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

2018	**Active Detect-and-Cluster: Efficient Instance Annotation for Connectomics,** IEEE Computer Society Conference on Computer Vision and Pattern Recognition	*Under Review*
2018	**exSeek: Robust exRNA Analysis Tool for Noninvasive Biomarker,**	*Ready to Submit*
2018	**DeepShape: Detection of Sequence and Structural Motif using Deep Learning,** 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^{st} 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 juntions 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	**Teaching Assistant in Bioinformatics Basic Course**, Wrote three chapters of teaching gitbook	*University*
2015-2018	**Scholarship**, XueTang scholarship	*University*
2017	**Second prize**, The First National College Students' Brain Computation and Application Competition	*International*
2017	**First Prize**, eMaize Challenge: Machine learning in breeding	*National*
2018	**Meritorious Winner**, Mathematical Contest in Modeling (MCM)	*International*
2016-2018	**Xuetang Research Funding**, $10,000 for Research in Lu lab	*University*
2016-2018	**Initiative Scientific Research Program**, $8,000 for Research in Biomedical Image analysis	*University*
2015	**Golden Prize**, Social practice award for investigation on e-cycling	*University*
2015	**Grand Prize & best captain**, 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, LaTeX
- Familiar with Machine Learning, Deep Learning (Tensorflow, Keras, Pytorch) and Computer Vision tools.
- Familiar with Linux, MacOS, Windows