

# Zhigang Tu

Position: **Professor**

Born: **Aug. 1986**

Affiliation: **State Key Laboratory of Information Engineering in Surveying, Mapping and Remote sensing, Wuhan University, Wuhan, China**

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## 【Bio & CV】

Zhigang Tu received the Master Degree in image processing at Wuhan University, China, 2008. In 2015, he received the Ph. D. degree in Computer Science from Utrecht University, Netherlands. From 2015 to 2016, he was a postdoctoral researcher at Arizona State University, US. Then from 2016 to 2018, he was a research fellow at Nanyang Technological University, Singapore. He is currently a professor at the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote sensing, Wuhan University.

His research interests include computer vision, image processing, video analytics, and machine learning. Special for motion estimation, object segmentation, action recognition and localization, hand/human pose estimation, and anomaly detection. On those topics, he has co-/authored more than 60 articles on international SCI-indexed journals and conferences, e.g. IEEE Trans. Image Process. (TIP), IEEE Trans. Multimedia (T-MM), IEEE Trans. Circuits and Sys. Video Tech. (T-CSVT), Pattern Recognition (PR), CVPR, ICCV, ECCV, IJCAI, ACM MM, etc. He is an Associate Editor of The Visual Computer (IF=2.835), a Guest Editor of journals JVCIR (IF=2.887) and Combinatorial Chemistry & High Throughput Screening (IF=1.195). He is the organizer of the ACCV2020 Workshop on MMHAU (Japan) and the ACPR2019 Workshop on MAGR (New Zealand). He serves as a reviewer for more than 10 SCI-indexed journals and conferences, e.g., IEEE Trans.-PAMI, IEEE Trans.-IP, IEEE Trans.-CSVT, IEEE Trans.-MM, Pattern Recognition, CVPR, ICCV, AAAI, ACM MM, etc. He received the “Best Student Paper” Award in the 4th Asian Conference on Artificial Intelligence Technology.

## 【Research Interests】

**Computer Vision:** Motion Estimation, Object Detection & Segmentation, Human Action Analysis (Action Recognition/Localization/Prediction), Hand/Human Pose Estimation, Anomaly Detection

**Image Processing:** Image Filter, Deblurring, Restoration, and Reconstruction

**Mathematical Method:** Variational Computation and Probabilistic Computation

**Artificial Intelligence:** Supervised/Semi-Supervised/Un-supervised Deep learning

## 【Education & Working】

**Dec. 2016–July 2018, Research Fellow**

School of Electrical, Electronic Engineering (EEE)

Nanyang Technological University, Singapore

Advisor: Prof. Junsong Yuan

**Dec. 2015–Nov. 2016, Postdoctoral Scholar**

School of Computing, Informatics, Decision System Engineering

Arizona State University, USA

Advisor: Prof. & Chair Baoxin Li

**Sep. 2011–Nov. 2015, Ph.D.**

Institute of Information and Computing Sciences

Utrecht University, Netherlands

Supervisor: Prof. Remco Veltkamp

**Sep. 2008–Aug. 2011, MS-PhD**

The State Key Laboratory of information Engineering in Surveying, Mapping and Remote Sensing

Wuhan University, China.

## 【 Representative Publications 】

**2022**

1. Jinlu Zhang, **Zhigang Tu\***, Jianyu Yang, Yujin Chen, and Junsong Yuan. MixSTE: Seq2seq Mixed Spatio-Temporal Encoder for 3D Human Pose Estimation in Video. In Proc. Comput. Vis. Pattern Recogn. (CVPR), 2022.
2. Zhengbo Zhang, Chunlan Zhou, and **Zhigang Tu\***. Distilling Inter-Class Distance for Semantic Segmentation. In Proc. IJCAI, 2022 (Oral).
3. Jinlu Zhang, Yujin Chen, and **Zhigang Tu\***. Uncertainty-Aware 3D Human Pose Estimation from Monocular Video. In Proc. ACM Multimedia, 2022.
4. **Zhigang Tu**, Xiangjian Liu, and Xuan Xiao. A General Dynamic Knowledge Distillation Method for Visual Analytics. IEEE Transactions on Image Processing, vol.31, pp.6517-6531, 2022.
5. **Zhigang Tu**, Jiayu Zhang\*, Hongyan Li, Yujin Chen, and Junsong Yuan. Joint-bone Fusion Graph Convolutional Network for Semi-supervised Skeleton Action Recognition. IEEE Transactions on Multimedia, 2022. DOI: 10.1109/TMM.2022.3168137
6. Yuanzhong Liu, Junsong Yuan, and **Zhigang Tu\***. Motion-driven Visual Tempo Learning for Video-based Action Recognition. IEEE Trans. Image Processing, vol.31, pp.4104-4116, 2022.
7. **Zhigang Tu**, Hongyan Li, Wei Xie, Yuanzhong Liu, Shifu Zhang, Baoxin Li, and Junsong Yuan. Optical Flow for Video Super-Resolution: A Survey. Artificial Intelligence Review, 2022. DOI: 10.1007/s10462-022-10159-8.
8. Yunpeng Chang, **Zhigang Tu\***, Wei Xie, Bin Luo, Shifu Zhang, Haigang Sui, and Junsong Yuan. Video anomaly detection with spatio-temporal dissociation. Pattern Recognition, vol.122, pp.108213:1–12, 2022.

9. Songlian Li, **Zhigang Tu\***, Yujin Chen, and Tan Yu. Multi-scale attention encoder for street-to-aerial image geo-localization. *CAAI Transactions on Intelligence Technology*, **2022**.

**2015 - 2021**

10. Yujin Chen, **Zhigang Tu\***, Di Kang, Linchao Bao, Ying Zhang, Xuefei Zhe, Ruizhi Chen, Junsong Yuan. Model-based 3D Hand Reconstruction via Self-Supervised Learning. In *Proc. Comput. Vis. Pattern Recogn. (CVPR)*, pp. pp.10451–10460, **2021**.

11. Yujin Chen<sup>#</sup>, **Zhigang Tu<sup>#</sup>**, Di Kang, Ruizhi Chen, Linchao Bao, Zhengyou Zhang, and Junsong Yuan. Joint Hand-object 3D Reconstruction from a Single Image with Cross-branch Feature Fusion. *IEEE Transactions on Image Processing*, vol.30, pp.4008–4021, **2021**.

12. Jiayu Zhang, Gaoxiang Ye, **Zhigang Tu\***, Yongtao Qin, Qianqing Qin, Jinlu Zhang, and Jun Liu. A Spatial Attentive and Temporal Dilated (SATD) GCN for Skeleton-Based Action Recognition. *CAAI Transactions on Intelligence Technology*, vol.7, pp.46–55, 2022. (**Best Student Paper Award for ACAIT 2020**)

13. Long Tian, **Zhigang Tu\***, Dejun Zhang, Jun Liu, Baoxin Li, and Junsong Yuan. Unsupervised Learning of Optical Flow With CNN-based Non-Local Filtering. *IEEE Transactions on Image Processing*, vol.29, pp.8429–8442, **2020**.

14. Yunpeng Chang, **Zhigang Tu\***, Wei xie, Junsong Yuan. Clustering-driven Deep Autoencoder for Video Anomaly Detection. In *Proc. European Conf. Comput. Vision (ECCV)*, pp.329–345, **2020**.

15. Dejun Zhang\*, Linchao He, **Zhigang Tu\***, Shifu Zhang, Fei Han, and Boxiong Yang. Learning Motion Representation for Real-Time Spatio-Temporal Action Localization. *Pattern Recognition*, vol.103, pp.107312:1–10, **2020**.

16. Yujing Chen, **Zhigang Tu\***, Liuhaohao Ge, Dejun Zhang, Ruizhi Chen, and Junsong Yuan. SO-HandNet: Self-Organizing Network for 3D Hand Pose Estimation with Semi-supervised Learning. In *Proc. Int. Conf. Comput. Vision (ICCV)*, pp.6961–6970, **2019**.

17. **Zhigang Tu**, Hongyan Li\*, Dejun Zhang, Justin Dauwels, Baoxin Li, and Junsong Yuan. Action-Stage Emphasized Spatio-Temporal VLAD for Video Action Recognition. *IEEE Transactions on Image Processing*, 28(6): 2799–2812, **2019**.

18. **Zhigang Tu\***, Wei Xie, Justin Dauwels, Baoxin Li, and Junsong Yuan. Semantic Cues Enhanced Multi-modality Multi-Stream CNN for Action Recognition. *IEEE Transactions on Circuits and Systems for Video Technology*, 29(5): pp.1423–1437, **2019**.

19. **Zhigang Tu\***, Wei Xie\*, Dejun Zhang, Ronald Poppe, Remco C. Veltkamp, Baoxin Li, and Junsong Yuan. A survey of variational and CNN-based optical flow techniques. *Signal Processing: Image Communication*, vol.72, pp.9–24, **2019**.

20. **Zhigang Tu**, Wei Xie, Qianqing Qin\*, Remco C. Veltkamp, Baoxin Li, and Junsong Yuan. Multi-Stream CNN: Learning Representations Based on Human-Related Regions for Action Recognition. *Pattern Recognition*, vol.79, pp.32–43, **2018**.

21. Shizheng Wang, Wenjuan Liao, **Zhigang Tu**, Yuanjin Zheng, and Junsong Yuan. Saliency Guided Depth Calibration for Perceptually Optimized Compressive Light Field 3D Display. In Proc. Comput. Vis. Pattern Recogn. (CVPR), pp.2031–2040, **2018**.
22. **Zhigang Tu**, Zuwei Guo, Wei Xie\*, Mengjia Yan, Remco Veltkamp, Baoxin Li, and Junsong Yuan. Fusing disparate object signatures for salient object detection in video. **Pattern Recognition**, vol.72, pp.285–299, 2017.
23. **Zhigang Tu\***, Wei Xie, C. Gemeren, and Remco C. Veltkamp. Variational Method for Joint Optical Flow Estimation and Edge-aware Image Restoration. **Pattern Recognition**, vol.65, pp.11–25, 2017.
24. **Zhigang Tu\***, Ronald Poppe, and Remco C. Veltkamp. Weighted Local Intensity Fusion Method for Variational Optical Flow Estimation. **Pattern Recognition**, vol.50, pp.223–232, 2016.
25. **Zhigang Tu**, Nico. Aa, C. Gemeren, and Remco C. Veltkamp\*. A combined post-filtering method to improve accuracy of variational optical flow estimation. **Pattern Recognition**, vol.47, no.5, pp.1926–1940, 2014.
26. **Zhigang Tu\***, Ronald Poppe, and Remco C. Veltkamp. Adaptive Guided Image Filter for Warping in Variational Optical Flow. **Signal Processing**, vol.127, pp.253–265, 2016.
27. **Zhigang Tu**, Yikang Li, Jun Cao, and Baoxin Li\*. MSR-CNN: Applying Motion Salient Region Based Descriptors for Action Recognition. In Proc. Int. Conf. Pattern Recognition (ICPR), pp. 3524–3529, 2016.
28. **Zhigang Tu**, Coert Van Gemeren, and Remco C. Veltkamp. Improved color patch similarity measure based weighted median filter. In Proc. Asian Conf. Comput. Vis. (ACCV), vol.9007, pp.413–427, 2015.
29. Dejun Zhang, Fazhi He, **Zhigang Tu**, Lu Zou, Yilin Chen. Pointwise geometric and semantic learning network on 3D point clouds. *Integrated Computer-Aided Engineering*, vol.27, no.1, pp.57–75, 2020.
30. Kang Dang, Chunluan Zhou, **Zhigang Tu**, Justin Dauwels, and Junsong Yuan. Actor-Action Semantic Segmentation with Region Masks. In Proc. British Machine Vis. Conf. (BMVC), 2018.

## 【Services】

### Associate Editor

The Visual Computer (IF=2.835)

### Guest Editor

Journal of Visual Communication and Image Representation (IF=2.887)

Combinatorial Chemistry & High Throughput Screening (IF=1.714)

### SCI-Indexed Journal Special Issue Organizer

1. Organizer of the Special Issue on “Multi-Modality Human Activity Understanding” in

journal JVCIR

<https://www.journals.elsevier.com/journal-of-visual-communication-and-image-representation/call-for-papers/multi-modality-human-activity-understanding>

### **Conference Organizer & Chair**

1. Organizer of the ACCV 2020 Workshop on Multi-visual-Modality Human Activity Understanding (MMHAU), Kyoto, Japan  
[http://tuzhigang.cn/ACCV\\_Workshop.html](http://tuzhigang.cn/ACCV_Workshop.html)
2. Organizer of the 5th Asian Conference on Pattern Recognition (ACPR) 2019 Workshop on Multi-sensor for Action and Gesture Recognition, 26-29 Nov. 2019, Auckland, New Zealand.  
<https://www.acpr2019.org/>

### **Journal Reviewer**

IEEE Transactions on Pattern Analysis and Machine Intelligence  
IEEE Transactions on Image Processing  
IEEE Transactions on Circuits and Systems for Video Technology  
IEEE Transactions on Multimedia  
IEEE Signal Processing Letters  
Pattern Recognition (Elsevier)  
Artificial Intelligence (Elsevier)  
Signal Processing (Elsevier)  
Image and Vision Computing (Elsevier)  
Neurocomputing (Elsevier)  
Mathematics and Computers in Simulation (Elsevier)  
Artificial Intelligence Review (Springer)  
The Visual Computer Journal (Springer)

### **Conference Reviewer**

IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)  
IEEE/CVF International Conference on Computer Vision (ICCV)  
AAAI Conference on Artificial Intelligence (AAAI)  
ACM Multimedia  
IEEE International Conference on Image Processing (ICIP)  
IEEE International Conference on Pattern Recognition (ICPR)  
IEEE International Conference on Multimedia and Expo (ICME)

### **Conference PC Member**

AAAI Conference on Artificial Intelligence  
IEEE International Conference on Image Processing  
Computer Graphics International