Xinming Tu

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EDUCATION

Peking University *Undergraduate student* **September 2016 - Present**
Undergraduate Honors Program in Biology
School of Life Science
Overall GPA: 86/100

Peking University *Undergraduate student(Dual Degree)* **September 2016 - Present**
Computer Science and Technology

Yale University *Visiting Student* **July 2019 - Septemper 2019**
Prof. Hongyu Zhao's Lab
Center for Statistical Genomics and Proteomics

WORKING EXPERIENCE

Microsoft Research Asia *Research Intern* **October 2019 - April 2020**
Machine Learning Group

RESEARCH

Research Experience :

- **Using the statistical view to understand and improve deep learning model in bio-sequence data**
  Advisors : Dr.Ge Gao(Center for Bioinformatics,Peking university) **January 2019 - May 2019**
  Dr.Minghua Deng (Center for Quantitative Biology, Peking university)
  Collaborators : Xiao Luo, Dr.Yang Ding
  - Drive a statistical view to understand the learning ability of a convolutional neural network (CNN) in bio-sequence data
  - Develop a exact kernel-to-PWM transformation and the theory
  - Propose an expectation pooling which is inspired from the EM algorithm and can be interpreted from the view of statistical models

- **Proposing a novel convolution-based model vCNN (Variable CNN) for effective bio-motif detection via the adaptive kernel length**
  Advisor : Dr.Ge Gao **December 2018 - February 2019**
  Collaborators : Jingyi Li, Shen Jin, Dr.Yang Ding
  - Develop a theoretical framework for quantitatively modeling the relationship of convolution kernel shape and the motif detection effectiveness
  - Design and propose a novel convolution layer, vCNN (Variable CNN), for effective bio-motif detection via the adaptive kernel length at runtime

- **A new metric for the single cell gene expression based on interaction network**
  Advisor : Dr.Ge Gao **April 2019 - July 2019**
  Collaborators : Tianyuan Teng, Jingyi Wei
  - Use Markov Random Field with biological priors to estimate the distribution of expression
  - Design a new metric of cell-cell distance based on the probability distribution

- **Single-cell mass Cytometry (CyTOF) re-analysis of peripheral blood mononuclear cells (PBMCs) from staged IPF patients**
  Advisor : Dr.Hongyu Zhao(Yale University) **July 2019 - September 2019**
  Collaborators : Wenxuan Deng
  - Use the random forest to rescue the unlabeled cells
  - Get a more convincing proportion of different cell types, especially CD4+ and cytotoxic cells
  - Identify immune cell-type specific signatures correlated with IPF stages

- **TCR-Antigen Map, early detection of multiple diseases from a single blood test**
  Advisor : Dr.Huanhuan Leo Xia(Microsoft Research Asia) **October 2019 - April 2020**
  - Participate in the TCR-Antigen Map Project

PUBLICATIONS

- Xiao Luo *,**Xin-Ming Tu** *, Yang Ding, Minghua Deng, Ge Gao *Expectation pooling: An effective and interpretable method of pooling for predicting DNA-protein binding*, ***Bioinformatics*, 2019**
- Yang Ding, Jing-Yi Li, Meng Wang,**Xin-Ming Tu**, Ge Gao. *An exact transformation of convolutional ker-nels enables accurate identification of sequence motifs*, ***biorxiv*, 2019**
- Shen Jin *, Jing-yi Li *, **Xin-Ming Tu**, Yang Ding, and Ge Gao.*Effectively detect bio-motif via a new convolution model with adaptive kernel length*, ***In Submission***

*__Equal contribution__

SELECTED COURSES

- **Bioinformatics & Genomics**

Technologies for Genomics Biology*	Statistical Models in Bioinformatics*
Statistical analysis of genomics data*	Methods in Bioinformatics*
Current topics on Genetics	Mathematical Modeling in the Life Sciences
Genetics	Mathematical Biophysics*

- **Advanced Math & CS**

Probabilistic Models for Structured Data	Deep Learning: Algorithms and Applications*
Statistical Learning*	Bayesian Theory and Computation*

* *Graduate Student Course*

HONORS

- Merit Student in Peking University 2019
- May Fourth Scholarship in Peking University 2018
- Academic Excellence Award in Peking University 2018
- The 20^{th} annual Interdisciplinary Contest in Modeling (ICM) Meritorious Winners (9%) 2018
- The 32^{th} Chinese Mathematical Society (CMS) 1^{st} prize 2015
- The 20^{th} National Olympiad in Informatics in Provinces(NOIP) 1^{st} prize 2014

COMPUTER SKILLS

Python(TensorFlow, Keras,PyTorch)/C++/ MATLAB/R, Linux, Git, LaTeX