

Guolian Kang

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Education

- **Ph.D. in System Modeling and Control with specialization in Statistical Genetics**
Institute of Systems Science, Chinese Academy of Sciences, China July 2006
Dissertation: Association Studies on Complex Diseases by Case-Control Designs
Advisor: Ji-Feng Zhang, Ph.D.
- **M.S. in Applied Mathematics**
Qufu Normal University, China July 2003
Thesis: Oscillation and asymptotic analyses for second-order nonlinear difference equations
- **B.S. in Mathematics**, Qufu Normal University, China July 2000

Continuing Education

- The 2009 international workshop on statistical genetics and methodology of twin and family studies: the advanced course, University of Colorado at Boulder, Boulder 03/2009
- FBAT/PBAT short course, Harvard University, Boston 06/2008
- Haplotype analysis of population & pedigree data in association studies, 05/2008
The University of Alabama at Birmingham, Birmingham
- Advanced gene mapping/linkage course, the Rockefeller University, New York 12/2007

Research Interests

- **Statistical Genetics**—statistical methods for studying susceptibility genes for complex traits, specific topics include: association analysis, haplotype-based analysis, outlier detection, EM algorithm, multiple testing/false discovery rate, Bayes hierarchical modeling, SNP synergistic block
- **Statistical Genomics**—design and analyze issues in genome-wide association studies (GWAS) for complex human diseases: multi-stage analysis strategies for GWAS, gene- or region-based association tests, gene-gene interactions, controlling false positive rates, combining information from linkage and association, population stratification/substructure, haplotype-based analyses
- **Modeling for Complex Data**—longitudinal data analysis, microarray data analysis, mixture model, machine learning and its application to biology and medicine
- **Application of Statistical Physics to Genetics/traditional Chinese medicine**—mainly apply the main idea of statistical physics to genetics and traditional Chinese medicine from a systems point of view

Research Experiences

- **Post-doctoral scholar**, University of Alabama at Birmingham, USA 07/2007 -
 1. Detecting complex epistasis among genes, multiple testing problems, gene- or region-based association tests, combining information from linkage and association and other important problems in GWAS for complex human diseases
 2. Structured association testing in genome-wide association studies of admixed populations, population stratification
 3. Haplotyping and quantitative trait locus mapping in pedigree, genetic linkage
 4. Analyses of **four** genome-wide real datasets including rheumatoid arthritis from Genetic Workshop Analysis 16 and coronary artery disease, hypertension and rheumatoid arthritis from the Wellcome Trust Case-Control Consortium
- **Visiting assistant professor**, Michigan State University, USA 03/2006 - 06/2007
 1. Mathematical and statistical modeling and analysis for complex data
 2. Multi-stage analysis strategies and gene- or region-based designs for GWAS for complex human diseases
- **Research assistant**, Chinese Academy of Sciences, China 09/2003 - 02/2006
 1. Association studies of neurodevelopment-related candidate genes for a role in schizophrenia (Co-Investigator, National Natural Sciences Foundation of China)
 2. Mathematical studies on causative genes mapping with interaction effects on complex diseases, especially association studies, haplotype-based studies, single nucleotide polymorphisms (SNPs) data analysis, SNP synergistic block studies
 3. Mathematical studies on disease, medicine and symptoms in traditional Chinese medicine using entropy theory

Grants

- 2008 Career Awards at the Scientific Interface, Burroughs Wellcome Fund (not funded) Total Amount: \$500,000. Role: Sole PI. Period: 5 years.
System-centric genome-wide association studies
- 2005-2007 National Natural Sciences Foundation of China No. 30400149 Total Amount: ¥260,000. Role: Co-PI. Period: 3 years.
Association studies of neurodevelopment-related candidate genes for a role in Schizophrenia

Awards

- 2009 The Science Unbound Foundation Best Paper Award in Statistical Genetics Research, USA
- 2008 Travel fellowship from International Genetic Epidemiology Society, USA
- 2008 Spring 2008 Career Enhancement Award, The University of Alabama at Birmingham, USA
- 2003-2006 Research Assistant Fellowship, Chinese Academy of Science, China
- 1998-1999 Outstanding Undergraduate Scholarship, Qufu Normal University, China

Skills

- **Languages:** Matlab, SAS, R/Splus
- **Operating Systems:** Windows, Unix/Linux
- **Typesetting Systems:** Latex, Microsoft Word, Excel, Power Point, Dreamweaver
- **Genetic Software:** MS, fastPHASE, PLINK, ANCESTRYMAP, EIGENSTRAT, HAP-SAMPLE, MERLIN, FBAT/PBAT, Haploview

Conferences and Workshops

- Aug. 2009 Joint Statistical Meetings, Washington DC, USA
- Sep. 2008 International Genetic and Epidemiology Society, 17th Annual Meeting, St. Louis, Missouri, USA
- Sep. 2008 Genetic Analysis Workshop 16, St. Louis, Missouri, USA
- May 2007 Computational Genomics Workshop, Michigan State University, Michigan, USA
- Sep. 2006 Impact of Statistical Science in the 21st Century, Michigan State University, Michigan, USA
- Jul. 2005 The 24th Chinese Control Conference, Guangzhou, China
- Dec. 2004 New Strategies for Complex Diseases, Chinese National Human Genome Center, Beijing, China
- Dec. 2004 2004 Annual Report of the Center of Bioinformatics, Institute of Systems Science, Beijing, China
- Oct. 2004 The 2nd Institute on Statistical Genetics, Beijing, China

Oral Presentations

- *Robust genome-wide scans with genetic model selection in two-phase analysis using case-control design*, Journal Club of Section on Statistical Genetics, University of Alabama at Birmingham 09/03/2009
- *A generalized sequential Bonferroni procedure for genome-wide association studies incorporating information of Hardy-Weinberg disequilibrium among cases*, 2009 Joint Statistical Meetings, Washington DC 08/05/2009
- *A generalized sequential Bonferroni procedure for genome-wide association studies*, 2009 SOPH Research Day, University of Alabama at Birmingham 04/09/2009
- *A generalized sequential Bonferroni procedure for genome-wide association studies incorporating information of Hardy-Weinberg disequilibrium*, 2009 Postdoctoral Research Day, University of Alabama at Birmingham 02/05/2009
- *Genome-wide Weighted Hypothesis Testing in Family-Based Association Studies, with an Application to a 100K Scan*, Journal Club of Section on Statistical Genetics, University of Alabama at Birmingham 06/05/2008
- *A Sequentially Weighted Multiple Testing Procedure and Its Application to Genome-wide Association Studies*, 2008 Postdoctoral Research Day, University of Alabama at Birmingham 02/05/2008

- *Mixed analysis for genomewide association studies*, Department of Biostatistics, University of Alabama at Birmingham 05/08/2007
- *Two-stage designs for genome-wide association studies*, Department of Epidemiology, Michigan State University 03/27/2007
- *Evolution analysis of life systems via entropy theory*, The 24th Chinese Control Conference, Guangzhou, China 07/15/2005

Professional Activities

- **Memberships:**
 American Statistical Association, 2008-
 American Society of Human Genetics, 2008-
 International Genetic Epidemiology Society, 2008-
- **Invited reviewer (/times)**
 BMC Genomics (/1), Atherosclerosis (/3), Behavior Genetics (/1), Computational Statistics and Data Analysis (/1), NeuroQuantology (/1), Journal of Genetics and Genomics (/1), Journal of Public Health and Epidemiology (/1)
- **Invited section chair:**
 The 2009 Joint statistical meetings, Washington DC (Chair) Aug. 2009
 The 24th Chinese Control Conference, Guangzhou, China (Co-chair) Jul. 2005
- **Judge:** UAB Graduate Student Research Days 2008
- **Teaching experience:** Tutor for Calvin Elam 2008

Bibliographic Listings

- Selected Biography, Marquis Who's Who in America, 2008
- Selected Biography, Marquis Who's Who in America, 2009

Selected Posters

1. **Guolian Kang**, Guimin Gao (2009). A Bonferroni procedure using weights accounting for Hardy-Weinberg disequilibrium information in genome-wide association studies. The 18th Annual Meeting of The American Society of Human Genetics. (Honolulu, Hawaii)
2. **Guolian Kang**, Bo Jiang (2009). Analysis of two gene-centric approaches for genome-wide association studies. The 18th Annual International Genetic Epidemiology Society Conference. (Kahuku, Hawaii)
3. **Guolian Kang** (2008). An efficient multilocus Monte Carlo approach for gene-centric genome-wide association studies. The 17th Annual International Genetic Epidemiology Society Conference. (St. Louis, Missouri)
4. Guimin Gao, **Guolian Kang** (2008). A generalized sequential Šidák procedure for multiple hypothesis testing. The 17th Annual International Genetic Epidemiology Society Conference. (St. Louis, Missouri)
5. Yuehua Cui, **Guolian Kang**, et al. (2007). An entropy approach for gene-centric genomewide association study. Cambridge Healthtech Institute 7th annual Conference for New Applications for Microarray Data Analysis: Integrating Genetics with Omics. (Washington DC)

Peer-Reviewed Publications

1. **Guolian Kang**, Douglas K. Childers, Nianjun Liu, Kui Zhang, Guimin Gao. (2009) Genome-wide association studies of Rheumatoid Arthritis data via multiple hypothesis testing methods for correlated tests. *BMC Proceedings* (In press)
2. Douglas K. Childers, **Guolian Kang**, Nianjun Liu, Guimin Gao, Kui Zhang. (2009) Application of imputation methods for the analysis data from genome-wide association studies. *BMC Proceedings* (In press)
3. Lisa J. Martin, Guimin Gao, **Guolian Kang**, Yixin Fang, Jessica G. Woo. (2009) Improving the signal-to-noise ratio in genomewide association studies. *Genetic Epidemiol* (In press)
4. **Guolian Kang**, Keying Ye, David B. Allison, Nianjun Liu, and Guimin Gao. (2009) Weighted multiple hypothesis testing procedures. *Statistical Applications in Genetics and Molecular Biology*. 8(1), Article 23.**
*Most Popular Papers (4/16/2009-8/21/2009) in the journal based on the average number of full text downloads per day since the paper was posted
<http://www.bepress.com/sagmb/topdownloads.html>
*The 10 Most Popular Articles in Collection of Biostatistics Research Archive (COBRA) on May 27, 2009
5. **Guolian Kang**, Weihua Yue, Jifeng Zhang, Yuehua Cui, Yijun Zuo and Dai Zhang. (2008). An entropy-based approach for testing genetic epistasis underlying complex diseases. *Journal of Theoretical Biology* 250: 362-374.*
* Awarded 2009 best paper by UAB-based investigator in the area of statistical genetics from Science Unbound Foundation <http://www.scienceunboundfoundation.org/2009.html>
6. Yuehua Cui, **Guolian Kang**, Kelian Sun, Minping Qian, Roberto Romero and Wenjiang Fu. (2008). Gene-centric genome-wide association study via entropy. *Genetics* 179: 637-650.
7. **Guolian Kang**, Weihua Yue, Jifeng Zhang, Huebner Marianne, Handi Zhang, Yan Ruan, Tianlan Lu, Yansu Ling, Yijun Zuo, Dai Zhang. (2008). Two-stage designs to identify the effects of SNP combinations on complex diseases. *Journal of Human Genetics* 53: 739-746.
8. **Guolian Kang**, Shao Li, Jifeng Zhang. (2008). Entropy-based models for interpreting life systems in traditional Chinese medicine. *Evidence-based Complementary and Alternative Medicine* 5(3): 273-279. *
* Reported by NewsRX.com <http://www.newsrx.com/article.php?articleID=1304851>
9. **Guolian Kang**, Yijun Zuo. (2007). Entropy-based joint analysis for two-stage genome-wide association studies. *Journal of Human Genetics* 52: 747-756.
10. Weihua Yue, **Guolian Kang**, Yanbo Zhang, Mei Qu, Fulei Tang, Yonghua Han, Yan Ruan, Tianlan Lu, Jifeng Zhang and Dai Zhang. (2007). Association of DAOA polymorphisms with schizophrenia and clinical symptoms or therapeutic effects. *Neurosci Lett* 416: 96-100.
11. Weihua Yue, Zhonghua Liu, **Guolian Kang**, Jun Yan, Fulei Tang, Yan Ruan, Jifeng Zhang, Dai Zhang. (2006). Association of G72/G30 polymorphisms with early-onset and male schizophrenia. *NeuroReport* 17(18): 1899-1902.
12. **Guolian Kang**, Fanwei Meng. (2006). Oscillation criteria for second-order quasi-linear neutral difference equations. *Journal of Engineering Mathematics* 23(1): 923-926.

13. **Guolian Kang.** (2006). Oscillation criteria for second-order half-linear neutral difference equations. *Journal of Mathematical Research and Exposition* 26(2): 247-252.
14. **Guolian Kang.** (2005). Oscillation criteria for second-order nonlinear difference equation with “summation small” coefficient. *Bull. Korean Math. Society* 42(2): 245-256.
15. **Guolian Kang, Shao Li, Jifeng Zhang.** (2005). Evolution analysis of life systems via entropy theory. *Proc. of the 24th Chinese Control Conference* 1567-1572.
16. **Guolian Kang, Hui Zhang.** (2004). Oscillation criteria of solutions of nonlinear difference equations of second order. *Annals of Differential Equations* 20(1): 41-48.
17. **Guolian Kang.** (2004). Oscillation theorems of solutions of nonlinear difference equations of second order. *Journal Of Binzhou Teachers College* 18(4): 6-10.
18. **Guolian Kang.** (2004). Some generalizations and applications on some integral inequalities. *Journal of Engineering Mathematics* 21(5): 715-721. (In Chinese)

Papers in Submission

1. Yijun Zuo, **Guolian Kang.** (2009). A mixed two-stage analysis for detecting interacting genes in genomewide association studies. (Provisionally accepted with a minor revisions)
2. **Guolian Kang, Bo Jiang, Guimin Gao** (2009) A generalized sequential Bonferroni procedure incorporating information of Hardy-Weinberg disequilibrium among cases for genome-wide association studies. (submitted to 2009 JSM Proceedings)

Papers in Preparation

1. **Guolian Kang, Bo Jiang, Nianjun Liu, David B Allison, Guimin Gao.** (2009) A generalized sequential Bonferroni procedure incorporating information of Hardy-Weinberg disequilibrium among cases for genome-wide association studies. (To be submitted)
2. **Guolian Kang, Guimin Gao, Sanjay Shete, David T. Redden, Nicholas Patterson, Nicholas M. Pajewski, David B. Allison.** (2009) A powerful two-stage self-replication procedure for structured association testing in genome-wide association studies of admixed populations. (In preparation)
3. **Guolian Kang, Bo Jiang** (2009) A truncated tail strength method for gene-centric genomewide association studies. (In preparation)
4. **Guolian Kang, Bo Jiang** (2009) Analysis of two gene-centric approaches for genome-wide association studies. (In preparation)
5. Bo Jiang, **Guolian Kang** (2009) A weighted method for assessing the overall univariate significance in a dataset. (In preparation)

References

Available upon request.