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 from Scene Graphs and Layout Models: A Comparative Analysis. Journal of King Saud University - Computer and Information Sciences. (**IF: 9.00**)

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: 3.84**)

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 Press

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**)

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**)

Abbas, S. K., Khan, M. U. G., **Hassan, M. U.**, & Hameed, I. A. Vision Based Intelligent Traffic Light Management System using Faster R-CNN. Engineering. (**IF: 12.83**)

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. Journal of the Association for Information Science and Technology. (**IF: 3.27**)

Awards, Fellowships, & Grants

2020-present	**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 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

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

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

Languages: English (fluent), Bokmål (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