

Hong Zhang

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EDUCATION

Worcester Polytechnic Institute (WPI)

PhD, Statistics

Dissertation: Goodness-of-Fit Tests for Signal Detection and Genetic Association Studies.

Worcester, MA

08/2013 – 04/2018

Johns Hopkins University

MS, Financial Mathematics

Baltimore, MD

08/2011 – 12/2012

Wuhan University

BA and BS, Mathematics and Finance

Wuhan, China

08/2007 – 06/2011

PROFESSIONAL EXPERIENCE

Merck & Co., Inc.

Senior Scientist

Rahway, NJ

05/2018 – present

- Developed powerful statistical tests for genetic association analyses in Pharmacogenetics studies;
- Performed large-scale simulation studies to compare powers of different association tests;
- Identified genetic biomarkers that potentially could influence drug responses.

PUBLICATIONS AND PREPRINTS

1. Hong Zhang, Jiashun Jin and Zheyang Wu. "Distributions and Statistical Power of Optimal Signal Detection Methods in Finite Samples". *IEEE Transactions on Signal Processing*, vol. 68 (2020), pp. 1021-1033, doi:10.1109/TSP.2020.2967179.
2. Hong Zhang, Tiejun Tong, John Landers and Zheyang Wu. "TFisher Tests: Optimal and Adaptive Thresholding for Combining p -Values." *Annals of Applied Statistics*, vol. 14, no. 1 (2020), 178–201. doi:10.1214/19-AOAS1302.
3. Hong Zhang, Ni Zhao, Devan Mehrotra and Judong Shen. "Composite Kernel Association Test (CKAT) for SNP-set Joint Analysis of Genotype and Genotype-by-treatment Interaction in Pharmacogenetics Studies". *Bioinformatics*, pii: btaa125 (2020). doi:10.1093/bioinformatics/btaa125.
4. Hong Zhang, and Roger Lui. "Releasing Wolbachia-infected *Aedes aegypti* to prevent the spread of dengue virus: a mathematical study." *Infectious Disease Modelling*, vol. 5 (2020), pp. 142-160. doi:10.1016/j.idm.2019.12.004.
5. Lan Luo, Judong Shen, Hong Zhang, Aparna Chhibber, Devan Mehrotra and Zheng-zheng Tang. "Multi-trait analysis of rare-variant association summary statistics using MTAR". *Nature Communications*, Accepted.
6. Hong Zhang, Judong Shen and Zheyang Wu. "An efficient and accurate approximation to the distribution of quadratic forms of Gaussian variables". *Submitted*. arXiv:2005.00905.
7. Hong Zhang and Zheyang Wu. "A Generalized Family of Fisher's Combination Tests and Their Null Distributions Under Correlation". *Submitted*. arXiv:2003.01286.

8. Hong Zhang and Zheyang Wu. "Generalized Goodness-Of-Fit Tests for Correlated Data". *Submitted*. arXiv:1806.03668.

REFeree SERVICES

1. *IEEE Internet of Things Journal*
2. *Computational Statistics and Data Analysis*
3. *PLOS Computational Biology*
4. *PLOS ONE*
5. *BMJ Open*

PRESENTATIONS

1. Advancing Pharmacogenomics Analysis of Drug Response in Early-Phase Clinical Trials. *JSM 2019, Denver, CO, July 2019*.
2. Novel Statistical Methods for Polygenic Prediction of Drug Responses in PGx Studies. *Princeton/Branchburg Seminar, Princeton, NJ, November 2018*.
3. A Novel Subgroup Identification Method: Exhaustive Search with Repeated Cross-validation. *ICSA Applied Statistics Symposium, New Brunswick, NJ, June, 2018*.
4. Novel P-value Combination Methods with Application to Genetic Association Studies. *WPI Bioinformatics & Computational Biology Seminar, Worcester, MA, March, 2018*.
5. Power of Optimal Detection Methods. *The 10th ICSA International Conference, Shanghai, China, December, 2016*.

POSTERS

1. CC-CKAT: A fast and powerful method for SNP set joint test of prognostic and predictive effects in pharmacogenomics studies. *American Society of Human Genetics 2019, Houston, TX, October 2019*.
2. Exhaustive Search for Patient Subgroup with Repeated Cross-validation., *Merck Data Science Symposium, Upper Gwynedd, PA, May 2019*.
3. Thresholding Fisher's P-Value Combination Method (TFisher) for Set-based Genetic Association Studies. *American Society of Human Genetics 2018 Conference, San Diego, CA, October 2018*.
4. CK-SKAT: Composite Kernel Machine Association Test for Biomarker Discovery in PGx Studies. *Institute for Mathematics and its Applications Workshop: Innovative Statistics and Machine Learning for Precision Medicine, Twin Cities, MN, September 2017*.

SOFTWARE

Authored R packages *SetTest*, *TFisher* and *CKAT*.

- *SetTest*: Group Testing Procedures for Signal Detection and Goodness-of-Fit.

<https://cran.r-project.org/package=SetTest>

- *TFisher*: Thresholding Fisher's P-value Combination Methods.

<https://cran.r-project.org/package=TFisher>

- *CKAT*: Composite Kernel Association Test for Pharmacogenetics Studies.

<https://cran.r-project.org/package=CKAT>

AWARDS AND HONORS

- PhD Research Achievement Prize, Math Department WPI, 2018.
- Institute for Mathematics and its Applications PI Travel Fund, WPI, 2017.
- Graduate Student Travel Fund, WPI, 2016.
- Teaching Assistant of the Year, Math Department WPI, 2015.