

# Xupeng Chen

LIFE SCIENCE · TSINGHUA UNIVERSITY

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## Education

### School of Life Science, Tsinghua University

Beijing, China

BSC IN LIFE SCIENCE

Sept. 2014 - June. 2019

- Minor in Statistics
- XueTang program, cultivating top students to become leading researchers in science
- Courses Taken: Calculus, Linear Algebra, Probability and Statistics, Mathematical Modelling, Biostatistics, Bioinformatics, Pattern Recognition, Artificial Neural Networks.

## Publications

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|------|--|-----------------|
| 2018 | <b>Active Detect-and-Cluster: Efficient Instance Annotation for Connectomics</b> , IEEE Computer Society Conference on Computer Vision and Pattern Recognition | Under Review    |
| 2018 | <b>exSeek: Robust exRNA Analysis Tool for Noninvasive Biomarker</b> , Nucleic Acids Research   | Ready to Submit |
| 2018 | <b>DeepShape: Detection of Sequence and Structural Motif using Deep Learning</b> , Biology Forum in Tsinghua   | Poster          |

## Research Experience

### DeepShape: Detection of Sequence and Structural Motif using Deep Learning

Lu Lab, Tsinghua University

SUPERVISOR: ZHI LU

2017-2018

- Processed structure probing data for 1D and 2D deep learning model in structure prediction
- Used unsupervised deep learning model (VAE) and attention model for Motif detection and localization
- Used graph convolution neural networks to learn meaningful structural motifs

### exSeek: Robust exRNA Analysis Tool for Noninvasive Biomarker

Lu Lab, Tsinghua University

SUPERVISOR: ZHI LU

2017-2018

- Developed a complete pipeline for exRNA analysis. Included mapping, counts, matrix processing, robust feature selection and evaluation
- Used statistical and machine learning model for imputation, normalization, batch removal and feature selection
- Packaged all functions into software. Validated on published and lab dataset

### eMaize: Machine learning method for quantitative traits prediction

Lu Lab, Tsinghua University

SUPERVISOR: ZHI LU

2017-2018

- Developed a new linear mixed model to predict traits of 36,000 hybrid samples using SNP data to find heterosis in maize
- Developed a non-parameter model to solve small sample training problems

### Mixture density network for Localization Using NLOS TOAs or TDOAs

NYU wireless, New York University

COLLABORATOR: JUN LI

2017-2018

- Constructed a mixture density network for x, y and z coordinates joint prediction. Estimate uncertainty for confusing points identification
- Constructed an attention based model for feature weight adjustment

## Efficient Instance Annotation for Connectomics

Visual Computing Group, Harvard

University

SUPERVISOR: **HANSPETER PFISTER**

2018 Summer

- Constructed a powerful 3D U-net for synapse detection in CREMI dataset. Ranked **1<sup>st</sup>** place in CREMI contest
- Constructed 3D U-net and 3D-CNN for synaptic connections between neurons, and intracellular structures like mitochondria. Construct an active-learning annotation framework for proofreading
- Applied models to predict JWR dataset with 1 million synapses. Submitted a paper to conference on Computer Vision and Pattern Recognition (CVPR)

## Reconstruction of neural muscular junction connectomic EM data

Lichtman Lab, Harvard University

SUPERVISOR: **JEFF LICHTMAN**

2018 Summer

- Used 3D U-net and matching algorithm for neuron membrane prediction and tracing
- 3D reconstruction of 13 neural muscular junctions between neurons and muscles (largest ever)
- Quantified the linear correlation of axonal diameter and synaptic area by statistical analysis

## Cardiacai: a deep learning model for cardiac disease detection

Tsinghua University

SUPERVISOR: **HONGLIANG YU**

2017

- Use deep learning models to analyze 3,000 X-ray chest images for heart disease classification
- Utilized a U-net for heart region attention and a VGG-net for classification
- Won the second prize in the First National College Students' Brain Computation and Application Competition

## Medical data Analysis: Student research training project

Tsinghua University

SUPERVISOR: **XUEGONG ZHANG**

2016-2017

- Used 3D CNN and 3D U-net to analyze medical images
- Collected X-ray and CT images to detect lung diseases. Used 3D and 2D U-net for nodules detection

## Activities&Awards

2018	<b>Teaching Assistant in Bioinformatics Basic Course</b> , Wrote three chapters of teaching gitbook	University
2015-2018	<b>Scholarship</b> , XueTang scholarship	University
2017	<b>Second prize</b> , The First National College Students' Brain Computation and Application Competition	International
2017	<b>First Prize</b> , eMaize Challenge: Machine learning in breeding	National
2018	<b>Meritorious Winner</b> , Mathematical Contest in Modeling (MCM)	International
2016-2018	<b>Xuetang Research Funding</b> , \$10,000 for Research in Lu lab	University
2016-2018	<b>Initiative Scientific Research Program</b> , \$8,000 for Research in Biomedical Image analysis	University
2015	<b>Golden Prize</b> , Social practice award for investigation on e-cycling	University
2015	<b>Grand Prize &amp; best captain</b> , Return to Alma mater activity : Built a platform with 440,000 views overall, Published a book with 5,000 copies	University

## Skills

- Proficient in Python, MATLAB, R, Bash,  $\text{\LaTeX}$
- Familiar with Machine Learning, Deep Learning (Tensorflow, Keras, Pytorch) and Computer Vision tools.
- Familiar with Linux, MacOS, Windows