Shahab Ul Hassan

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Education

Doctor of Philosophy | ***in Information Technology*** 2023 – 2026
Universiti Teknologi PETRONAS Perak, Malaysia

Thesis Title: A Unified Perceptual Segmentation and Explainable Deep Learning Framework for Interpretable CT Scan Analysis

Main Contribution:

- To develop WK-Median, a clustering-based, perceptually guided segmentation method, to accurately delineate anatomical and pathological regions in CT scans while reducing noise and improving boundary clarity.
- To develop MedDeepNet, a custom CNN framework that incorporates segmentation outputs to improve feature learning and achieve higher classification performance for CT scan analysis.
- To develop ASP-LIME, an interpretable explanation framework that provides stable, consistent, and computationally efficient explanations with improved spatial localization compared to existing medical XAI methods.

Master of Science | ***in Information Technology*** 2020 – 2022
Universiti Teknologi PETRONAS Perak, Malaysia

Thesis Title: Classification of cardiac arrhythmia using hybrid convolutional neural network and bidirectional long short-term memory.

Main Contribution:

- Analysis of the effect of deep learning feature extraction on the robustness and classification performance of cardiovascular disease prediction models.
- Development of a hybrid CNN-BiLSTM model for predicting five classes of cardiac arrhythmia disease.

Bachelor of Science | ***in Computer Science*** 2012 – 2016
Institute of Business and Management Sciences Peshawar Pakistan

Work Experience

Graduate Research Assistantship Scheme 2020

∗ **Grant Funding body:** The Yayasan Universiti Teknologi PETRONAS Fundamental Research (YUTP-FRG), Grant [015LCO-244]
Project title: Predicting Cardiovascular Diseases Using Interpretable Machine Learning Model And Smart IOT Platform.

∗ **Grant Funding body:** Institute of Autonomous System, Centre for Research in Data Science, Grant (YUTP-FRG), Cost Centre [015LC0-308]
Project title: Optimization of One-Dimensional Convolutional Neural Network for Corrosion Prediction in Subsea Pipelines

Research Interest

Explainable Artificial Intelligence | Interpretability | Machine Learning | Deep Learning | Medical Imaging | Biomedical Applications |

Publications

Journals

* **Shahab Ul Hassan**, Mohd Zahid MS, Talal A.A. Abdullah, and Husain K. "Classification of cardiac arrhythmia using a convolutional neural network and bi-directional long short-term memory" Published in Sage Digital Health, 2021 (IF: 4.687). https://doi.org/10.1177/20552076221102
* **Shahab ul Hassan**, Said Jadid Abdulkadir, M Soperi Mohd Zahid, and Safwan Mahmood Al-Selwi. "Local interpretable model-agnostic explanation approach for medical imaging analysis: A systematic literature review". Published in Computers in Biology and Medicine 185 (2025): 109569. (I.F = 7.0) ISI indexed Q1. https://doi.org/10.1016/j.compbiomed.2024.109569
* Husain K, Mohd Zahid MS, **Shahab Ul Hassan** et al. "Advances of ECG sensors from hardware, software and format interoperability perspectives". Published in Electronics ISI indexed Q2, IF: 2.690 2021; 10(2): 105. https://doi.org/10.3390/electronics10020105
* Talal A.A. Abdullah, Mohd Zahid MS, Waleed Ali and **Shahab Ul Hassan**. "B-LIME: An Improvement of LIME for Interpretable Deep Learning Classification of Cardiac Arrhythmia from ECG Signals". Published in Processes 2023, 11(2), 595; (I.F = 3.352) ISI indexed Q2. https://doi.org/10.3390/pr11020595
* Abdul Muiz Fayyaz, Said Jadid Abdulkadir, **Shahab Ul Hassan**, Safwan Mahmood Al-Selwi, et al. "The Role of Advanced Machine Learning in COVID-19 Medical Imaging: A Technical Review". Published in Results in Engineering (2025): 105154. ISI indexed Q1 (I.F = 7.9). https://doi.org/10.1016/j.rineng.2025.105154
* Abdul Muiz Fayyaz, Said Jadid Abdulkadir, **Shahab Ul Hassan**, Safwan Mahmood Al-Selwi, et al. "Grad-CAM (Gradient-weighted Class Activation Mapping): A systematic literature review". Published in Computers in Biology and Medicine 185 (2025): 109569. (I.F = 7.0) ISI indexed Q1. https://doi.org/10.1016/j.compbiomed.2025.111200

Conferences

* **Shahab Ul Hassan**., Zahid, M. S. M, and Husain, K. 'Performance comparison of CNN and LSTM algorithms for arrhythmia classification'. In 2020 International Conference on Computational Intelligence (ICCI) (pp.23-228).IEEE. DOI: 10.1109/ICCI51257.2020.9247636
* **Shahab Ul Hassan**, Mohd Zahid S., and Husain, K. 'Impact of bi-directional LSTM layer variation on cardiac arrhythmia detection performance'. Published, 'The 5th international multi conference on artificial intelligence technology' (M-CAIT). (Best Paper Award)
* M. Y. Daha, M. S. M. Zahid, A. Alashhab, and **Shahab Ul Hassan,** 'Comparative Analysis of Community Detection Methods for Link Failure Recovery in Software Defined Networks', 2021 ICICyTA 2021, pp. 157–162, 2021, doi: 10.1109/ICICYTA53712.2021.9689089
* **Shahab Ul Hassan**, Said Jadid Abdulkadir, Mohd Soper Mohd Zahid, Abdul Muiz Fayyaz et al. "An Optimized CNN-LSTM Model for Detecting Cardiac Arrhythmias." Published in 2024 IEEE 8th International Conference on Signal and Image Processing Applications (ICSIPA). IEEE, 2024. DOI: 10.1109/ICSIPA62061.2024.10686688
* Shahab Ul Hassan, Abdulkadir, S. J., Zahid, M. S. M., Fayyaz, A. M., Al-Selwi, S. M., & Sumiea, E. H. " An optimized cnn-lstm model for detecting cardiac arrhythmia". In 2024, IEEE 8th International Conference on Signal and Image Processing Applications (ICSIPA) (pp. 1-6).IEEE [ISI, Scopus].

Conferences and Presentations

IEEE International Conference on Signal and Image Processing Applications (ICSIPA) 2024
8th IEEE (2024) Conference, Concorde Hotel, Kuala Lumpur, Malaysia

Si2TE Sirim invention, innovation and technology Expo 2022
Sirim Kulim Exhibition Kedah Malaysia.

5th International Multi-Conference on Artificial Intelligence Technology (MCAIT) 2021
Center of the Artificial Intelligence Technology (CAIT),
Universiti Kebangsaan Malaysia.

International Conference on Computational Intelligence (ICCI) 2020
Department of Computer and Information Science,
Universiti Teknologi PETRONAS Malaysia.

Honors and Awards

* **Best Paper Award**
The 5th international multi-conference on artificial intelligence technology (MCAIT), organized by,
Universiti Kebangsaan Malaysia, 2021.

* **Bronze Medal**
Sirim invention, innovation technology Expo 2022 (SITE2022), 19th to 21st July 2022,
SIRIM Kulim Hi-tech Park, Kedah, Malayisa.

* **Judge**
'Oh My Code' Expo 12.0 2023, held during the 20th to 21st July 2023,
Universiti Teknologi PETRONAS (UTP), Malaysia.

* **Certificate**
Peer Review Certificate – Scientific Reports (Nature Journal), 2025

* **Certificate**
Attended workshop "Producing a High-Quality and Well-researched Thesis",
conducted by CIS department on December 14, 2023.
Universiti Teknologi PETRONAS Malayisa

Teaching Experience

Structured Algorithm and Programing | Foundation Students
Lab demonstration Universiti Teknologi PETRONAS

Visual Programming | Foundation Students
Lab demonstration Universiti Teknologi PETRONAS

Cloud Computing | Undergraduate Students
Lab demonstration Universiti Teknologi PETRONAS

Software engineering & HCI | Undergraduate Students
Lab demonstration Universiti Teknologi PETRONAS

Strategic Business Analytics | Undergraduate Students
Lab demonstration Universiti Teknologi PETRONAS

Probability and Random Processes | Undergraduate Students
Lab demonstration Universiti Teknologi PETRONAS

Skills

Programming: Python (NumPy, SciPy, Scikit-Learn, TensorFlow Matplotlib, Pandas), MATLAB (Deep Learning Toolbox, Image Processing Toolbox, Signal Processing Toolbox, Optimization Toolbox, Parallel Computing Toolbox).
Document Creation: Overleaf/LaTex, Microsoft Office Suite, Origin, Draw.io, Seaborn, Mendeley, EndNote, Photoshop.

References

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