

YUSI FANG

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EDUCATION

Graduate School in Public Health, University of Pittsburgh

Pittsburgh, PA

Ph.D. Candidate in Biostatistics

Expected: Apr. 2023

Cumulative GPA: 4.0/4.0

Research Interest: High-dimensional Statistics, Meta-analysis, Statistical Genomics and Genetics, Machine Learning Methods

Relevant coursework: Longitudinal & Clustered Data Analysis, High-Dimensional Statistics, High-Dimensional Data with Omics Application, Advanced R Computing, Asymptotic Methods, Survival Analysis, Advanced Statistical Learning

School of Mathematical Sciences, Xiamen University

Xiamen, China

B.S. in Mathematics and Applied Mathematics

Aug. 2013 – May 2017

Major GPA: 3.94 / 4.00 (top 2/71 in the program)

EXPERIENCE

Research Assistant

Jul. 2017 – Present

Department of Biostatistics, School of Public health, University of Pittsburgh

Pittsburgh, PA

Advisors: George Tseng and Zhao Ren

- Develop statistical methodologies
- Collaborate with biologists and physicians to conduct data analysis
- Conduct daily maintenance and management of laboratory servers

Biostatistics Graduate Intern

Jun. 2021 – Aug. 2021

Biogen Inc.

Cambridge, MA

- Reviewed 2-in-1 flexible design and its variants
- Evaluated performance of 2-in-1 flexible design and its variants with comprehensive simulations
- Reported progress in weekly group meetings and gave a final presentation summarizing the intern project in the biostatistics department meeting

Undergraduate Research Assistant

Jul. 2016 – May 2017

School of Mathematical Sciences, Xiamen University

Xiamen, China

Advisor: Wei Liang

- Derived and performed a kernel-based semi-supervised Bayesian quantile regression to detect abnormal asynchrony of division between sister cells in cell lineage data

SELECTED RESEARCH PROJECTS

On p-value combination of independent and frequent signals

Aus. 2021 – Mar. 2022

Department of Biostatistics, University of Pittsburgh

- Evaluated asymptotic efficiencies of modified Fisher's methods using the criterion of exact slope
- Performed comprehensive simulations to evaluate the finite-sample performance of modified Fisher's methods
- Developed an ensemble method (FE) to aggregate modified Fisher's methods with fast computation and theoretical guarantee on asymptotic efficiency
- Extended the FE method for enhanced statistical power on detecting signals with concordant effect size directions
- Performed extensive simulations and a transcriptomics meta-analysis on the AGEMAP dataset to demonstrate the universally competitive performance of the proposed methods

Flexible 2-in-1 clinical trial design and its potential application to drug development Jun. 2021 – Aug. 2021
Biogen Inc.

- Reviewed flexible 2-in-1 design and its variants
- Verified the assumptions for flexible 2-in-1 design and its variants' type I error control procedures under a simulation setup that mimics the lupus drug development program
- Evaluated the numeric performance of the flexible 2-in-1 design and its variants under the alternatives mimicking the lupus drug development program

Heavy-tailed distribution for robust combination of dependent p-values Oct. 2019 – Sep. 2020
Department of Biostatistics, University of Pittsburgh

- Proposed a family of robust tests for combining dependent p-values by the transformations by regularly varying distributions
- Provided theoretical guarantee on the robustness of the test family for the type I error control
- Showed the family of tests are asymptotically optimal in terms of detection boundary for detecting weak and sparse signals
- Performed comprehensive simulations to verify our theoretical insights and provide a recommendation to the real practice
- Applied the methods to a neuroticism GWAS application to illustrate the theoretical findings and the advantages of our proposed methods

Outcome-guided disease subtyping using high-dimensional omics data Jun. 2019 – Jul. 2020
Department of Biostatistics, University of Pittsburgh

- Developed a unified latent generative model with feature selection to perform outcome-guided clustering using omics data
- Derived EM algorithm for implementation of the model
- Modified the model for survival outcomes by embedding an accelerated failure time model
- Performed simulations to evaluate the performance of the modified model for survival outcomes

Combining p-values for detecting heterogeneous, weak and sparse signals Jun. 2020– Present
Department of Biostatistics, University of Pittsburgh

- Developed a novel modified Fisher's method to aggregate p-values based on weakly geometric system
- Showed the proposed method's asymptotic optimality in terms of separating rate under a high-dimensional setup
- Performed comprehensive simulations to evaluate the statistical power under the high-dimensional setup
- Developed a fast-computing algorithm for the proposed method based on importance sampling and cross-entropy method

TEACHING EXPERIENCE

BIOST 2081 Mathematical Methods for Statistics Teaching Fellow 2021 Fall
Department of Biostatistics, University of Pittsburgh

BIOST 2094 Advanced R Computing Teaching Fellow 2021 Spring
Department of Biostatistics, University of Pittsburgh

BIOST 2094 Advanced R Computing Teaching Fellow 2020 Spring
Department of Biostatistics, University of Pittsburgh

- **Fang, Yusi** & Chang, Chung, & Tseng, George. (2022+). On p-value combination of independent and frequent signals: Asymptotic efficiency and Fisher ensemble. *submitted to Biometrics*. [[arxiv](#)]
- **Fang, Yusi** & Chang, Chung, & Park, Yongseok, & Tseng, George. (2022+). Heavy-tailed distribution for combining dependent p-values with asymptotic robustness (*in revision*), *Statistica Sinica*. [[arxiv](#)]
- Liu, Peng & **Fang, Yusi** & Ren, Zhao & Tang, Lu & Tseng, George. (2022+). Outcome-Guided Disease Subtyping for High-Dimensional Omics Data. *submitted to Biometrics*. [[arxiv](#)]
- Li, Yujia & **Fang, Yusi**, & Peng Liu, & Tseng, George. (2022+). Association study between gene expression and multiple phenotypes in omics applications of complex diseases. *submitted to Genes*. [[arxiv](#)]
- Orr, Brian & Mahdi, Haider & **Fang, Yusi** & Strange, Mary & Uygun, Ibrahim & Rana, Mainpal & Zhang, Lixin & Mora, Adria & Pusateri, Alexandra & Elishaev, Esther & Kang, Chaeryon & Tseng, George & Gooding, William & Edwards, Robert & Kalinski, Pawel & Vlad, Anda. (2022). Phase I Trial Combining Chemokine-Targeting with Loco-Regional Chemoimmunotherapy for Recurrent, Platinum-Sensitive Ovarian Cancer Shows Induction of CXCR3 Ligands and Markers of Type 1 Immunity. *Clinical Cancer Research*. clincanres.3659.2021. 10.1158/1078-0432.CCR-21-3659.
- Mora, Adria & Strange, Mary & **Fang, Yusi** & Uygun, Ibrahim & Zhang, Lixin & Tseng, George & Kalinski, Pawel & Edwards, Robert & & Vlad, Anda (2022+) Longitudinal modulation of loco-regional immunity in ovarian cancer patients receiving intraperitoneal chemotherapy. *submitted to Cancer Immunology, Immunotherapy*.
- Taylor, Sarah & **Fang, Yusi** & Wield, Alyssa & Bhargava, Rohit & Lang, Susan & Tseng, George & Soong, Rinda & Edwards, Robert & Oesterreich, Steffi & Coffman, Lan. (2022+). Endocrine biomarkers in low grade serous ovarian cancers and serous ovarian tumors of low malignant potential. *submitted to Gynecologic Oncology*.
- Carleton, Neil & Zou, Jian & **Fang, Yusi** & Kosciub, Stephen & Shah, Osama & Chen, Fangyuan & Beriwal, Sushil & Diego, Emilia & Brufsky, Adam & Oesterreich, Steffi & Shapiro, Steven & Ferris, Robert & Emens, Leisha & Tseng, George & Marroquin, Oscar & Lee, Adrian & McAuliffe, Priscilla. (2021). Outcomes After Sentinel Lymph Node Biopsy and Radiotherapy in Older Women With Early-Stage, Estrogen Receptor-Positive Breast Cancer. *JAMA network open*. 4. e216322. 10.1001/jamanetworkopen.2021.6322.
- Li, Zheqi & Wu, Yang & Bahreini, Seyed Amir & Priedigkeit, Nolan & Ding, Kai & Sartorius, Carol & Miller, Lori & Rosenzweig, Margaret & Wagle, Nikhil & Richer, Jennifer & Muller, William & Buluwela, Laki & Ali, Simak & **Fang, Yusi** & Zhu, Li & Tseng, George & Gertz, Jason & Atkinson, Jennifer & Lee, Adrian & Oesterreich, Steffi. (2021). ESR1 mutant breast cancers show elevated basal cytokeratins and immune activation. *to appear in Nature Communications*.
- Liu, Peng & Liu, Silvia & **Fang, Yusi** & Xue, Xiangning & Zou, Jian & Tseng, George & Konnikova, Liza. (2020). Recent Advances in Computer-Assisted Algorithms for Cell Subtype Identification of Cytometry Data. *Frontiers in Cell and Developmental Biology*. 8. 234. 10.3389/fcell.2020.00234.
- Lin, Chien-Wei & Chang, Lun-Ching & Ma, Tianzhou & Oh, Hyunjung & French, Beverly & Puralewski, Rachel & Mathews, Fasil & **Fang, Yusi** & Lewis, David & Kennedy, James & Mueller (Müller), Daniel J. & Marshe, Victoria & Jaffe, Andrew & Chen, Qiang & Ursini, Gianluca & Weinberger, Daniel & Newman, Anne & Lenze, Eric & Nikolova, Yuliya & Sibille, Etienne. (2020). Older molecular brain age in severe mental illness. *Molecular Psychiatry*. 1-11. 10.1038/s41380-020-0834-1.
- Grabosch, Shannon & Bulatovic, Mirna & Zeng, Feitianzhi & Ma, Tianzhou & Zhang, Lixin & Ross, Malcolm & Brozick, Joan & **Fang, Yusi** & Tseng, George & Kim, Eun & Gambotto, Andrea & Elishaev, Esther & Edwards, Robert & Vlad, Anda. (2019). Cisplatin-induced immune modulation in ovarian cancer mouse models with distinct inflammation profiles. *Oncogene*. 38. 10.1038/s41388-018-0581-9.
- Liang, Wei & Yuxiao Yang & **Yusi Fang** & Zhongying Zhao & Jie Hu. "Bayesian Detection of Abnormal Asynchrony of Division Between Sister Cells in Mutant *Caenorhabditis elegans* Embryos." *Journal of Computational Biology* 26, no. 5 (2019): 495-505.

- McAuliffe, Priscilla & Carleton, Neil & Zou, Jian & **Fang, Yusi** & Koscumb, Stephen & Shah, Osama & Chen, Fangyuan & Beriwal, Sushil & Diego, Emilia & Brufsky, Adam & Oesterreich, Steffi & Shapiro, Steve & Ferris, Robert & Emens, Leisha & Tseng, George & Marroquin, Oscar & Lee, Adrian. (2021). Abstract PS1-10: Outcomes after sentinel lymph node biopsy and radiation therapy in women over 70 years old with ER+, HER2-, clinically node negative breast cancer. PS1-10. 10.1158/1538-7445.SABCS20-PS1-10.
- Nasrazadani, Azadeh & Li, Yujia & **Fang, Yusi** & Shah, Osama & Atkinson, Jennifer & Lee, Joanna & McAuliffe, Priscilla & Lee, Adrian & Tseng, George & Lucas, Peter & Oesterreich, Steffi & Wolmark, Norman. (2021). Abstract PS7-15: Mixed invasive ductal lobular carcinomas (mDLC) are clinically more similar to invasive lobular carcinoma (ILC) than to invasive ductal carcinoma (IDC). PS7-15. 10.1158/1538-7445.SABCS20-PS7-15.
- Taylor, Sarah & Wield, Alyssa & **Fang, Yusi** & Bhargava, Rohit & Lang, Susan & Tseng, George & Coffman, Lan & Oesterreich, Steffi. (2020). Endocrine biomarkers in low-grade serous ovarian cancers (LGSC) and serous ovarian tumors of low malignant potential (LMP). Journal of Clinical Oncology. 38. e18045-e18045. 10.1200/JCO.2020.38.15_suppl.e18045.

PRESENTATIONS

- (Poster) “Heavy-tailed distribution for combining dependent p-values with asymptotic robustness.”, Pitt Biostatistics Student Research Day, Pittsburgh, PA, February 2020.
- (Virtual Talk) “On p-value combination of independent and frequent signals”, Pitt Biostatistics Student Research Day, Pittsburgh, PA, February 2022.
- (Talk) “Robust aggregation of p-values with unknown dependency structure for SNP-set test”, ENAR, Houston, TX, March 2022
- (Virtual Talk) “On p-value combination of independent and frequent signals: Asymptotic efficiency and Fisher ensemble”, NISS Graduate student research conference, Pittsburgh, PA, May 2022
- (Lightning Talk) “On p-value combination of independent and frequent signals”, SDSS, Pittsburgh, PA, June 2022
- (Poster) “On p-value combination of independent and frequent signals”, SDSS, Pittsburgh, PA, June 2022

TECHNICAL SKILLS

Languages: English and Chinese

Statistical Packages and Software: RShiny, Rcpp, STATA, SPSS, SAS

Programming Languages: R, Python, LaTeX