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# ZHIGUANG (CALEB) HUO

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## EDUCATION

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University of Pittsburgh,

Pittsburgh, PA, US

- Ph.D. in Biostatistics, *Expected:* Summer 2017
  - Dissertation: *Statistical integrative omics methods for disease subtype discovery and methods for single cell methylation*
  - GPA: 3.93/4.00
  - Advisors: George C. Tseng, ScD and Yong Seok Park, PhD
- M.S. in Physics, Apr 2012
  - GPA: 3.86/4.00

Harbin Institute of Technology,

Harbin, Heilongjiang, China

- B.S. in Physics, June 2011
  - GPA: 90.43/100

## RESEARCH INTEREST

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My research interest lies in both statistical methodology and application on genomics and bioinformatics. I am particularly interested in genomic data integration, modeling and variable selection in high-dimensional data, graphical model, Bayesian methods, optimization and statistical computing. I have collaborated with biologists in the fields of cancer and psychiatry to analysis a broad range of genomic data, which motivates me to develop practical methodology and user-friendly software.

## PUBLICATIONS

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### Methodology

1. **Zhiguang Huo**, Ying Ding, Silvia Liu, Steffi Oesterreich, and George Tseng. Meta-Analytic Framework for Sparse  $K$ -Means to Identify Disease Subtypes in Multiple Transcriptomic Studies. *Journal of the American Statistical Association*, 111, no. 513 (2016): 27-42.
2. **Zhiguang Huo**, Chi Song, George C. Tseng. (2016) Bayesian latent hierarchical model for transcriptomic meta-analysis to detect biomarkers with clustered meta-patterns of differential expression signals. Submitted to *Annals of Applied Statistics* (under second round of review).
3. **Zhiguang Huo**, George C. Tseng. (2016) Integrative Sparse  $K$ -means with overlapping group lasso in genomic applications for disease subtype discovery. Submitted to *Annals of Applied Statistics* (under second round of review).
4. Li Zhu, Ying Ding, Cho-Yi Chen, Lin Wang, **Zhiguang Huo**, SungHwan Kim, Christos Sotiriou, Steffi Oesterreich and George C. Tseng. (2016) MetaDCN: meta-analysis framework for differential coexpression network detection with an application in breast cancer. *Bioinformatics* (accepted).
5. SungHwan Kim, Dongwan Kang, **Zhiguang Huo**, Yongseok Park, George C. Tseng. (2016) Meta-analytic principal component analysis in integrative omics application. (Submitted).
6. Silvia Liu, Wei-Hsiang Tsai, Ying Ding, Rui Chen, Zhou Fang, **Zhiguang Huo**, SungHwan Kim, Tianzhou Ma, Ting-Yu Chang, Nolan Michael Priedigkeit, Adrian V. Lee, Jianhua Luo, Hsei-Wei Wang, I-Fang Chung, George C. Tseng. (2015). Comprehensive evaluation of fusion transcript detection algorithms and a meta-caller to combine top performing methods in paired-end RNA-seq data. *Nucleic Acids Research*, 10.1093/nar/gkv1234.

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7. Xingbin Wang, Dongwan Kang, Kui Shen, Chi Song, Shuya Lu, Lunching Chang, Serena G. Liao, **Zhiguang Huo**, Naftali Kaminski, Etienne Sibille, Yan Lin, Jia Li and George C. Tseng. (2012) A Suite of R Packages for Quality Control, Differentially Expressed Gene and Enriched Pathway Detection in Microarray Meta-analysis. *Bioinformatics*, 28:2534-2536.

## Application

8. Dominique Arion, **Zhiguang Huo**, John F. Enwright, John P. Corradi, George Tseng and David A. Lewis. (2016) Transcriptome alterations in prefrontal pyramidal neurons distinguish schizophrenia from bipolar and major depressive disorders. Submitted to *Biological Psychiatry*, (under second round of review).
9. Tiffany A. Katz, Serena G. Liao, Vincent J. Palmieri, Robert K. Dearth, Thushangi Pathiraja, **Zhiguang Huo**, Patricia Shaw, Sarah Small, Nancy E. Davidson, David G. Peters, George C. Tseng, Steffi Oesterreich, Adrian V. Lee. (2015) Targeted DNA Methylation Screen in the Mouse Mammary Genome Reveals a Parity-Induced Hypermethylation of IGF1R That Persists Long after Parturition. *Cancer Prevention Research* 8, no. 10 (2015): 1000-1009.
10. Yan P. Yu, Silvia Liu, **Zhiguang Huo**, Amantha Martin, Joel B. Nelson, George C. Tseng and Jian-Hua Luo. (2015) Genomic copy number variations in the genomes of leukocytes predict prostate cancer clinical outcomes. *PloS one*, 10(8):e0135982.

## Manuscript in Preparation

### • Methodology

11. **Zhiguang Huo**, Shaowu Tang, YongSeok Park and George Tseng. (2017) Biomarker categorization and fast computing of adaptively weighted Fisher's method for meta-analysis in omics applications.
12. Li Zhu, **Zhiguang Huo**, Tianzhou Ma, George Tseng. (2017) Bayesian indicator variable selection model with multi-layer overlapping groups.
13. Tianzhou Ma\*, **Zhiguang Huo\***, Anche Kuo\*, Xiangrui Zeng, Li Zhu, Ark Fang, Lin Wang, Chien-Wei Lin, Tanbin Rahman, Shuchang Liu, YongSeok Park, Sunghwan Kim, Jia Li, Lun-Ching Chang, Chi Song, George Tseng. (2017) MetaOmics - a Comprehensive Software Suite with Interactive Visualization for Transcriptomic Meta-Analysis. (\*: co-first author).

### • Application

14. Enwright, John, Dominique Arion, John Corradi, Aiqing He, **Zhiguang Huo**, George Tseng, and David Lewis. (2017) Transcriptome Profiling of Layer 3 Parvalbumin Neurons from the Dorsolateral Prefrontal Cortex of Schizophrenia Subjects. In preparation.
15. Logan, R.W., Ozburn, A.R., **Huo, Z.**, Zhu, X., Fitzgerald, E., Arey, R.N., Jarpe, M., Tseng, G. and McClung, C.A. (2017) Valproic acid targets HDAC2 to normalize mania-like behaviors in mice. In preparation.
16. Rachel Puralewski, **Zhiguang Huo**, George Tseng, Ryan Logan, Marianne Seney. (2017) Sex differences in basolateral amygdala transcriptome associated with effects of chronic stress. In preparation.
17. **Zhiguang Huo**, Rachel Puralewski, George Tseng, Ryan Logan, Marianne Seney. (2017) Circuit-wide transcriptional profiling reveals sex differences in coherence patterns across brain regions. In preparation.

## Book

18. George C. Tseng, **Zhiguang Huo** and Tianzhou Ma. (2017) Foundations for High-Throughput Omics Data Analysis: Methods, Theories and Applications. *Chapman & Hall/CRC*. (Under preparation).

## Book Chapter

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19. SungHwan Kim, **Zhiguang Huo**, YongSeok Park and George Tseng. (2015) MetaOmics: transcriptomic meta-analysis methods for biomarker detection, pathway analysis and other exploratory purposes. Book chapter in Integrating omics data: statistical and computational methods. Edited by George C. Tseng, Debashis Ghosh, Xianghong Jasmine Zhou. *Cambridge University Press*. Page 39-67.

## AWARD

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### Student Awards

- American Statistics Association (ASA) Pittsburgh chapter March 2016
  - Student of the year
- Department of Physics, Harbin Institute of Technology May 2009
  - National Scholarship of P.R. China.(Awarded to the top 2 students in my Bachelors degree.)

### Travel Awards

- SAMSI Research Triangle Park, NC.
  - Optimization Summer School Aug 2016
  - Epigenetics Workshop Mar 2015
  - Beyond Bioinformatics Workshop June 2014

## TEACHING EXPERIENCE (UNIVERSITY OF PITTSBURGH)

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### Main Lecturer (teaching fellow)

- BIOST2094 - Advanced R Computing – (with Tianzhou Ma) Spring 2017
- BIOST2025 - Special Studies in Bayesian Data Analysis Fall 2016
  - (with George Tseng, Tianzhou Ma and Li Zhu)

### Guest Lecturer

- BIOST2055 - Introductory high-throughput genomic data analysis I: data mining and applications Mar 2016
  - Differential and isoform analysis of RNA-seq data
- BIOST2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Dec 2015
  - Reproducible research and parallel computing in R
- BIOST2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Dec 2014
  - Reproducible research

### Teaching Assistant

- BIOST 2078 - Introductory high-throughput genomic data analysis II: theories and algorithms Fall 2014
- PHYS 0212 - Introduction to Laboratory Physics Spring 2012
- PHYS 0212 - Introduction to Laboratory Physics Fall 2011

## PRESENTATIONS

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### Poster and Oral Presentation

- Poster, SAMSI optimization summer school, Research Triangle Park, NC Aug 2016
  - Integrative Sparse  $K$ -means for disease subtype discovery using multi-level omics data.
- Poster, Pittsburgh ASA banquet, Pittsburgh, PA Mar 2016

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- Integrative Sparse  $K$ -means for disease subtype discovery using multi-level omics data.
  - Oral Presentation, JSM, Seattle, WA Aug 2015
    - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
  - Poster, Pittsburgh ASA banquet, Pittsburgh, PA Apr 2015
    - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
  - Oral Presentation, ENAR Conference, Miami, FL Mar 2015
    - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
  - Poster, Dean's Day's competition, GSPH, University of Pittsburgh Mar 2015
    - Discover and Characterize Invasive Lobular Breast Carcinoma Subtypes.
  - Oral Presentation, ENAR Conference, Baltimore, MA Mar 2014
    - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.
  - Poster, Dean's Day's competition, GSPH, University of Pittsburgh Mar 2014
    - Meta-analytic framework for sparse  $K$ -means to identify disease subtypes in multiple transcriptomic studies.

### Seminar Talk

- Department of Biostatistics, University of Pittsburgh Nov 2015
  - How to use Latex to make slides

## HOBBIES

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Running, skiing, other endurance activities.

### Running Record

- Bank of America Chicago Marathon, Chicago, IL. 10/09/2016
- First National Bank Pittsburgh Triathlon (Sprint), Pittsburgh, PA 08/14/2016
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA. 05/01/2016
- First National Bank Pittsburgh Triathlon (Olympic standard), Pittsburgh, PA 08/09/2015
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/03/2015
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/04/2014
- Dick's Sporting Goods Pittsburgh Marathon, Pittsburgh, PA 05/05/2013