Yixian Wang

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Education

University of Wisconsin-Madison, USA

Master student in Mathematics — Sep. 2019 – May 2020

Visiting student in Mathematics — Sep. 2018 – May 2019

Nankai University, China

B.S. in Statistics — Sep. 2015 – June 2019

Publications

- Chung, M. K., Xie, L., Huang S.-G., Wang Y., Yan J., Shen L. (2019) Rapid acceleration of the permutation test via transpositions. CNI'19: MICCAI Workshop on Connectomics in Neuroimaging, Lecture Notes in Computer Science, in press, Shenzhen, China, Oct. 13, 2019.

Conferences

- Rapid Acceleration of the Permutation Test via Transpositions. CNI'19: MICCAI Workshop on Connectomics in Neuroimaging, Shenzhen, China, Oct. 13, 2019. (Selected for Oral)
- Rapid Acceleration of the Permutation Test via Slow Random Walks in the Permutation Group. Annual Meeting of the Organization of Human Brain Mapping (OHBM), Rome, Italy, Jun. 10, 2019. (Poster)

Academic Experience

Research Assistant — June 24, 2021 –

Advisors: Edo Airoldi (Temple University),
Panos Toulis (University of Chicago)

Research Assistant — July 2020 –

Advisors: Guillaume Pouliot (University of Chicago),
Alexander Volfovsky (Duke University)

Improvements on Cross-Validation: the *p*-Method

Statisticians care about estimating the error rate of a prediction rule. Suppose a prediction rule (e.g. k-nearest neighbors) is constructed based on some observed data, what will the error rate be if this rule is used to predict future observations? The goal of the project is to investigate whether a newly invented method, known as *p*-method, could achieve a less biased and less variable estimate of prediction error rate. The method is applied to binary classification problems, and compared against other error estimators such as leave-one-out bootstrap, .632 and .632+.

- Design and implement the simulations in R, showing that the *p*-method has smaller mean-squared error compared to the other error estimators.
- Run a parallelized version of program on the University of Chicago high performance computing cluster to speed up the run time.
- Currently investigating on finding an empirical estimate of the optimal p value, i.e. the p that minimizes the mean-squared error.

Research Assistant — Sep. 2018 – Aug. 2019

Advisor: Moo Chung (University of Wisconsin-Madison)

Accelerating Permutations via Transpositions

Doing permutations on large-scale medical imaging datasets can cost a huge amount of time. In the past literature, usually only a tiny fraction of permutations were drawn, which potentially decreases the accuracy of further analysis. A new method is proposed to accelerate this procedure by each time randomly transposing two

elements and doing this iteratively. By repeating this, we can "mimic" the standard permutation process, and reaches a higher accuracy when computing certain statistics (e.g. t-statistics) within the same amount of time.

- Derived formulas and assisted with proof writing.
- Did simulations in MATLAB to test the efficiency of the proposed method.
- Processed the original neuroimaging dataset and built the pipeline for doing applications.

Teaching Assistant Sep. 2019 – May 2020

Department of Mathematics, University of Wisconsin-Madison

- Math 421: The Theory of Single Variable Calculus
- Math 522: Analysis II.

Skills

- Programming Languages: Python, R, MATLAB

Other Experience

National Mathematical Modeling Contest Second Prize 2017

Conference Volunteer
Annual Meeting of the New Champions 2016 (World Economic Forum) June 2016

- Less than 1% applicants were selected as conference volunteers. Stood out with excellent communication skills, high spirits of teamwork and commitment.
- Introduced some newly developed high-tech products to guests and collaborated closely with the committee staff. Did timely translation for some TV news reporters.

Volunteer
Young Volunteers Association at Nankai University Sep. 2016 – July 2017

- Visited local nursing homes. Hosted small parties with dinner and short performances for them.
- Communicated with children living in poor conditions in Thailand by letter. Encouraged them to continue their study.

Honors and Awards

- *Freshman Scholarship*, awarded by Nankai Univeristy Oct. 2015
- Outstanding Thesis Prize, awarded to top 3% graduation theses by Nankai University June 2019

Memberships

- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) Society
- Chinese Young Volunteers Association