Tatsunori Taniai, Ph.D.

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Professional Employment

Apr 2019 – present:	**Senior Researcher**, **OMURON SINIC X Corp.,** JAPAN
Jul 2019 – Nov 2020:	**Visiting Researcher, RIKEN AIP**, JAPAN
Apr 2017 – Mar 2019:	**Special Postdoctoral Researcher**, **RIKEN AIP**, JAPAN
Apr 2014 – Mar 2017:	**JSPS Young Research Fellow**, **The University of Tokyo**, JAPAN
	(also employed as research interns at Microsoft in 2012, 2015 and 2016)

Education

The University of Tokyo, JAPAN (Apr 2009 – March 2017)

March 2017:	**Ph.D. degree** in Information Science and Technology
	Advisor: Yoichi Sato
March 2014:	**Master of Science** in Information Science and Technology
	Advisor: Takeshi Naemura
March 2012:	**Bachelor of Engineering** in Information and Communication Engineering
	Advisor: Takeshi Naemura

National Institute of Technology, Tokyo College (a.k.a. Tokyo Kosen), JAPAN (2003-2009)

Mar 2009:	**Associate of Engineering** in Information Engineering
	Advisor: Tetsuya Kojima

Research Interests

Geometric and photometric 3D computer vision and physics-informed machine learning, particularly,

- **3D reconstruction** by geometric and photometric approaches.
- **Deep learning for molecules and materials.**

Awards & Honors

March 2019: **2018 IPSJ Yamashita SIG Research Award** from Information Processing

Society of Japan (IPSJ).

March 2017: **Dean's Award for Best Doctoral Thesis** from the Graduate School of Information Science and Technology, the University of Tokyo.

October 2015: **Microsoft Research Asia Ph.D. Fellowship** from Microsoft Research Asia, as one of thirteen winners among 100 applicants from Asian universities (with research fund of 10,000 USD.)

2014 - 2017: **JSPS Young Research Fellowship (DC1)** from the Japan Society for the Promotion of Science with research fund of approximately 10,000 USD / year for three years. Acceptance rate: 23%.

March 2014: **Dean's Award for Best Master Thesis** from the Graduate School of Information Science and Technology, the University of Tokyo.

March 2012: **Dean's Award for Best Bachelor Thesis** from the Faculty of Engineering, the University of Tokyo.

Others: **Outstanding Reviewer Awards** from CVPR 2018, 2020, 2023, ECCV 2020.

Publications

♦ **Books and Chapters**

[1] Tatsunori Taniai: "Binocular Stereo", In *Ikeuchi K. (eds) Computer Vision*. Springer, Cham, 2020.

♦ **Journals**

[2] Naoya Chiba, Yuta Suzuki, Tatsunori Taniai, Ryo Igarashi, Kotaro Saito, Yoshitaka Ushiku, Kanta Ono: "Neural structure fields with application to crystal structure autoencoders", In *Communication Materials*, vol. 4, no. 1, pages 106 (Dec. 2023).

[3] Yuta Suzuki, Tatsunori Taniai, Kotaro Saito, Yoshitaka Ushiku, Kanta Ono: "Self-supervised learning of materials concepts from crystal structures via deep neural networks", In *Machine Learning: Science and Technology*, vol. 3, no. 4, pages 045034 (Dec. 2022).

[4] Tatsunori Taniai, Yasuyuki Matsushia, Yoichi Sato, and Takeshi Naemura: "Continuous 3D Label Stereo Matching using Local Expansion Moves", In *IEEE Transactions on Pattern Analysis and Machine Intelligence* (**TPAMI**), vol. 40, no. 11, pp. 2725–2739 (Nov. 2018). (An extended version of [15])

[5] Tatsunori Taniai, Viet-Quoc Pham, Keita Takahashi, and Takeshi Naemura: "Image Segmentation using Simultaneous Matching of Foreground-Background Color Distributions", *IEICE Transactions on Information and Systems (Japanese edition)*, vol. J96-D, no. 8, pp. 1764–1777 (Aug. 2013).

♦ **International Conference Papers**

[6] Tatsunori Taniai, Ryo Igarashi, Yuta Suzuki, Naoya Chiba, Kotaro Saito, Yoshitaka Ushiku, Kanta Ono: "Crystalformer: Infinitely Connected Attention for Periodic Structure Encoding", In *Proc. of the Twelfth International Conference on Learning Representations* (**ICLR 2024**), Vienna,

Austria. (May 2024). (Acceptance rate: 2260/7262 = 31.1%)

[7] Masafumi Endo, Tatsunori Taniai, Ryo Yonetani, Genya Ishigami: "Risk-aware Path Planning via Probabilistic Fusion of Traversability Prediction for Planetary Rovers on Heterogeneous Terrains", In *Proc. of the 2023 IEEE International Conference on Robotics and Automation* (**ICRA 2023**), pp. 11852-11858, London, UK. (May 2023). (Acceptance rate: 1345/3125 = 43.0%)

[8] Sotaro Katayama, Tatsunori Taniai, Kazutoshi Tanaka: "Quasistatic contact-rich manipulation via linear complementarity quadratic programming", In *Proc. of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems* (**IROS 2022**), pp. 203–210, Kyoto, Japan. (Jul. 2021). (Acceptance rate: 1740/3579 = 48.6%)

[9] Ryo Yonetani*, Tatsunori Taniai*, Mohammadamin Barekatain, Mai Nishimura, Asako Kanezaki: "Path Planning using Neural A* Search", In *Proc. of the 38th International Conference on Machine Learning* (**ICML 2021**), a virtual conference (Jul. 2021). (Acceptance rate: 1184/5513 = 21.5%) (* equal contributions.)

[10] Tatsunori Taniai and Takanori Maehara: "Neural Inverse Rendering for General Reflectance Photometric Stereo", In *Proc. of the 35th International Conference on Machine Learning* (**ICML 2018**), pp. 4864–4873, Stockholm, Sweden (Jul. 2018). (Acceptance rate: 618/2473 = 25.0%)

[11] Daniel Scharstein, Tatsunori Taniai, Sudipta N. Sinha. "Semi-Global Stereo Matching with Surface Orientation Priors". In *Proc. of the 5th International Conference on 3D Vision* (**3DV 2017**), pp. 215–224, Qingdao, China, 2017. (Spotlight presentation)

[12] Tatsunori Taniai, Sudipta Sinha, and Yoichi Sato: "Fast Multi-frame Stereo Scene Flow with Motion Segmentation", In *Proc. of IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR 2017**), pp. 6891–6900, Honolulu, Hawaii, USA (Jul. 2017). (Acceptance rate: 783/2620 = 29.9%)

[13] Tatsunori Taniai, Sudipta Sinha, and Yoichi Sato: "Joint Recovery of Dense Correspondence and Cosegmentation in Two Images", In *Proc. of IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR 2016**), pp. 4246–4255, Las Vegas, NV, USA (Jun. 2016). (Acceptance rate: 643/2145 = 29.9%)

[14] Tatsunori Taniai, Yasuyuki Matsushia, and Takeshi Naemura: "Superdifferential Cuts for Binary Energies", In *Proc. of IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR 2015**), pp. 2030–2038, Boston, MA, USA (Jun. 2015). (Acceptance rate: 602/2123 = 28.4%)

[15] Tatsunori Taniai, Yasuyuki Matsushia, and Takeshi Naemura: "Graph Cut based Continuous Stereo Matching using Locally Shared Labels", In *Proc. of IEEE Conference on Computer Vision and Pattern Recognition* (**CVPR 2014**), pp. 1613–1620, Columbus, OH, USA (Jun. 2014). (Acceptance rate: 540/1807 = 29.8%)

[16] Tatsunori Taniai, Viet-Quoc Pham, Keita Takahashi, and Takeshi Naemura: "Image Segmentation using Dual Distribution Matching", In *Proc. of British Machine Vision Conference* (**BMVC 2012**),

pp. 74.1–74.11, Surrey, UK (Sep. 2012). **(**Oral presentation. Acceptance rate: 32/414 = 8%)

♦ **Technical Reports**

♦ **Invited Talks**

[17] Tatsunori Taniai†, Sudipta N. Sinha, and Yoichi Sato: "Fast Multi-frame Stereo Scene Flow with Motion Segmentation (CVPR 2017)", In *The 20th Meeting on Image Recognition and Understanding (MIRU 2017)*, IT-16, at International Conference Center Hiroshima in Hiroshima, Japan (Aug. 10th, 2017).

[18] Tatsunori Taniai†: "Joint Recovery of Dense Correspondence and Cosegmentation in Two Images", In *The Workshop on Vision, Learning, and Cognition in Microsoft Research Asia Ph.D. Forum 2016*, Microsoft office, Beijing, China (Sep. 20th, 2016).

[19] Tatsunori Taniai, Sudipta N. Sinha, and Yoichi Sato†: "Joint Recovery of Dense Correspondence and Cosegmentation in Two Images (CVPR 2016)", In *The 19th Meeting on Image Recognition and Understanding (MIRU 2016)*, IS2-15, at Actcity Hamamatsu in Shizuoka, Japan (Aug. 4th, 2016).

[20] Tatsunori Taniai†: "Solving Segmentation and Dense Correspondence Problems using Graph Cuts", In *The 1st CREST Symposium on Random Fields and Deep Learning*, at Waseda University in Tokyo, Japan (Jan. 13th, 2016). (Organizers: Prof. Hiroshi Ishikawa & Prof. Takayuki Okatani)

[21] Tatsunori Taniai†: "Joint Co-segmentation and Dense Correspondence", In *The final interview of Microsoft Research Asia Ph.D. fellowships*, at Microsoft Research Asia in Beijing, China (Sep. 11th, 2015).

[22] Tatsunori Taniai, Yasuyuki Matsushia†, and Takeshi Naemura: "Superdifferential Cuts for Binary Energies (CVPR 2015)", In *The 18th Meeting on Image Recognition and Understanding (MIRU 2015)*, IS1-10, at Hotel Hankyu Expo Park in Osaka, Japan (Jul. 28th, 2015).

[23] Tatsunori Taniai†, Yasuyuki Matsushia, and Takeshi Naemura: "Graph Cut based Continuous Stereo Matching using Locally Shared Labels (CVPR 2014)", In *The 17th Meeting on Image Recognition and Understanding (MIRU 2014)*, IT1-1, at Okayama Convention Center in Okayama, Japan (Jul. 29th, 2014).

Names with † are the presenters.

♦ **Domestic Conference Papers** (in Japanese)

Two papers including one refereed paper.

Experiences

Conference Reviewer: 3DV 2014, '17, '18, ICCV 2017, CVPR 2018, 2020, ECCV 2020

Journal Reviewer: IEEE TIP 2015, '18, IMAVIS 2016, IEICE TIS 2016, CVIU 2017

Research Internship at Microsoft Research (May 23th – Aug 26th, 2016 in Redmond, USA)

Supervisor: Dr. Sudipta Sinha

Part of the internship achievements has been published as a CVPR 2017 paper [12].

Visiting Research at Microsoft Research Asia (Jan 26th – Apr 25th, 2016 in Beijing, China)

Supervisor: Dr. David Wipf

Research Internship at Microsoft Research (June 1st – Sep 4th, 2015 in Redmond, USA)

Supervisor: Dr. Sudipta Sinha

Part of the internship achievements has been published as a CVPR 2016 paper [13].

Research Internship at Microsoft Research Asia (Dec 11th, 2012 – Apr 17th, 2013 in Beijing, China)

Supervisor: Dr. Yasuyuki Matsushita

Part of the internship achievements has been published as a CVPR 2014 paper [15].

Skills

- 10+ years of programming experiences in **C++** (primary use), **C#**, **Java**, and **Python**
- Learner of **modern C++** (not mastering level yet!)
- Visual computing using **OpenCV** (primary use) and ~~**MATLAB**~~ **Python + numpy**
- GPGPU programming skills using **OpenCL** and **CUDA** (basic level)
- SIMD code optimization using **SSE** and **AVX** (basic level)
- Academic literacy & conversation skills in **English** (TOEIC 930 of 990 in May 2011)