Congchao Wang

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SUMMARY:

• 7+ years of academic research experience in Machine Learning, Applied Statistics (e.g. hypothesis testing, random process), Optimization (e.g. network flow) and Computer Vision (e.g. object detection, segmentation and tracking).
• 10+ years of programming experience (majorly in C/C++, Matlab, and Java).

EDUCATION:

Virginia Polytechnic Institute and State University, Virginia, USA — May. 2021(expected)
Doctor of Philosophy in Computer Engineering (GPA: 3.94/4.00)

Nankai University, Tianjin, China — Sep. 2014 - Nov. 2015
Master of Science in Computer Science (GPA: 4.10/4.30)

National Tsing Hua University, Hsinchu, Taiwan — Sep. 2013 - Jul. 2014
Master of Science in Computer Science (GPA: 4.24/4.30)

Nankai University, Tianjin, China — Sep. 2009 - Jun. 2013
Bachelor of Science in Computer Science (GPA: 3.66/4.30)

SKILLS:

Languages and Tools: C/C++, Python, SQL, Matlab, Java, C#, Qt, OpenGL, OpenCV, VMWare, Maven, PyTorch.

EXPERIENCES:

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

- Designed a **4,000 faster** min-cost flow algorithm for object tracking with **no loss of accuracy** and the **same memory consumption** as before. ([1], C++ code)
- Built a global data association framework that allows for **iterative refinement** on detection/linking results with a rigorous mathematical proof of its **best-of-known worst-case complexity**. ([2], C code)
- Applied our framework on a **10*TB*** data cell tracking problem, achieving **>20% accuracy gain**.
- Build a 3D+time **terabyte-level** data visualization platform. (ongoing, C++ with OpenGL)

Probability Principled Spot Detection on Low-SNR Data.

- Proposed to use order statistics to measure the statistical significance for each spot. ([3], Java code)
- Proposed a component-tree based quasi-linear algorithm for exhaustive spot candidate searching.

Whole-Brain Image Analysis for Drosophila larvae (100*GB* data).

- Built a novel whole-brain 3D image alignment pipeline in **C/C++ and Matlab**, with applications on 2,000+ Drosophila larvae brain imaging data analysis. ([4], Matlab code)
- Proposed a sigmoid brain signal transferring model to explain how the nociceptive stimulus is converted into "Yes" or "No" escaping behavioral decision in larvae brain.

Functional Unit (FU) Identification on Time-Lapse Calcium Imaging Data.

- Designed **conditional inhomogeneous Poisson process** for FU identification on calcium data. (Manuscript)

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* (**TPAMI**), 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.