Preface

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Published online: 4 June 2011

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Professor Paul Y. Tseng
1959–2009

Paul Tseng, Professor of Mathematics at the University of Washington, Seattle, has been missing since August 13, 2009 while kayaking in the Yangtze river near Lijiang, in Yunnan province of China. He did not show up for an invited talk on August 17 at an International Conference on Numeric Optimization and Numeric Linear Algebra

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in Lijiang, hosted by the Chinese Academy of Sciences. It is believed that Paul was a victim of an unfortunate accident.

Paul grew up in Taiwan and Canada, and worked primarily in the United States. His family came from mainland China to Taiwan, where he was born in 1959 in Hsin-Chu. Later his family moved to Taipei, where Paul went to elementary school. Paul and his family moved to Vancouver, Canada in 1970, where Paul graduated from high school in 1977.

Paul received his B.Sc. from Queen's University (Kingston, Ontario) in Mathematics in 1981, and his Ph.D. from the Operations Research Center of the Massachusetts Institute of Technology (Cambridge, MA) in 1986. After working for 1 year at the University of British Columbia, he spent 3 years at the Massachusetts Institute of Technology as a postdoc in the group of Dimitri Bertsekas and John Tsitsiklis, working on optimization and distributed computation. Paul moved in 1990 to the University of Washington's Department of Mathematics, where he worked alongside Terry Rockafellar and Victor Klee.

Paul's research has been mainly in continuous optimization, with side interests in discrete optimization, distributed computation, and network and graph algorithms. He is widely recognized by his peers as one of the foremost optimization researchers of his generation, at a time of great progress in his field. He has published extensively (over 120 journal papers), and many of his publications can be found at his web site. Paul's research subjects include among others: efficient algorithms for structured convex programs and network flow problems, complexity analysis of interior point methods for linear programming, parallel and distributed computing, error bounds and convergence analysis of iterative algorithms for optimization problems and variational inequalities, interior point methods and semidefinite relaxations for hard quadratic and matrix optimization problems, and applications of large scale optimization techniques in signal processing and machine learning.

Paul's Ph.D. thesis was on network optimization methods and related monotropic programming problems. He coauthored with his advisor Dimitri Bertsekas, a series of papers on relaxation methods and monotropic programming, as well as a publicly available network optimization program, called RELAX, which is widely used in industry and academia for research purposes. Among his other research accomplishments, Paul, together with Tom Luo, resolved a long-standing open question on the convergence of matrix splitting algorithms for linear complementarity problems and affine variational inequalities, and was the first to establish the convergence of the affine scaling algorithm for linear programming in the presence of degeneracy. Furthermore, in a series of papers with Tom Luo, he developed a theory of error bounds and used it creatively to yield a strong convergence rate analysis for a broad class of iterative algorithms including the proximal splitting methods and the successive projection methods to convex sets, both of which find contemporary applications in compressive sensing and image processing. He was widely admired for his creative work and his productivity, and was well-liked for his cheerful and friendly manner. He has had close collaborations with several colleagues, and he served the community as a conscientious and hard-working editor in several top optimization journals for many years.

A special workshop called “Large-scale optimization: Analysis, algorithms and applications” took place in Paul’s honor on May 21, 2010, at Fudan University, in Shanghai, China, where several of his collaborators participated and presented research related to topics where Paul’s work has had a major impact. See <http://www.se.cuhk.edu.hk/Workshop2010/home.html> where you can also view and upload photos of Paul.

We were privileged to be close friends and collaborators of Paul, and together with his many other friends, have joined in several ways to honor his memory, including this special issue of Mathematical Programming which is dedicated to him. It includes a total of nine papers on topics to which Paul had made significant contributions. Many of these papers are authored by Paul’s collaborators, former students and close colleagues. We are especially pleased to be able to include a paper that originated from some unfinished work by Paul. The first paper of this special issue is by Paul’s Ph.D advisor, Professor Dimitri Bertsekas. It is about the extension of the incremental gradient algorithm to the proximal point minimization setup which is well suited for large scale optimization involving nonsmooth component functions. The second paper by Razaviyayn et al. is about the application of game theoretic tools to cognitive radio communication systems. This work was started when Paul paid a visit to Tom Luo’s research group at the University of Minnesota, just prior to his fateful kayak trip. The third paper by Nedic is about the randomized projection algorithm for convex optimization where she extends the analysis of random incremental subgradient method to projection type algorithms. The paper by Lobel et al. is on distributed optimization where a network of agents collaborate to minimize an objective function while passing messages over noisy communication links. The paper by Ge et al. gives a simple NP-hardness proof for the L_p -norm regularized minimization problem for $p \in (0, 1)$. This problem is motivated by applications from compressive sensing. The paper by Zheng et al. deals with semidefinite relaxation of nonconvex quadratically constrained quadratic programming. The next paper in the special issue is co-authored by Paul’s former student, S. Yun, and deals with efficient first order methods for solving separable convex minimization problems such as those from compressive sensing applications. The last two papers in this special issue deal respectively with approximation algorithms for nonconvex polynomial optimization and a complexity issue related to linear complementarity problems, both favorite research topics of Paul. Collectively, these nine papers represent a good sampling of areas in which Paul’s research had made a significant impact.

We close with a few notes about Paul’s nonprofessional interests. He liked sports and he was well-known for his expert tennis game, and for his adventurous and unconventional travels, often using bicycle and kayak. In the years 1986–2008, he took long bicycle trips through Europe, Central America, and Kenya, and kayaking trips in the Danube, the Mekong, the Baltic Sea, the Nile, the Red Sea, Vancouver Island, the Yellow River in China, and the Rio Madre de Dios (a headwater tributary of the Amazon River in Peru). He kayaked for long distances (as examples, from Laos to the Mekong delta in Vietnam, and from Prague to the Danube delta in Romania), often mixing with local people on the way and sharing their lifestyles. His ambition was to kayak in all the major rivers of the world. He brought back many pictures and stories, which can be found at his website <http://www.math.washington.edu/~tseng/personal.html>.

Paul also had a variety of artistic interests. He played the piano, and he liked drawing, painting, pottery making and woodcarving. He spent a few summers drawing portraits in Stanley Park in Vancouver, and he had a summer job making wood carvings of West Coast animals. He was a minimalist in life, with a deeply held commitment to environmentalism and humanitarian issues (he had frequently “walked for hunger”), and he tended his garden and beautiful roses with great care.

Paul was a gentle person, whose life enriched the lives of many, through his great research accomplishments, his dedication to noble causes, and his personal warmth. He made many friends who remember him fondly and miss him a great deal.