reiman, E., Chen, K., Su, Y., Wu, T., "Deep Residual Inception Encoded-Decoder Network for Amyloid PET Harmonization", *Alzheimer's Association International Conference, 2021.*

Patents

1. (*Provisional, #63285002*) Deep Residual Inception Encoder-Decoder Network for Amyloid PET Harmonization, 12/01/2021, Fei Gao, Yi Su, **Jay Shah**, Teresa Wu.

AWARDS & SERVICES

Reviewer, Alzheimer's Association International Conference	01.2022
Reviewer, Alzheimer's & Dementia: The Journal of Alzheimer's Association, Wiley	11.2021
IEEE Impact Creator [link]	01.2021
Alzheimer's Association International Conference 2021, Travel Fellowship	06.2021
Graduate Research Assistantship, Arizona State University	05.2020 – Present
CVPR 2019, Travel Grant	06.2019
IEEE-IAS Annual Meeting Ex-Com, Travel Grant (US$1200 p.a., 3 years)	2017 - 2019

INVITED TALKS AND HIGHLIGHTS

Alzheimer's Imaging Consortium Spotlight Webinar, Neuroimaging PIA	10.2021
Deep Residual Inception Encoded-Decoder Network for Amyloid PET Harmonization	
Emerging Research Topics in Engineering, IEEE Gujarat Section[link]	10.2021
Landscape of Interpretable AI, its limitations and glance at Shapley Values	
4th OnCV&AI workshop, Nordling Lab, National Cheng Kung University in Taiwan[link]	09.2021
Landscape of Explainable AI, interpreting DL predictions and observations from hosting an ML podcast	
Dhirubhai Ambani Institute of Information and Communication Technology Blog[link]	

> From DAIICT to ASU and working with Nobel Laureate Frank Wilczek

AXIOS news article[link]
> How AI could revolutionize biology-and vice versa

IEEE Spectrum and Career Reset Podcast[link1, link2]   04.2021
> Scaling up a technical podcast

Currup Leadership Podcast[link]   04.2021
> Behind the scenes with Machine Learning Expert

Workshops at AI Club, ASU
> Python workshop 2020, Convolutional Neural Networks 2020, 2021

TECHNICAL SKILLS AND COURSEWORK

Programming Languages: Python, C/C++, Java, matlab, SQL, Shell Scripting
ML/DL frameworks: PyTorch, TensorFlow, R-Studio, Tableau, Gephi, scikit-learn, NLTK, OpenCV
Web Technologies: HTML, CSS, Javascript, d3, Google Compute and App Engines, AWS, MySQL, PostgreSQL

Human-Aware AI, Intro to ML, Fund. of Statistical Learning, Neural Networks, Intro to Digital Image Proc, Game Theory, NLP, Vision & Language frontier, Data Mining and Vis, Social Media Mining, Dist. & Parallel Database Systems, Stochastic Simulation, Discrete Math, Calculus & Complex Variables, Algebraic Structures, Prob & Stats, Cloud Computing, GPU Programming, Data-Structures & Algorithms, Obj. Oriented Prog, Theoretical Computer Science, OS, Compiler Design

LEADERSHIP ACTIVITIES

Machine Learning Podcast Host (3,730+ subscribers, 120,000+ downloads) [link]   01.2019 - Present
Research Associate, ASU-Mayo Center for Innovative Imaging [link]   05.2020 - Present
IEEE-IAS Subcommittee Chair   08.2018 - Present
Technical Director, AI Club, ASU   01.2020 - Present
Chairperson, IEEE-IAS DAIICT (Student Branch Chapter)   01.2017 – 12.2017