

# 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).

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## EDUCATION:

<b>Virginia Polytechnic Institute and State University</b> , Virginia, USA	May. 2021(expected)
Doctor of Philosophy in Computer Engineering (GPA: 3.94/4.00)	
<b>Nankai University</b> , Tianjin, China	Sep. 2014 - Nov. 2015
Master of Science in Computer Science (GPA: 4.10/4.30)	
<b>National Tsing Hua University</b> , Hsinchu, Taiwan	Sep. 2013 - Jul. 2014
Master of Science in Computer Science (GPA: 4.24/4.30)	
<b>Nankai University</b> , Tianjin, China	Sep. 2009 - Jun. 2013
Bachelor of Science in Computer Science (GPA: 3.66/4.30)	

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## SKILLS:

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

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## 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 (100GB 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](#))

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## 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.