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Ruqi Huang

Research Interests

My research interest lies in the area of Geometry Processing and 3D Computer Vision, with a strong focus on developing 3D reconstruction techniques for both static and dynamic scenes. In particular, I am interested in developing learning approaches towards 3D computer vision tasks without heavy dependency on supervision, via incorporating structural priors (especially the geometric ones) into neural networks. Beyond that, I am also interested in applying geometric/topological analysis on interdisciplinary data, e.g., biological, medical and high-dimensional imaging data.

Working Experience

2020–Present **SIGS/TBSI, Tsinghua University**.
Assistant Professor

2017–2019 **Stream group, LIX, Ecole Polytenique**.
Post-doc Researcher

Education

2013-2016 **University of Paris-Saclay, Paris, France**.
Ph.D., Computer Science, December 2016.
Thesis: *Two contributions to geometric data analysis: filamentary structures approximations, and stability properties of functional approaches for shape comparison.*
Advisor: Frédéric Chazal

2011–2013 **Tsinghua University, Beijing, China**.
M.S., Computational Mathematics, December 2013.
Thesis: *Non-negative matrix factorization in network data dimension reduction.*
Advisor: Fengshan Bai

2007–2011 **Tsinghua University, Beijing, China**.
B.S., Mathematics and Applied Mathematics, July 2011.

Publication [* indicates being corresponding author]

1 "Gromov-Hausdorff Approximation of Filamentary Structures Using Reeb-Type Graphs.", F. Chazal, **R. Huang**, J. Sun. *Discrete Computational Geometry, 2015.*

2 "On the Stability of Functional Maps and Shape Difference Operators.", **R. Huang**, F. Chazal, M. Ovsjanikov. *Computer Graphics Forum, 2017.*

3 "Adjoint Map Representation for Shape Analysis and Matching.", **R. Huang**, M. Ovsjanikov. *Symposium on Geometry Processing, 2017.*

4 "Limit Shape – A Tool for Understanding Shape Differences and Variablity in 3D Model Collections", **R. Huang**, P. Achlioptas, L. Guibas, M. Ovsjanikov. *Symposium on Geometry Processing, 2019.*

5 "OperatorNet: Recovering 3D Shapes From Difference Operators", **R. Huang**, M. Rakotosaona, P. Achlioptas, L. Guibas, M. Ovsjanikov. *International Conference on Computer Vision, 2019.*

6 "Consistent ZoomOut: Efficient Spectral Map Synchronization", **R. Huang**, J. Ren, P. Wonka, M. Ovsjanikov. *Symposium on Geometry Processing, 2020.*

7 "EFENet: Reference-based Video Super-Resolution with Enhanced Flow Estimation", Y. Zhao, M. Ji, **R. Huang***, B. Wang, S. Wang, *CAAI International Conference on Artificial Intelligence, 2021.*

8 "Cross-Camera Deep Colorization", Y. Zhao, H. Zheng, M. Ji, **R. Huang***, *CAAI International Conference on Artificial Intelligence, 2022.(Oral presentation)*

9 "ParseMVS: Learning Primitive-aware Surface Representations for Sparse Multi-view Stereopsis", H. Ying, J. Zhang, Y. Chen, Z. Cao, J. Xiao, **R. Huang***, L. Fang*, *ACM Int. Conf. on Multimedia 2022.*

10 "ElasticMVS: Learning Elastic Part Representation for Self-supervised Multi-view Stereopsis", J. Zhang, R. Tang, Z. Cao, J. Xiao, **R. Huang***, L. Fang*, *NeurIPS, 2022. (Spotlight)*

11 "Optical Neural Ordinary Differential Equations", Y. Zhao, H. Chen, M. Lin, H. Zhang, T. Yan, **R. Huang**, X. Lin, Q. Dai, *Optics Letters*, 48(3), 628-631, 2023.

12 "Neural Intrinsic Embedding for Non-rigid Point Cloud Matching", P. Jiang, M. Sun, **R. Huang***, *IEEE CVPR*, 2023.

Teaching

1 Computational Photography, graduate level course in TBSI.

2 Digital Image and Video Processing, graduate level course in TBSI.

Research Funding

1 "Theory and Technique of Dynamic Scene 3D Reconstruction via Spectral Methods", General Program supported by National Natural Science Foundation of China, (Grant No. 62171256), 560k CNY, from 2022 to 2025, PI.

2 "Depth Image Enhancement and 3D Reconstruction", Commerical Research Fund from Berxel Photonics Co., 450k CNY, from 2022 to 2023, PI.

3 "Noninvasive Dynamic Biomechanics Study of Organoids Based on Muller Microscopy Imaging", Cross-disciplinary Research and Innovation Fund from SIGS, 125K CNY (out of 250K CNY), Co-PI.

4 "Shenzhen Key Laboratory of Next Generation Interactive Media Innovative Technology", Shenzhen STIC, 80K (Phase I), Participant.

Services

1 I have been a reviewer for top conferences and journals in Computer Vision and Graphics, including IEEE Transactions on Image Processing (J), IEEE Transactions on Multi-Media (J), Graphics Models (J), ACM SIGGRAPH (C), EuroGraphics (C), Pacific Graphics (C), CICAI (C), etc.

2 I serve as the deputy secretary general of Expert Committee on Metaverse Techniques, Chinese Association for Artificial Intelligence (CAAI).