Zihao Wang

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EDUCATION

University of Chicago | Transferred from 2017 | *B.S., Computational and Applied Mathematics* **Chicago, IL**
- GPA: 3.93/4.00; Major GPA: 3.95/4.00 Sep 2017 - Sep 2019

Wuhan University | *Mathematics Base Class* **Wuhan, China**
- GPA: 3.92/4.00; Major GPA: 3.97/4.00; Class Rank: 1/50 Sep 2015 - June 2017

Selected Courses: • Real Analysis (98/100) • Complex Analysis (96/100) • Abstract Algebra (97/100) • Convex Optimization (A) • Nonparametric Inference (A) • Stochastic Simulation (A) • Fundamentals of Deep Learning (A) • Advanced Natural Language Processing (A)

RESEARCH EXPERIENCE

Nonnegative Matrix Factorization on Genomics Data | *Research Assistant* June 2018 – Present

Advisor: **Prof. Matthew Stephens**, Department of Statistics and Department of Human Genetics, University of Chicago
- Designed Empirical Bayes approach to Poisson Matrix Factorization, implemented in R package https://github.com/stephenslab/ebpmf . Manuscript is in preparation.
- Designed Empirical Bayes approach to Poisson Means problem, implemented in R package https://github.com/stephenslab/ebpm.
- Derived the relationship between Nonnegative Matrix Factorization, Poisson Factor Analysis and Latent Dirichlet Allocation.
- Implemented Expectation-Maximization algorithm, Gibbs sampling, Mean Field Variational Inference and Variational Auto-encoder (VAE) for Poisson Matrix Factorization and Negative Binomial Matrix Factorization, and performed systematic empirical comparisons using simulated data and large scale GTEx v7 and single cell RNA-seq data.

Modeling Seasonal Influenza Dynamics | *Research Assistant* Jan 2018- Present

Advisor: **Prof. Mercedes Pascual**, Department of Ecology and Evolution, University of Chicago.
- Investigated the heterogeneity of influenza transmission in 10 US regions using Partially Observed Markov Processes, and estimated parameters using Iterated Filtering methods.
- Showed heterogeneity in seasonality patterns among different regions.
- Presented results in Quantitative Biology Fellowship Conference of University of Chicago in August 2018.

Course Projects

Convex Optimization (repo: cvx_projects) Jan 2019 – March 2019
Instructor: **Prof. Mihai Anitescu**, Department of Statistics and Department, University of Chicago and Mathematics and Computer Science Division, Argonne National Laboratory
- Implemented Newton methods for unconstrained, and equality constrained problems, interior-point methods for inequality constrained problems, Alternating Direction Method of Multipler (ADMM) for Lasso linear regression in Matlab.

Advanced Natural Language Processing (repo: nlp_projects) March 2019 – June 2019
Instructor: **Prof. Kevin Gimpel,** Toyota Technological Institute at Chicago
- Designed and implemented Sentiment Analysis using Word-Embedding and Attention function in PyTorch.
- Implemented Hidden Markov Model for Structured Prediction through Viterbi algorithm, Greedy algorithm, Beam Search algorithm, and Gibbs Sampling.
- Built an unsupervised segmenter for English text with nonparametric Bayes using Gibbs Sampling.

SELECTED EXTRACURRICULAR EXPERIENCE

Product Hackathon, Shenzhen, China | Team Leader Dec 2018
- Led a team of 3 to build an innovative plan for smart backpack that learns to customize weight distribution from user data using Deep Learning and Reinforcement Learning within 24 hours.
- Led the presentation in the hackathon forum to the audience of 100+ (PowerPoint available on request).
- Won the third place of 2018 Hackathon Innovation Competition.

AIESEC in Wuhan University, Wuhan, China | Team Manager Mar 2016 - Mar 2017
- Built and managed the volunteer team from 6 countries for the Innovation Dream Plan project, an educational initiative to inspire independent and creative thinking of Chinese high school students.
- Programmed and led a class for 46 high school students.

PROGRAMMING SKILLS

Python, R , Matlab, C, Racket