

Congchao Wang

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SUMMARY:

- 7+ years of research experience in Machine Learning and Computer Vision. Hand-on experience in Deep Learning. Published first-author papers in top-tier AI/ML conference (NeurIPS) and Journals (IEEE Trans. on PAMI, and Bioinformatics), involving object detection, segmentation and tracking.
- 10+ years of programming experience (C/C++, Matlab, Python, and Java).

EDUCATION:

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| Virginia Tech, Virginia, USA | May. 2021(expected) |
| Doctor of Philosophy in Computer Engineering | |
| Nankai University, Tianjin, China | Sep. 2014 - Nov. 2015 |
| Master of Science in Computer Science | |
| National Tsing Hua University, Hsinchu, Taiwan | Sep. 2013 - Jul. 2014 |
| Master of Science in Computer Science | |
| Nankai University, Tianjin, China | Sep. 2009 - Jun. 2013 |
| Bachelor of Science in Computer Science | |

SKILLS:

Languages and Tools: C/C++, Python, SQL, Deep Learning (PyTorch), Matlab, Java, C#, Qt, OpenGL, OpenCV.

PROJECTS:

Multi-object Tracking in Crowd Scenes with Deficient Detection and Segmentation Results.

- muSSP: a **4,000 faster** min-cost flow algorithm for object tracking with **no loss of accuracy**. ([1], [C++ code](#))
- CINDA: a global data association framework that allows for iterative refinement on detection/linking results with a rigorous mathematical proof of its **best-of-known complexity**. ([2], [C code](#))
- Promising performance improvement on various MOT benchmarks (KITTI, MOT17, and CVPR2019).
- A 3D+time **TB-level** object tracking, visualization and annotation platform. ([C++ with OpenGL](#))

Probability Principled Spot Detection on Low-quality Images.

- SynQuant: an order statistics based algorithm measures the statistical significance for each spot. ([3])
- Designed a component-tree based **quasi-linear algorithm** for exhaustive spot candidate searching. ([Java code](#))
- Achieved comparable performance with state-of-the-art deep learning frameworks (UNet and DoGNet).

Functional ROI Identification on Time-Lapse Calcium Imaging Data.

- CIPP: a conditional inhomogeneous Poisson process for functional ROI identification. ([Manuscript](#))

Whole-Brain Image Analysis (100GB data).

- Built a novel whole-brain 3D **image alignment pipeline** with applications on 2,000+ Drosophila larvae brain imaging data analysis. ([4], [Matlab/C++ code](#))

RECENT PUBLICATIONS (* equal contribution):

- [1] C Wang, Y Wang, Y Wang, C Wu and G Yu. muSSP: Efficient Min-cost Flow Algorithm for Multi-object Tracking. *Advances in Neural Information Processing Systems (NeurIPS)*, 2019.
- [2] C Wang, Y Wang, and G Yu. Efficient Global Multi-object Tracking Under Minimum-cost Circulation Framework. *IEEE Transactions on Pattern Analysis and Machine Intelligence (IEEE Trans. on PAMI)*, in press.
- [3] Y Wang*, C Wang*, P Ranefall, G Broussard, Y Wang, G Shi, B Lyu, C Wu, W Wang, L Tian, G Yu. SynQuant: An Automatic Tool to Quantify Synapses from Microscopy Images. *Bioinformatics*, 2020.
- [4] Y Hu*, C Wang*, G Pan, H Liu, G Yu and B Ye. A Neural Basis for Converting Graded Sensory Evidence to Discrete Decisions. *Current Biology*, 2020.
- [5] C Wang, J Yang, K Wang, and SH Lai. Multi-scale energy optimization for object proposal generation. *Multimedia Tools and Applications*, 2017.