James Patrick Bailey

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Research Interests

Game theory (and applications to economics)
Integer Programming and Combinatorial Optimization
Graph Theory (specifically coloring)

Education

Georgia Institute of Technology, Atlanta, GA

Ph.D. Algorithms Combinatorics and Optimization, August 2012 - May 2017
Dissertation Topic: Manipulation in Mechanism Design and the Price of Deception
Advisor: Dr. Craig A. Tovey
Home Department: Industrial and Systems Engineering
Minor: Machine Learning
Supported by NSF Grant 1335301.

Kansas State University, Manhattan, KS

M.S., Industrial Engineering, August 2011 - May 2012
Thesis Title: *Octanary Branching Algorithm*
Advisor: Dr. Todd Easton
Area of Study: Operations Research

B.S., Mathematics, August 2008 - May 2012
B.S., Industrial and Manufacturing Systems Engineering, August 2008 - May 2012
I-Center Scholar for research on the use of integer programs for the fast recovery of fourier compressible functions for compressed sensing.
McNair Scholar.

Funding

NSF Grant 1335301 – The Price of Deception

Amount Awarded: $276,880.00 July 1, 2013 - June 30, 2017
Provided preliminary research and assisted Craig A. Tovey in writing grant to support my research as a Ph.D. student.

Journal Publications

[1] J. P. Bailey, A. Nash, S. Koenig and C. A. Tovey. Path Length Analysis for Grid-Based Path Planning. *Journal of Artificial Intelligence Research*. Accepted With Revisions.

[2] J. P. Bailey, and C. A. Tovey. Strategic Stable Marriages. *Journal of Economic Theory*. Under Review. Submitted September 13, 2016.

[3] J. P. Bailey, C. A. Tovey, T. Uras, S. Koenig, and A. Nash. Path Planning on Grids: The Effect of Vertex Placement on Path Length. *In Proceedings of the Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE)*. 2015.

[4] J. P. Bailey, M. A. Iwen, and C. V. Spencer. On the Design of Deterministic Matrices for Fast Recovery of Fourier Compressible Functions. *SIAM Journal on Matrix Analysis and Applications*, Vol. 33, No. 1, pages 263-289. 2012.

Working Papers

[5] J. P. Bailey. The Yolk is Almost Always A Unique, A Rejoinder to "On The Uniqueness of the Yolk".

[6] J. P. Bailey, and C. A. Tovey. The Price of Deception in Voting.

Conference Proceedings

[7] J. P. Bailey, and C. A. Tovey. Strategic Stable Marriage. *The 3rd annual Young Researchers Workshop on Data-Driven Decision Mechanisms.* Cornell University. October 14-16, 2016.

[8] J. P. Bailey, and C. A. Tovey. The Price of Deception in Elections. *The 13th Meeting of the Society for Social Choice and Welfare.* Lund, Sweden. June 28-July 1, 2016.

[9] J. P. Bailey, C. A. Tovey, T. Uras, S. Koenig, and A. Nash. Path Planning on Grids: The Effect of Vertex Placement on Path Length. *The Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE).* Santa Cruz, CA. October 8-12, 2015.

[10] J. P. Bailey An Intermediate Perfect Graph Theorem. *2011 Annual Ronald E. McNair Heartland Research Conference.* Kansas City, MO. September 23-25, 2011.

Experience in Education

Instructor of Record

Industrial and Systems Engineering, Georgia Institute of Technology

- ISyE 3833 Engineering Optimization — Fall 2015, Spring 2016
  - Worked with Georgia Tech faculty to develop smaller and more consistent courses for engineering optimization.
  - Taught two courses per semester for 25-30 students focusing on linear and integer programming. Specific emphasis included modeling of linear and integer programs, primal algorithms for simplex, sensitivity analysis and the branch and bound algorithm.
  - Used hands on approaches to engage students in the learning process including in class discussions, games, and competitions.
  - Designed homeworks to help students learn the Xpress optimization solver to solve and interpret the solutions for linear and integer programs.
- ISyE 2028 Basic Statistical Methods — Summer 2015
  - Developed a lesson plan and taught a course for 69 students focusing on the approximation of population statistics, hypothesis testing, confidence intervals and simple and multivariate linear regression.
  - Wrote textbook consistent with lectures that also incorporated the usage of R statistical software for statistical analysis.
  - Arranged individualized projects for students to apply new-found knowledge to a topic relating to their interests and emphasize the importance of communicating results from hypothesis testing, confidence intervals and linear regression.
- ISyE 3133 Engineering Optimization — Summer 2013
  - Developed a lesson plan and taught a course for 73 students focusing on linear, integer and dynamic programming with a minor emphasis on graph based algorithms and the stable marriage problem. Specific emphasis included modeling of linear and integer programs, primal/dual algorithms for simplex, sensitivity analysis and the branch and bound algorithm.
  - Wrote textbook for course that was distributed by tutors in the Georgia Tech tutoring center for several years after the course.
  - Designed homework to help students learn the GAMS mathematical programming language to solve and interpret the solutions for linear and integer programs.

Teaching Assistant

Industrial and Systems Engineering, Georgia Institute of Technology

- ISyE 6669: Deterministic Optimization — Fall 2013
  - Held office hours for 30+ master's students. Reviewed and graded assignments focused on linear and integer programming.
- ISyE 3133: Engineering Optimization — Fall 2012, Spring 2013
  - Organized recitation once a week and office hours for a class of 73 and 80 students respectively. Reviewed and graded assignments pertaining to the linear and integer optimization, dynamic programming and graph based algorithms.

Industrial and Manufacturing Systems Engineering, Kansas State University

- IMSE 822: Network Flows and Graph Theory — Spring 2012
  - Served as the primary contact for students enrolled in the course. Reviewed and graded assignments pertaining to the theoretical sides of network flows and graph theory.
- IMSE 643: Simulation — Fall 2011
  - Held office hours and taught students to develop computer programs to model complex stochastic systems using ARENA and use those models to improve the system.

Math Grader — May 2009 - December 2011

Graded students in Discrete Math, Real Number Systems, Algebraic Systems, Number Theory, and Foundations of Analysis for the Department of Mathematics at Kansas State University.

Tutor — January 2008 - May 2012

Worked privately and for a variety of programs at Kansas State University tutoring students in advanced mathematics, statistics, physics, and programming courses.

Peer Assistant — January 2008 - May 2011

Mentored and tutored "at-risk" students through the Kansas State Pilots Program. 58% of the students are first-generation and 51% of the students are multicultural.

Community Service

Tutored elementary school students with Georgia Tech CCF at local shelter.
Mentored high school students at local shelter.

Personal Hobbies

Proficient at trombone, baritone, tuba and trumpet.
Hosting and cooking (and eating) meals.
Developing optimized methods for "grinding" video games.