Prof. Dr. Muhammad Shahzad

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Muhammad Shahzad is a Professor of Media Informatics at the German International University (GIU) in Berlin, Germany. He received his B.E. degree in electrical engineering from the National University of Sciences and Technology, Islamabad, Pakistan, M.Sc. degree in autonomous systems (robotics) from the Bonn Rhein Sieg University of Applied Sciences, Sankt Augustin, Germany, and his PhD degree on radar remote sensing & image analysis at the department of Signal Processing in Earth Observation (SiPEO), Technische Universität München (TUM), Munich, Germany in 2004, 2011 and 2016 respectively. His PhD topic was automatic 3-D reconstruction of objects from point clouds retrieved from spaceborne synthetic-aperture-radar (SAR) image stacks. His work was closely linked to the TerraSAR-X and TanDEM-X satellite missions, the biggest German Earth observation endeavors ever, with both scientific as well as commercial applications. Besides, he also attended twice two weeks professional thermography training courses at Infrared Training Center (ITC), North Billerica, Massachusetts and Portland, Oregon, USA in 2005 and 2007 respectively. Moreover, he worked as a Visiting Scientist at the Institute for Computer Graphics and Vision, Technical University of Graz, Austria in 2015/16. He also served as Associate Professor at the School of Electrical Engineering and Computer Science (SEECS), National University of Sciences and Technology (NUST), Islamabad where he also co-led the Deep Learning Laboratory established under the umbrella of National Center of Artificial Intelligence (NCAI), Islamabad. Since May 2021, Dr. Shahzad has been working as Guest Professor at the Future Lab AI4EO: Artificial Intelligence for Earth Observation – Reasoning, Uncertainties, Ethics and Beyond at the Technical University of Munich (TUM), Germany where he co-led one of the key focus areas related to the uncertainty estimation and quantification in AI systems relevant for remote sensing and Earth observation research.

Education

B.E. Electrical Engineering, National University of Sciences and Technology, 2004

M.Sc. in Autonomous Systems (Robotics), Bonn Rhein Sieg University of Applied Sciences, 2011

PhD in Radar Remote Sensing & Image Analysis, Technical University of Munich, 2016

Research Interests

His research interests include visual computing, data science, machine learning, artificial intelligence, and human-computer-interaction. He has a strong interest in developing AI based solutions for 2D/3D computer vision & data science applications. Specifically, he has experience in developing machine (deep) learning and AI algorithms to process diverse kind of data obtained from various sensor modalities including natural RGB images, RGB-D (Stereo, Time-of-flight, Microsoft Kinect), multispectral optical (LandSAT-7/8 & Sentinel-2), radar images (TerraSAR-X & Sentinel-1), unstructured 3D point clouds (TomoSAR, LiDAR, photogrammetry), sequential (time-series), and accelerometer (gyroscopes) data acquired from terrestrial, airborne and satellite platforms for variety problems in both urban and non-urban environments.

Selected Research

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- R. Hassan, M. M. Fraz, A. Rajput, M. Shahzad, “Residual learning with annularly convolutional neural networks for classification and segmentation of 3D point clouds”, Neurocomputing, Vol. 526, PP. 96-108, 14 March 2023.
- J. Gawlikowski, C. R. N. Tassi, M. Ali, J. Lee, A. Kruspe, R. Triebel, P. Jung, R. Roscher, M.Shahzad, W. Yang, R. Bamler, X. Zhu, “A survey of uncertainty in deep neural networks”, Artificial Intelligence Review, 56, S1513–S1589, 2023.
- N. Pervaiz, M. M. Fraz, M. Shahzad, “Smart Surveillance with simultaneous Person Detection and Re-identification”, Multimedia Tools and Applications, 2022.
- S. Saha, M. Shahzad, L. Mou, Q. Song, X. X. Zhu, “Unsupervised Single-Scene Semantic Segmentation for Earth Observation”, IEEE Transactions on Geoscience and Remote Sens-ing, Vol. 60, 2022.
- N. Ahmed, M. Shahzad, S. Saha, M. M. Fraz, X. X. Zhu, “Progressive Unsupervised Deep Transfer Learning for Forest Mapping in Satellite Image”, International Conference on Computer Vision (ICCV) Workshops, Oct 2021, (Virtual) Montreal, Canada.
- S. Saha, L. Mou, M. Shahzad, X. X. Zhu, “Segmentation of VHR EO Images using Unsupervised Learning”, ECML-PKDD 2021 Workshop, MACLEAN: MAChine Learning for EArth ObservatioN, Sep 2021, (Virtual) Bilbao, Spain.
- N. Abid, M. Shahzad, M. I. Malik, U. Schwanecke, A. Ulges, G. Kovacs, F. Shafait, “UCL: Unsupervised Curriculum Learning for Water Body Classification from Remote Sensing Imagery”, International Journal of Applied Earth Observation and Geoinformation, Vol. 105, 102568, 2021.
- S. S. Ali, M. M. Fraz, M. Shahzad, S. Khan, “A Multi-Approach Generalized Framework for Automated Solution Suggestion of Support Tickets”, International Journal of Intelligent Systems, pp. 1-28, 2021.

- M. H. Mughal, M. J. Khokhar, M. Shahzad, “Assisting UAV Localization Via Deep Contextual Image Matching”, IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing (JSTARS), Vol. 14, PP. 2445-2457, 2021.
- R. M. S. Bashir, M. Shahzad, M. M. Fraz, “VR-PROUD: Vehicle Re-identification using
- PROgressive Unsupervised Deep architecture”, Pattern Recognition, Vol. 90, No. -, P. 52-65, Jun 2019.
- S. A. Khan, Y. Shi, M. Shahzad, X. X. Zhu, "FGCN: Deep Feature-Based Graph Convolutional Network for Semantic Segmentation of Urban 3D Point Clouds", Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, Jun 2020, Seattle, Washington, USA.
- Q. Riaz, M. Z. H. Hashmi, M. A. Hashmi, M. Shahzad, H. Errami, A. Weber, “Move Your Body: Age Estimation Based on Chest Movement During Normal Walk”, IEEE Access, Vol. 7, No. -, PP. 28510-28524, Mar 2019.
- M. Shahzad, M. Maurer, F. Fraundorfer, Y. Wang, X. X. Zhu, “Buildings Detection in VHR SAR Images Using Fully Convolution Neural Networks”, IEEE Transactions on Geoscience and Remote Sensing, Vol. 57, No. 2, PP. 1100 - 1116, Jan 2018.