ATIFA SARWAR

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SUMMARY

A dedicated researcher with a Ph.D. in Computer Science and over 13 years of combined experience in research, teaching, and software development across academia and industry. Possesses a strong background in Artificial Intelligence, Temporal Modeling, Sensor Data Analysis, Digital Health, and Computer Vision, with a solid publication record in leading journals. Passionate about applying AI and data science to real-world problems, with a particular interest in healthcare.

TECHNICAL SKILLS

Languages: Python, Numpy, C++, C#, ASP.NET, SQL, HTML5, CSS3, Angular

Machine Learning Libraries: TensorFlow, Pytorch, Keras, sklearn, PyG

Developer Tools: Jupyter Notebook, MySQL, Anaconda, Openshift, Docker Containers, Amazon AWS

EXPERIENCE

Software Engineer, Machine Learning, and Perception Dec 2024 – Present
Motive - Remote *San Jose, CA, USA*

- Led initiatives to transition fleet management systems from rule-based to data-driven approaches using deep learning for real-time road safety analytics.
- Conducted in-depth literature reviews and feasibility assessments to guide architecture selection and experimental design.
- Designed and optimized neural architectures to model temporal dependencies in dashcam video streams for detecting unsafe driving behaviors.
- Performed benchmarking and ablation studies to ensure model robustness across diverse environments and edge-compute settings.

Fulbright Research Scholar Aug 2019 – July 2024
Worcester Polytechnic Institute *Worcester, MA, USA*

- Analyzed longitudinal physiological data collected from consumer-grade smart wearables for passive infectious disease screening.
- Proposed novel predictive models using meta-learning, reinforcement learning, and graph neural networks, enabling pre-symptomatic detection of Covid-19.
- Led development, testing, and integration of proposed methods into production environment.
- Published 5 research papers contributing to the advancement of knowledge in passive infectious disease screening using AI techniques.
- Presented findings and recommendations to stakeholders through reports and visualizations.
- Worked extensively with data analysis frameworks (NumPy, Pandas, Scikit-learn) and deep learning tools (Keras, PyTorch, PyG).

DevOps Engineer June 2020 – Aug 2020
Red Hat *Boston, MA, USA*

- Contributed to the development of a standalone operator for Dataverse, an open-source data repository platform by Harvard University.
- Deployed the operator on OpenShift, utilizing Docker images, Kubernetes config maps, and secrets.
- Integrated PostgreSQL and Solr for enhanced data management and search capabilities.

Lecturer Aug 2016 - June 2019
National University of Computer and Emerging Sciences *Islamabad, Pakistan*

- Conducted lectures on programming courses tailored for students ranging from freshmen to seniors.
- Taught students various programming languages and frameworks, including C++, C#, ASP.NET, SQL, Angular, and Java.
- Supervised final year projects in the field of machine learning, image processing, and web development, fostering practical problem-solving and technical skills.
- Counseled students to plan their semester courses, and mentor them in intra-university competitions.

Software Engineer Aug 2012 - July 2016
Foundation for Advancement of Science and Technology *Islamabad, Pakistan*

- Played a key role in revamping the university's web portal and redesigning the admission system for a multi-campus setup.
- Worked in-depth on a wide range of technologies, including MVC, .Net Framework, ASP.NET and C#.

PROJECTS

Machine Learning Prediction of Chronic Lower Back Pain
Keywords: Machine Learning, Rest-Activity Circadian Dysregulation, Actigraphy Devices

- Conducted a thorough predictive analysis of activity counts gathered passively from actigraphy devices for identifying chronic lower back pain.
- Extracted novel digital biomarkers characterizing sleep, activity, and rest-activity rhythm dysregulation, and classified them using traditional machine learning algorithms.
- Achieved an AUC-ROC of 97%, demonstrating the effectiveness of machine learning and rhythm disruption analysis for passive pain detection.

Detecting Hypertrophic Cardiomyopathy (HCM) from Echocardiograms
Keywords: Video Action Recognition models, Transfer learning

- Developed an end-to-end framework leveraging SlowFast, a deep video action recognition model, for detecting HCM from echocardiogram videos.
- Segmented 1553 echocardiogram videos into frames, and fed them into the SlowFast model, pretrained on 10,030 echocariograms from EchoNet-Dynamic dataset.
- Achieved exceptional performance with 93.13% accuracy, highlighting the efficacy of deep learning in advancing HCM diagnosis.

Estimating Blood Intoxication from Gait Analysis
Keywords: Gramian Angular Field (GAF), Deep Learning

- Analyzed smartphone tri-axial accelerometer and gyroscope sensor readings of 121 subjects to detect blood intoxication.
- Transformed sensors readings into Gramian angular fields (GAFs), subsequently processed by BiCNN to determine whether the subject surpasses the legal driving limit (0.08).
- Achieved an accuracy of 83.5%, showcasing the feasibility of our approach in averting DUI incidents.

EDUCATION

Worcester Polytechnic Institute Worcester, MA, USA
Ph.D.(Computer Science) *2019 – 2024*
Dissertation Title: Machine Learning For Passive Pre-Symptomatic Covid-19 Detection using Smart Wearables
Advisor: Prof. Emmanuel O. Agu

National University of Science and Technology Islamabad, Pakistan
MS (Information Technology) *2013 - 2016*
Thesis Title: Smartfit - A Step Count based Mobile Application for Engagement in Physical Activities
Advisor: Dr. Hamid Mukhtar

National University of Computer and Emerging Sciences Islamabad, Pakistan
BS (Computer Science) *2008 – 2012*

PUBLICATIONS

Journals

- **Sarwar, A.**, Almadani, A., & Agu, E. O. (2024). Early Time Series Classification Using Reinforcement Learning for Pre-Symptomatic Covid-19 Screening From Imbalanced Health Tracker Data. IEEE Journal of Biomedical and Health Informatics.
- Almadani, A., **Sarwar, A.**, Agu, E., Ahluwalia, M., & Kpodonu, J. (2024). HCM-Echo-VAR-Ensemble: Deep Ensemble Fusion to Detect Hypertrophic Cardiomyopathy in Echocardiograms. IEEE Open Journal of Engineering in Medicine and Biology.
- **Sarwar, A.**, Almadani, A., & Agu, E. (2024). Few-shot meta-learning for pre-symptomatic detection of Covid-19 from limited health tracker data. Smart Health, 100459.
- **Sarwar, A.**, Agu, E., & Almadani, A. (2023). CovidRhythm: A Deep Learning Model for Passive Prediction of Covid-19 using Biobehavioral Rhythms Derived from Wearable Physiological Data. IEEE Open Journal of Engineering in Medicine and Biology, 4, 21–30.
- Li, R., Agu, E., **Sarwar, A.**, Grimone, K., Herman, D., Abrantes, A., & Stein, M. (2023). Fine-Grained Intoxicated Gait Classification using a Bi-linear CNN. IEEE Sensors Journal.
- **Sarwar, A.**, Agu, E., Polcari, J., Ciroli, J., Nephew, B., & King, J. (2022). PainRhythms: Machine learning prediction of chronic pain from circadian dysregulation using actigraph data—a preliminary study. Smart Health, 26, 100344.

Conferences

- Almadani, A., Agu, E., **Sarwar, A**., Ahluwalia, M., & Kpodonu, J. (2023). HCM-Dynamic-Echo: A Framework for Detecting Hypertrophic Cardiomyopathy (HCM) in Echocardiograms. In 2023 IEEE International Conference on Digital Health (ICDH) (pp. 217–226).
- **Sarwar, A.**, & Agu, E. (2021). Passive COVID-19 Assessment using Machine Learning on Physiological and Activity Data from Low End Wearables. In 2021 IEEE International Conference on Digital Health (ICDH) (pp. 80–90).
- **Sarwar, A**., Mukhtar, H., Maqbool, M., & Belaid, D. (2015). Smartfit: a step count based mobile application for engagement in physical activities. International Journal of Advanced Computer Science and Applications (IJACSA), 6(8), 271–278.

AWARDS

- Fulbright PhD Scholar
- Awarded with scholarship to attend CRA-WP 2019
- Winner of IEEE ICDH 2020 Best Student Paper Award
- Silver Medal for achieving 2^{nd} position in Bachelor's degree
- Gold Medal for achieving top position for semester results in Bachelor's degree