

# Penghao Qian

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## EDUCATION

**Southeast University (SEU), Nanjing, China** 2021.09 - 2024.06

Master in Computer Science | Standard Score: 84.24/100 | Rank: 5% (7/151)

- Work on brain network analysis and neuron morphology under the lab of Prof. Hanchuan Peng.

**China Agricultural University (CAU), Beijing, China** 2016.09 - 2021.06

Bachelor of Engineering | Major in Computer Science | GPA: 3.61/4.0 | Rank: 15%

## RESEARCH EXPERIENCE

**Analysis of structural and functional brain networks at the single-cell level** Southeast University

*Graduate Research* Supervisor: Prof. Hanchuan Peng 2021.09 - 2023.08

- Develop an algorithm to generate single-cell network from 1891 full morphology reconstructions.
- Find that bouton locations are not homogeneous and have a significant impact on network wiring.
- Explore the link between anatomical details and network topology by perturbing morphology.

One paper is submitted to *Neuron* and currently under review. It can be found at *bioRxiv*.

**Project Link:** [https://github.com/MorphoNeuralNetworks/Full\\_morphology\\_networks\\_Qian](https://github.com/MorphoNeuralNetworks/Full_morphology_networks_Qian)

**Tools for neuron classification based on manifold patterns** Southeast University

*Graduate Research* Supervisor: A.P. Lijuan Liu 2022.5 - 2023.08

- Develop a toolkit to analyze the manifold patterns in the feature space of neuronal morphology.
- Detect the optimal subspace of features for classification of more than 9,400 mouse neurons.

One manuscript about manifold patterns was published in *Bioinformatics*. Another one is under review.

**Project Link:** <https://github.com/SEU-ALLEN-codebase/ManifoldAnalysis>

**Research of EEG signal correlation between students** Tsinghua University

*Undergraduate Research* Supervisor: A.P. Dan Zhang 2018.10 - 2020.06

- Provide a process to reduce artifacts in Electro-encephalography (EEG) data collected by portable devices, including slicing, evaluating data quality, removing slow drifts and ocular artifacts.
- Analyze the relationship between EEG correlations among students and scores in different subjects.

One paper was published in *npj Science of Learning*.

## PUBLICATIONS

- **Qian P**, Manubens-Gil L, et al. Non-homogenous axonal bouton distribution in whole-brain single cell neuronal networks. *bioRxiv*, 2023. (*Neuron*, under review)
- Zhao S, **Qian P**, et al. Cell Typing and Sub-typing Based on Detecting Characteristic Subspaces of Morphological Features Derived from Neuron Images. *bioRxiv*, 2023. (*Bioinformatics*, under review)
- Chen J, **Qian P**, et al. Inter-brain coupling reflects disciplinary differences in real-world classroom learning. *npj Science of Learning*, 2023, 8(1): 11.
- Liu L, **Qian P**. Manifold classification of neuron types from microscopic images. *Bioinformatics*, 2022, 38(21): 4987-4989.

## ACTIVITIES

**Research Assistant** **Laboratory of Brain and Intelligence, Tsinghua University**

*Supervisor:* Prof. Dan Zhang

2017.09 - 2020.06

- Learned Brain-Computer Interface (BCI) and Electro-encephalography (EEG) related knowledge. Participated in the experiment design and execution.
- Managed, processed, and analyzed the EEG and Electrodermal activity (EDA) data. Completed the preprocessing process of physiological data such as EEG in natural scenes.

## CONFERENCES AND TALKS

**BioBit Program Summer School for Computational Biology** **Zhejiang Lab, Hangzhou**

- Best Poster and Best Student Award 2023.08

**BioImage Informatics 2021 virtual conference** **Institut Pasteur, Online**

- Poster in *Bioimaging and microscopy applications* section 2021.11

**The 3rd Annual Conference on Engineering Psychology of C.P.S.** **East China Normal University**

- Analysis of EEG data collected by portable devices were presented by A.P. Dan Zhang 2019.10

**IEEE 4th International Summer School for Neural Engineering** **Tsinghua University**

- Comprehensive study of BCI techniques and participation in experiments 2018.08

## COMPETITION

**The 18th China Postgraduate Mathematical Contest in Modeling** **Guangzhou, China**

Modeling of deep brain electrical stimulation (DBS) therapy for Parkinson's disease

*Won the National 2nd Prize*

*Position: Team Leader*

2021.12

**Project Link:** [https://github.com/Mr-strlen/Basal\\_Ganglia\\_Network\\_Model](https://github.com/Mr-strlen/Basal_Ganglia_Network_Model)

**Contemporary Undergraduate Mathematical Contest in Modeling** **Beijing, China**

Design of Dynamic Scheduling Strategy of Smart Rail Guided Vehicle (RGV)

*Won the National 2nd Prize*

*Position: Team Leader*

2018.09

**National 3rd prize in The Physical Competition in parts of China** 2018

**3rd prize in The Chinese Mathematics Competitions (Beijing Division)** 2017

**3rd prize in Province Blue Bridge Cup Programming Competition** 2017

## ADDITIONAL INFORMATION

### Selected Honors

**2023.10** Honor Students Award (only 15 per year at the college)

**2021 - 2023** First level scholarship of graduate students

**2017 - 2019** Scholarship for Academic Excellence

### Skills

- Good programming foundation, proficient in Python
- Experience in complex network analysis and brain network simulation
- Systematically studied machine learning and signal processing
- Good listening and speaking skills due to my interaction with American and Spanish supervisors

Homepage: <https://mr-strlen.github.io>