

Muhammad Umair Hassan

ASSISTANT PROFESSOR · COMPUTER SCIENCE

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Education

Norwegian University of Science and Technology-(NTNU)

Norway

PHD COMPUTER SCIENCE (NEAR COMPLETION)

2020 - present

- Advisor: Prof. Ibrahim A. Hameed

University of Jinan

P.R. China

MS COMPUTER SCIENCE AND ENGINEERING

2017 - 2020

- Advisor: Prof. Xiuyang Zhao

University of the Punjab

Pakistan

BS COMPUTER SCIENCE

2013 - 2017

Professional Experience

- 2023-2024 **Assistant Professor**, Department of ICT and Natural Sciences, Norwegian University of Science and Technology, Norway
- 2020-2023 **PhD Fellowship**, Department of ICT and Natural Sciences, Norwegian University of Science and Technology, Norway
- 2018-2020 **Research Assistant**, Shandong Provincial Key Laboratory of Network-Based Intelligent Computing, University of Jinan, P.R. China
- 2015-2016 **Teaching Assistant**, Department of Information Technology, University of the Punjab, Pakistan

Projects

Automated Traffic Signal Control Using Real-Time CCTV Analysis

NTNU, Norway

PYTHON & DEEP LEARNING

- Developed an innovative algorithm for dynamic traffic signal control, leveraging real-time data analysis
- Utilized Faster R-CNN for accurate vehicle detection in diverse traffic conditions
- Created a specialized local dataset from these live feeds for algorithm training and validation
- **Technologies Used:** Faster R-CNN, CCTV Analytics, Real-Time Data Processing

Tyre Defect Detection using GLCM, Gabor Filter and Radiography

University of Jinan, China

MATLAB & C++

- Developed a method for identifying defects in tyre textures using Gray-Level Co-occurrence Matrix (GLCM) and Gabor filter texture segmentation
- Enhanced defect detection accuracy by matching abnormal textures with standard images and using GLCM features for scoring
- Implemented advanced image processing techniques including radiographic analysis, curvelet transformation, and canny edge detection to decompose and examine tyre defects
- **Technologies Used:** MATLAB, C++, Gabor Filter Texture Segmentation

Face Anonymization

NTNU, Norway

PYTHON & DEEP LEARNING

- Proposed a method for deep privacy preservation of human subjects
- Fine-tuning of YOLOv7 & YOLOv5 to work on edge devices for real-time anonymization of data

Asymmetric Hashing based on Generative Adversarial Network – AGAN

University of Jinan, China

PYTHON & DEEP LEARNING

- Proposed AGAN framework that provides binary representations with an accurate image retrieval ability
- Developed an advanced sign-activation and loss function-based learning process by designing a contemporary model based on an encoder loss, a generator loss, and a discriminator loss
- Hashing-based strategy resulted in efficient training time for large-scale nearest neighbour searching

Shape Matching of Non-rigid Structures

University of Jinan, China

MATLAB

- Proposed an automatic dense correspondence method to match the mesh vertices of two 3D shapes under near-isometric and non-rigid deformations
- The proposed method is implemented MATLAB and combines three different types of graphical information

Book Corner App

University of the Punjab,
Pakistan

ANDROID & JAVA

- Led the development of a high-performance Android application using Java, focusing on optimizing user experience and interface design for mobile devices.
- Engineered key features, including push notifications, real-time data synchronization, and offline access capabilities for book-shop retailers, significantly enhancing app functionality and user engagement.
- Implemented best practices in Java for memory management and efficient data processing, resulting in a smooth and responsive application.

Online Shopping & Cart System

University of the Punjab,
Pakistan

ASP .NET, C# & SQL

- Led designing and implementing a user-friendly online shopping platform, ensuring a responsive design for seamless access across devices.
- Engineered an SQL database schema for efficient storage and retrieval of product, user, and transaction data.
- Integrated secure payment processing with support for multiple payment methods to enhance transaction safety and reliability.
- Implemented a comprehensive user authentication system, including secure login, registration, and password recovery functionalities.

Student Web Portal System

University of the Punjab,
Pakistan

ASP .NET, C# & SQL

- Spearheaded the creation of a comprehensive web portal to facilitate student access to academic resources, course registrations, and personal academic records.
- Implemented essential features such as course enrollment, grade tracking, and academic calendar management, enhancing the educational experience for students.
- Designed an intuitive and accessible user interface, ensuring easy navigation and a positive user experience for students and faculty.

Skills

Programming: Python, C/C++, C#, HTML, CSS, MATLAB, Java, Javascript, SQL

Public Library: PyTorch, Tensorflow, Scikit-image, CUDA, Keras, Scipy, Numpy, Caffe, OpenCV

Environments & IDE: Linux, Github, Docker, Windows, Visual Studio, NetBeans

Languages: English (fluent), Norwegian (basic), Mandarin (basic), Urdu (native)

Publications

PUBLISHED (JOURNAL)

Sarwar, R., Parera, M., Teh, P. S., Nawaz, R. & **Hassan, M. U.** (2024). Crossing Linguistic Barriers: Authorship Attribution in Sinhala Texts. ACM Transactions on Asian and Low-Resource Language Information Processing (TALLIP) (**IF: 2.00**)

- Abbas, S. K., Khan, M. U. G., Zhu, J., Sarwar, R., Aljohani, N. R., Hameed, I. A. & **Hassan, M. U.** (2024). Vision Based Intelligent Traffic Light Management System using Faster R-CNN. *CAAI Transactions on Intelligence Technology*. (IF: 5.10)
- Hassan, M. U.**, Zhao, X., Sarwar, R., Aljohani, N. R., & Hameed, I.A. (2024). SODRet: Instance retrieval using salient object detection for self-service shopping. *Machine Learning with Applications*.
- Sarwar, R., Ha, L. A., ... & **Hassan, M. U.** (2024). AGI-P: A Gender Identification Framework for Authorship Analysis Using Customized Fine-Tuning of Multilingual Language Model. *IEEE Access*. (IF: 3.90)
- Hassan, M. U.**, Alaliyat, S., & Hameed, I. A. (2023). Image Generation Models from Scene Graphs and Layouts: A Comparative Analysis. *Journal of King Saud University - Computer and Information Sciences*. (IF: 6.90)
- Hassan, M. U.**, Alaliyat, S., Sarwar, R., Nawaz, R., & Hameed, I. A. (2023). Leveraging Deep Learning and Big Data to Enhance Computing Curriculum for Industry-Relevant Skills: A Norwegian Case Study. *Heliyon*. (IF: 4.00)
- Hassan, M. U.**, Steinnes, O. H., Gustafsson, E., Løken, S., & Hameed, I. A. (2023). Predictive Maintenance of Norwegian Roads Network Using Deep Learning Models. *Sensors*. (IF: 3.90)
- Hussain, S. A., **Hassan, M. U.**, Nasar, W., Ghorashi, S., ... & Hameed, I. A. (2023). Efficient Trajectory Clustering with Road Network Constraints Based on Spatiotemporal Buffering. *ISPRS International Journal of Geo-Information*. (IF: 3.40)
- Bhakar, S., Sinwar, D., Pradhan, N., ... & **Hassan, M. U.** (2023). Computational Intelligence-Based Disease Severity Identification: A Review of Multidisciplinary Domains. *Diagnostics* (IF: 3.60)
- Zhang, M., **Hassan, M. U.**, Niu, D., Zhao, X., Hameed, I. A. & Hassan, S. U. (2022). A methodology for shape matching of non-rigid structures based on integrated graphical information. *Displays*. (IF: 4.30)
- Yaqoob, I., **Hassan, M. U.**, Niu, D., Zhao, X., Hameed, I. A., & Hassan, S. U. (2022). A novel person re-identification network to address low-resolution problem in smart city context. *ICT Express*. (IF: 5.40)
- Hassan, M. U.**, Niu, D., Zhang, M., & Zhao, X. (2022). Asymmetric hashing based on generative adversarial network. *Multi-media Tools and Applications*, 1-17. (IF: 3.60)
- Yan, A., Chen, Z., Zhang, H., Peng, L., Yan, Q., **Hassan, M. U.**, ... & Yang, B. (2021). Effective detection of mobile malware behavior based on explainable deep neural network. *Neurocomputing*, 453, 482-492. (IF: 6.00)
- Hassan, M. U.**, Yaqoob, I., Zulfiqar, S., & Hameed, I. A. (2021). A comprehensive study of HBase storage architecture—A systematic literature review. *Symmetry*, 13(1), 109. (IF: 2.70)
- Griibbestad, M., **Hassan, M. U.**, Hameed, I. A., & Sundli, K. (2021). Health monitoring of air compressors using reconstruction-based deep learning for anomaly detection with increased transparency. *Entropy*, 23(1), 83. (IF: 2.70)
- Griibbestad, M., **Hassan, M. U.**, & Hameed, I. A. (2021). Transfer learning for Prognostics and health Management (PHM) of marine Air Compressors. *Journal of Marine Science and Engineering*, 9(1), 47. (IF: 2.90)
- Li, M., Zhang, M., Niu, D., **Hassan, M. U.**, Zhao, X., & Li, N. (2020). Point set registration based on feature point constraints. *The Visual Computer*, 36(9), 1725-1738. (IF: 3.50)
- Hassan, M. U.**, Karim, S., Shah, S. K., Abbas, S., Yasin, M., Shahzaib, M., & Umair, M. (2018). A Comparative Study on Frequent Link Disconnection Problems in VANETs. *EAI Endorsed Transactions on Energy Web*, 5(17), e2-e2.
- Shaukat, K., **Hassan, M. U.**, Masood, N., & Shafat, A. B. (2017). Stop words elimination in Urdu language using finite state automaton. *International Journal of Asian Language Processing*, 27(1), 21-32.

PUBLISHED (CONFERENCE)

- Hassan, M. U.**, Stava, M., & Hameed, I. A. (2023). Deep Privacy based Face Anonymization for Smart Cities, In 2023 International Conference on Smart Applications, Communications and Networking (SmartNets), Istanbul, Turkiye, 2023, pp. 1-6.
- Hassan, M. U.**, Angelaki, S., Alfaro, C. V. L., ... & da Silva Torres, R. (2022, June). Digital Twins for Lighting Analysis: Literature Review, Challenges, and Research Opportunities. In 36th International ECMS Conference on Modelling and Simulation, ECMS 2022 (Vol. 36, No. 1, pp. 226-235).
- Hassan, M. U.**, Zafar, N., Ali, H., Yaqoob, I., Alaliyat, S. A. A., & Hameed, I. A. (2022). Collaborative Filtering Based Hybrid Music Recommendation System. In *Proceedings of International Conference on Information Technology and Applications* (pp. 239-249). Springer, Singapore.

- Cui, L., Zhao, W., **Hassan, M. U.**, & Yaqoob, I. (2020, December). Shape Matching Based on the Enhancement of Riemannian Structure Information. In Proceedings of the 2020 4th International Conference on Vision, Image and Signal Processing (pp. 1-5).
- Yaqoob, I., **Hassan, M. U.**, Niu, D., Irfan, M. M., Zafar, N., & Zhao, X. (2020, December). Efficient Deep Learning Approach to Address Low-Resolution Person Re-Identification. In Proceedings of the 2020 4th International Conference on Vision, Image and Signal Processing (pp. 1-5).
- Ma, Y., Zhang, J., Niu, D., **Hassan, M. U.**, & Zhao, X. (2019, December). An Unsupervised Approach for 3D Medical Image Registration. In Proceedings of the 2019 7th International Conference on Information Technology: IoT and Smart City (pp. 259-263).
- Hassan, M. U.**, Niu, D., Zhao, X., Shohag, M. S. A., Ma, Y., & Zhang, M. (2019, December). Salient object detection based on CNN fusion of two types of saliency models. In 2019 International Conference on Image and Vision Computing New Zealand (IVCNZ) (pp. 1-6). IEEE.
- Shabir, M. A., **Hassan, M. U.**, Yu, X., & Li, J. (2019, November). Tyre defect detection based on GLCM and gabor filter. In 2019 22nd International Multitopic Conference (INMIC) (pp. 1-6). IEEE.
- Shabir, M. A., **Hassan, M. U.**, Yu, X., & Li, J. (2019, November). Extensive Techniques to Detect Defects in Tyres through Radiography. In 2019 22nd International Multitopic Conference (INMIC) (pp. 1-4). IEEE.
- Hassan, M. U.**, Shohag, M. S. A., Niu, D., Shaukat, K., Zhang, M., Zhao, W., & Zhao, X. (2019, August). A framework for the revision of large-scale image retrieval benchmarks. In Eleventh International Conference on Digital Image Processing (ICDIP 2019) (Vol. 11179, pp. 1154-1161). SPIE.
- Zhang, M., **Hassan, M. U.**, Niu, D., Li, N., Liu, M., Zhou, J., & Zhao, X. (2019, August). Shape correspondence based effective combination of linear and quadratic assignment matrices. In Eleventh International Conference on Digital Image Processing (ICDIP 2019) (Vol. 11179, pp. 1162-1170). SPIE.
- Shohag, M. S. A., **Hassan, M. U.**, Niu, D., Kong, X., Zhao, X., & Rahman, F. (2019, May). Graph Based Image Matching Using the Fusion of Several Kinds of Features. In Proceedings of the 2019 4th International Conference on Multimedia Systems and Signal Processing (pp. 188-193).
- Hassan, M. U.**, Shahzaib, M., Shaukat, K., Hussain, S. N., Mubashir, M., Karim, S., & Shabir, M. A. (2019). DEAR-2: An energy-aware routing protocol with guaranteed delivery in wireless ad-hoc networks. In Recent Trends and Advances in Wireless and IoT-enabled Networks (pp. 215-224). Springer, Cham.
- Yan, A., Chen, Z., Wang, L., Peng, L., **Hassan, M. U.**, & Zhao, C. (2018, December). Neural Network Rule Extraction for Real Time Traffic Behavior Identification. In 2018 International Conference on Security, Pattern Analysis, and Cybernetics (SPAC) (pp. 146-151). IEEE.
- Shen, J., Chen, Z., Wang, S., Zhu, Y., & **Hassan, M. U.** (2018, July). DroidDetector: a traffic-based platform to detect android malware using machine learning. In Third International Workshop on Pattern Recognition (Vol. 10828, pp. 160-168). SPIE.
- Ma, Y., **Hassan, M. U.**, Niu, D., & Wang, L. (2018, July). Glandular cavity segmentation based on local correntropy-based K-means (LCK) clustering and morphological operations. In Third International Workshop on Pattern Recognition (Vol. 10828, pp. 108-114). SPIE.
- Hassan, M. U.**, Shaukat, K., Niu, D., Mahreen, S., Ma, Y., Haider, F., ... & Zhao, X. (2018, May). An Overview of Schema Extraction and Matching Techniques. In 2018 2nd IEEE Advanced Information Management, Communicates, Electronic and Automation Control Conference (IMCEC) (pp. 1290-1294). IEEE.
- Hassan, M. U.**, Shaukat, K., Niu, D., Mahreen, S., Ma, Y., Zhao, X., & Shabir, M. A. (2018, May). Web-Logs Prediction with Web Mining. In 2018 2nd IEEE Advanced Information Management, Communicates, Electronic and Automation Control Conference (IMCEC) (pp. 1295-1299). IEEE.
- Ma, Y., **Hassan, M. U.**, Niu, D., & Wang, L. (2017, November). The segmentation of glandular cavity based on K-means and mathematical morphology. In 2017 4th International Conference on Systems and Informatics (ICSAI) (pp. 1287-1291). IEEE.

Awards, Fellowships, & Grants

2020-2024 **PhD Fellowship**, NTNU, Norway

Fully Funded

2017-2020 **Chinese Government Scholarship For Master Studies**, Ministry of Education, P.R. China

Fully Funded

- 2019 **Machine Learning Research School**, VISTEC, Bangkok, Thailand *Fully Funded*
- 2018 **Student Best Paper Award**, IEEE IMCEC, Xian, P.R. China
- 2017 **3rd Position in SISE Graduate Academic Research Competition**, University of Jinan, P.R. China *RMB 3000*

Presentations

- Delivered Oral Presentation at IEEE SmartNets 2023, Istanbul, Türkiye
- Delivered Oral Presentation at 36th ECMS Conference on Modelling and Simulation, Norway
- Delivered Oral Presentation at 34th Image and Vision Computing, New Zealand
- Poster Presentation at Machine Learning Research School, Bangkok, Thailand
- Delivered Oral Presentation at 22nd INMIC 2019, Islamabad, Pakistan
- Delivered Oral Presentation at 11th ICDIP 2019, Guangzhou, China
- Delivered Oral Presentation at IEEE IMCEC 2018, Xian, China
- Delivered Oral Presentation at EAI FUTURE5V 2017, Islamabad, Pakistan

Online Courses

- 2019 **IBM Cognitive Class**, Python for Data Science
- 2019 **IBM Cognitive Class**, Machine Learning with Python
- 2019 **IBM Cognitive Class**, Deep Learning Fundamentals
- 2019 **IBM Cognitive Class**, Deep Learning with TensorFlow

Mentoring

- 2024-Present **Bachelor Degree**, 2 Final Year Projects
- 2021-2022 **Master Degree**, 2 Final Year Theses

Outreach & Professional Development

SERVICE AND OUTREACH

- 2022 **ELLIS Doctoral Symposium**, Presenter

*Alicante,
Spain*

PEER REVIEW

- IEEE Transactions on Systems, Man, and Cybernetics: Systems
- Engineering Applications of Artificial Intelligence
- Multimedia Tools and Applications
- IEEE Transactions on Artificial Intelligence

INTERESTS

- Keeping up-to-date with the latest trends and advancements in AI and data science.
- Exploring new AI approaches and techniques to stay innovative.

REFERENCES

Available upon request.