Zhitong **Xiong**

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"Be the change that you want to see in the world."

Summary

I received the B.E. degree in Software Engineering, the M.S. degree in Computer Science and Technology and the Ph.D. degree in Computer Science and Technology from Northwestern Polytechnical University, Xi'an, China, in 2015, 2018 and 2021, respectively. My research interests lie broadly in the area of deep learning, remote sensing, computer vision, and Earth observation. Currently, I am a **senior research scientist** working on remote sensing and Earth observation with Prof. Xiaoxiang Zhu at the department of **Data Science in Earth Observation**, **Technical University of Munich**. More Specifically, I am serving as the leader of the ML4Earth working group (`https://ml4earth.de/`). I am also working on the project **Energy-efficient AI for Extreme Weather Events Forecasting** (`https://www.asg.ed.tum.de/en/sipeo/projects/ekapex/`), which aims to fight against climate change with machine learning and Earth observation technologies.

Experience

Technical University of Munich –`http://www.tum.de` *Ottobrunn 85521, Germany*

Leader of the ML4Earth Working Group *May 2021 - Present*

- Research Task: Remote Sensing and Earth Observation

Northwestern Polytechnical University–`http://www.nwpu.edu.cn` *Xi'an 710072, Shaanxi, P.R. China*

Doctorate in Computer Science and Technology *Mar. 2018 - Mar. 2021*

- Graduation Thesis: Research on RGB-D Image based Scene Understanding
- Research Task: RGB-D Image based Scene Recognition and Segmentation

Northwestern Polytechnical University–`http://www.nwpu.edu.cn` *Xi'an 710072, Shaanxi, P.R. China*

Master in Computer Science and Technology *Sep. 2015 - Mar. 2018*

- Research Task: Traffic Sign Detection and Recognition
- Graduation Thesis: Video-based Traffic Sign Detection and Recognition.

Northwestern Polytechnical University–`http://www.nwpu.edu.cn` *Xi'an 710072, Shaanxi, P.R. China*

Bachelor in Software Engineering *Sep. 2011 - July 2015*

- GPA: 4.0 / 5.0
- Learned programming languages, the principle of computer and operating systems.
- Graduation Thesis: Traffic Sign Detection, Tracking and Recognition.

Projects

Energy-efficient AI for Extreme Weather Events Forecasting

Research *Jan. 2023 - Current*

- website: `https://www.asg.ed.tum.de/en/sipeo/projects/ekapex/`
- The goal of the project is to develop AI-based precipitation forecasting models for Germany with a special focus on extreme weather events. For this purpose, the most efficient and powerful AI algorithms (label-efficient AI models) will be developed, which at the same time aim at a significant saving in resource consumption when using AI (binary neural networks).

ML4Earth

Research *Jan. 2022 - Dec. 2024*

- website: `https://www.asg.ed.tum.de/en/sipeo/projects/ml4earth/`
- The national excellence center "Machine Learning for Earth Observation" (ML4Earth) will conduct own research at the highest international level by tackling fundamental methodical challenges in AI4EO and their application to the European mission of a Digital Twin Earth.

EarthNets for Earth Observation

Research *Jan. 2022 - Dec. 2023*

- website: https://earthnets.github.io/
- A new platform for Earth observation, termed EarthNets, is released as a means of achieving a fair and consistent evaluation of deep learning methods on remote sensing data. EarthNets supports standard dataset libraries and cutting-edge deep learning models to bridge the gap between the remote sensing and machine learning communities.Based on this platform, extensive deep learning methods are evaluated on the new benchmark.

Publications

Accepted Publications

- [1] Wei Huang, Yilei Shi, **Zhitong Xiong**, Qi Wang, Xiao Xiang Zhu, "Semi-supervised bidirectional alignment for Remote Sensing cross-domain scene classification", *ISPRS Journal of Photogrammetry and Remote Sensing*, 2023.
- [2] **Zhitong Xiong**, Haopeng Li, Xiao Xiang Zhu, "Doubly Deformable Aggregation of Covariance Matrices for Few-Shot Segmentation", *European Conference on Computer Vision*, 2022.
- [3] **Zhitong Xiong**, Xiao Xiang Zhu, "Knowledge Transfer for Label-Efficient Monocular Height Estimation", *IGARSS*, 2022.
- [4] Qi Wang, Yanfeng Liu, **Zhitong Xiong**, Yuan Yuan, "Hybrid Feature Aligned Network for Salient Object Detection in Optical Remote Sensing Imagery", *IEEE Transactions on Geoscience and Remote Sensing*, 2022.
- [5] Chuang Yang. Mulin Chen, **Zhitong Xiong**, Yuan Yuan, Qi Wang, "CM-net: Concentric mask based arbitrary-shaped text detection", *IEEE Transactions on Image Processing*, 2022.
- [6] Zhenghang Yuan, Lichao Mou, **Zhitong Xiong**, Xiao Xiang Zhu, "Change detection meets visual question answering", *TGRS*, 2022.
- [7] **Z. Xiong**, Yuan Yuan*, Nianhui Guo, Qi Wang, "Variational Context-Deformable ConvNets for Indoor Scene Parsing", *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.
- [8] W. Huang, **Z. Xiong**, Q. Wang*, and X. Li, "KALM: Key Area Localization Mechanism for Abnormality Detection in Musculoskeletal Radiographs," *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2020.
- [9] **Z. Xiong**, Yuan Yuan*, Qi Wang, "MSN: Modality Separation Networks for RGB-D Scene Recognition", *Neurocomputing*, vol. 373, pp. 81-89, 2020.
- [10] Y. Yuan, **Z. Xiong** and Q. Wang*, "VSSA-NET: Vertical Spatial Sequence Attention Network for Traffic Sign Detection," *IEEE Transactions on Image Processing (T-IP)*, vol. 28, no. 7, pp. 3423-3434, 2019.
- [11] Y. Yuan, **Z. Xiong**, and Q. Wang*, "ACM: Adaptive Cross-Modal Graph Convolutional Neural Networks for RGB-D Scene Recognition," Proc. AAAI Conference on Artificial Intelligence (AAAI), pp. 9176-9184, 2019. **Oral**
- [12] **Z. Xiong**, Y. Yuan, and Q. Wang*, "AI-NET: Attention Inception Neural Networks for Hyperspectral Image," *Proc. IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, pp. 2647-2650, 2018.
- [13] Y. Yuan, **Z. Xiong**, and Q. Wang*, "An Incremental framework for Video-based Traffic Sign Detection, Tracking and Recognition," *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, vol. 18, no. 7, pp. 1918-1929, 2017. **Highly Cited & Hot Paper**
- [14] Qi Wang, Wei Huang, **Zhitong Xiong**, Xuelong Li, "Looking Closer at the Scene: Multi-Scale Representation Learning for Remote Sensing Image Scene Classification", *IEEE Transactions on Neural Networks and Learning Systems (TNNLS)*, DOI: 10.1109/TNNLS.2020.3042276.
- [15] **Zhitong Xiong**, Qi Wang, Yuan Yuan, "ASK: Adaptively Selecting Key Features for RGB-D Scene Recognition", *IEEE Transactions on Image Processing (T-IP)*, vol. 30, pp. 2722-2733, 2021.
- [16] Qi Wang, Nianhui Guo, **Zhitong Xiong**, Zeping Yin, Xuelong Li, "Gradient Matters: Designing Binarized Neural Network via Enhanced Information-flow", *IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)*
- [17] Yang Zhan, **Zhitong Xiong***, Yuan Yuan, "RSVG: Exploring Data and Models for Visual Grounding on Remote Sensing Data", *TGRS*, 2023.
- [18] Yi Wang, Nassim Ait Ali Braham, **Zhitong Xiong**, Chenying Liu, Conrad M Albrecht, Xiao Xiang Zhu, "SSL4EO-S12: A Large-Scale Multi-Modal, Multi-Temporal Dataset for Self-Supervised Learning in Earth Observation", *GRSM*, 2023.
- [19] Fahong Zhang, Yilei Shi, **Zhitong Xiong**, Wei Huang, Xiao Xiang Zhu, "Pseudo Features Guided Self-training for Domain Adaptive Semantic Segmentation of Satellite Images", *TGRS*, 2023.
- [20] Yanfeng Liu, **Zhitong Xiong**, Yuan Yuan, Qi Wang, "Distilling Knowledge from Super Resolution for Efficient Remote Sensing Salient Object Detection", *TGRS*, 2023.
- [21] Qian Song, Conrad, **Zhitong Xiong**, Xiao Xiang Zhu, "Biomass Estimation and Uncertainty Quantification From Tree Height", *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2023.
- [22] **Zhitong Xiong** et al., "THE benchmark: Transferable representation learning for monocular height estimation", *TGRS, Accepted*, 2023.
- [23] Yanfeng Liu, **Zhitong Xiong** et al., "Transcending Pixels: Boosting Saliency Detection via Scene Understanding from Aerial Imagery", *TGRS, Accepted, 2023*.

Publications in Submission

- [1] **Zhitong Xiong**, Sining Chen, Yilei Shi, Xiao Xiang Zhu, "Disentangled Latent Transformer for Interpretable Monocular Height Estimation", *Under Review*.
- [2] **Zhitong Xiong**, Fahong Zhang, Yi Wang, Yilei Shi, Xiao Xiang Zhu, "EarthNets: Empowering AI in Earth Observation", *Submitted to TPAMI*.
- [3] **Sining Chenm Yilei Shi, Zhitong Xiong** et al., "HTC-DC Net: Monocular Height Estimation from Single Remote Sensing Images", *TGRS, Major Revision*.
- [4] Yuan Yuan, Yang Zhan, **Zhitong Xiong***, "Parameter-Efficient Transfer Learning for Remote Sensing Image-Text Retrieval", *Major*, TGRS.
- [5] Fahong Zhang, Yilei Shi, **Zhitong Xiong**, Xiang Xiao Zhu, "Few-shot Object Detection in Remote Sensing: Lifting the Curse of Unlabeled Novel Objects", *ISPRS, Under Review*.
- [6] **Zhitong Xiong**, Sining Chen, Yi Wang, Lichao Mou, Xiang Xiao Zhu, "GAMUS: A Geometry-aware Multi-modal Semantic Segmentation Benchmark for Remote Sensing Data", *ISPRS, Under Review*.
- [7] Wei Huang, Yilei Shi, **Zhitong Xiong**, Xiang Xiao Zhu, "AdaptMatch: Adaptive Matching for Semi-supervised Binary Segmentation of Remote Sensing Images", *TGRS, Major Revision*.

Professional Activities

Reviewer

Reviewer of

- Conferences: CVPR, ECCV, Neurips, ICCV
- IEEE Transactions on Cybernetics (T-CYB)
- IEEE Transactions on Intelligent Transportation Systems (T-ITS)
- IEEE Transactions on Geoscience and Remote Sensing (T-GRS)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
- PC member of The 30th International Joint Conference on Artificial Intelligence (IJCAI)

Professional Skills

Programming

- Languages: Python, Matlab, C++
- Frameworks: Pytorch, Tensorflow, OpenCV

Familiar Research Areas

- My primary research interests include computer vision and machine learning. More specifically, I am familiar with object detection, image segmentation, scene recognition, and remote sensing image analysis. I have been investigating how to learn effective multi-modal representations to understand RGB-D scene images. Besides, I am also interested in geometric deep learning for handling non-Euclidean domains. Furthermore, deep generative models and how to measure the uncertainty of deep models are also interesting research directions of my future work.