

Muhammad Umair Hassan

PHD FELLOW · COMPUTER SCIENCE

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Research Interests

Computer vision, deep learning and machine learning, including image analysis, shape matching, salient object detection, and digital twins. My doctoral thesis title is **Towards Creating Digital Twins Authoring Tool based on 3D Reconstruction and 3D Object Retrieval**. Previously, I have worked on information retrieval, wireless networking, and cloud computing and security.

Education

Norwegian University of Science and Technology--(NTNU)

Norway

PHD COMPUTER SCIENCE

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

2020-present **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

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

CNN-based Fusion of Salient Objects

University of Jinan, China

MATLAB, PYTHON & DEEP LEARNING

- Proposed a convolutional neural network based strategy to fuse salient objects information and generating a high-level model
- The development was done using MATLAB for salient object detection and segmentation whereas Python was used for deep learning assignment to combine dual information

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

- Final Year Project at Undergraduate Level
- Implemented android-based app with use cases for bookshop retailers

Online Shopping & Cart System

University of the Punjab,
Pakistan

ASP .NET, C# & SQL

- Semester Project at Undergraduate Level

Student Web Portal System

University of the Punjab,
Pakistan

ASP .NET, C# & SQL

- Semester Project at Undergraduate Level

Publications

PUBLISHED (JOURNAL)

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: 9.00)

Hassan, M. U., Alaliyat, S., Sarwar, R., Nawaz, R., & Hameed, I. A. "Leveraging Deep Learning and Big Data to Enhance Computing Curriculum for Industry-Relevant Skills: A Norwegian Case Study. Heliyon. (IF: 3.77)

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: 3.84)

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: 3.09)

Bhakar, S., Sinwar, D., Pradhan, N., ... & **Hassan, M. U.** (2023). Computational Intelligence-Based Disease Severity Identification: A Review of Multidisciplinary Domains. Diagnostics (IF: 3.99)

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: 3.07)

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: 4.75)

Hassan, M. U., Niu, D., Zhang, M., & Zhao, X. (2022). Asymmetric hashing based on generative adversarial network. Multimedia Tools and Applications, 1-17. (IF: 2.57)

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: 5.77)

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: 2.94)

Gribbestad, 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: 2.73)

Gribbestad, 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: 2.74)

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: 2.83)

- 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.**, Angelaki, S., Alfaro, C. V. L., Major, P., Styve, A., Alaliyat, S. A. A., ... & 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.
- Dar, K. S., Shafat, A. B., & **Hassan, M. U.** (2017, June). An efficient stop word elimination algorithm for Urdu language. In 2017 14th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON) (pp. 911-914). IEEE.

IN REVIEW

- Hassan, M. U.**, Alaliyat, S., & Hameed, I. A. Towards the Creation of a Digital Twin Authoring Tool: A Smart Mobility Perspective in Smart Cities. IEEE Consumer Electronics Magazine. (IF: 4.13)
- Hassan, M. U.**, Zhao, X., Sarwar, R., Nawaz, R., & Hameed, I.A. SODRet: Instance Retrieval Using Salient Object Detection for Self-service Shopping. Engineering Science and Technology, an International Journal. (IF: 5.15)
- Hassan, M. U.**, Stava, M., & Hameed, I.A. Deep privacy based face anonymization for smart cities. IEEE Cloud Summit (2023, July). Columbia, Maryland USA. (Accepted)
- Abbas, S. K., Khan, M. U. G., **Hassan, M. U.**, & Hameed, I. A. Vision Based Intelligent Traffic Light Management System using Faster R-CNN. CAAI Transactions on Intelligence Technology. (IF: 7.98)
- Saharkhizan, M., **Hassan, M. U.**, & Hameed, I. A. Automatic Face Anonymization in Videos Data Based on YOLOv7. Engineering Applications of Artificial Intelligence. (IF: 7.80)
- Naz, M. A., Amin, F., Cherrez-Ojeda, I., & **Hassan, M. U.** Role of IoT in Diabetes Healthcare: A Survey Based Approach. IEEE Access. (IF: 3.47)
- Sarwar, R., Ha, L. A., Teh, P. S., Edifor, E., **Hassan, M. U.**, Sabah, F., & Nawaz, R. AGI-P: Author Gender Identification Task for User Generated Content. Decision Support Systems. (IF: 6.96)
- Parera, M., Sarwar, R., Ha, L. A., Teh, P. S., Edifor, E., Nawaz, R., & **Hassan, M. U.** Cross-topic Authorship Attribution of Sinhala Texts. Journal of Computational Science. (IF: 3.81)

Awards, Fellowships, & Grants

2020-present	PhD Fellowship , NTNU, Norway	<i>Fully Funded</i>
2017-2020	Chinese Government Scholarship For Master Studies , Ministry of Education, P.R. China	<i>Fully Funded</i>
2019	Machine Learning Research School , VISTEC, Bangkok, Thailand	<i>Fully Funded</i>
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	<i>RMB 3000</i>

Presentations

- 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

- 2021-2022 **Mahdis Saharkhizan**, Master Student, NTNU
- 2021-2022 **Magnus Stava**, Master Student, NTNU

Research Experience

University of Jinan - School of Information Science and Engineering

Jinan, China

ADVISOR(S): PROF. XIUYANG ZHAO & DR. DONGMEI NIU

Sep. 2017 - Jun. 2020

- Master's Dissertation: "Instance Retrieval Based on Combination of Geometric Features and CNN"

Skills

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

Public Library: PyTorch, Tensorflow, Keras, Scipy, Numpy, Caffe, OpenCV

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

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

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
Cogent Engineering

PROFESSIONAL MEMBERSHIPS

Tekna, Norway

REFERENCES

Prof. Ibrahim A. Hameed, PhD Advisor, **Phone No.:** +47 413 15 695, **Email:** ibib@ntnu.no
Rune Volden, Department Head, **Phone No.:** +47 928 87 753, **Email:** rune.volden@ntnu.no
Dr. Raheem Sarwar, Academic Advisor, **Phone No.:** +44 7432 182535, **Email:** r.sarwar@mmu.ac.uk
Prof. Xiuyang Zhao, Master's Supervisor, **Phone No.:** +86 158 5316 7316, **Email:** zhaoxy@ujn.edu.cn