**Sou-Cheng (Terrya) Choi**

**Professional Preparation**

**Institution Location Major Degree Year**

National University of Singapore Singapore Computational Science, Mathematics B.S. (Hons) 1997

National University of Singapore Singapore Statistics and Applied Probability M.S. 1997

Stanford University Stanford, CA Computational and Mathematical Ph.D. 2007

Engineering

**Appointments**

2017–present Research Associate Professor, Illinois Institute of Technology, Chicago, IL

2018–present Lead Researcher in Machine Learning and Data Mining Applications, Allstate Corporation, Chicago, IL

2016–2017 Principal Data Scientist (Consultant), Allstate Corporation, Chicago, IL

2014–2017 Research Assistant Professor, Illinois Institute of Technology, Chicago, IL

2010–2013 Research Scientist, Computation Institute, University of Chicago, Chicago, IL with joint appointment in the Argonne National Laboratory, Argonne, IL

2007–2013 University Affiliate, Department of Management Science and Engineering, Stanford University, Stanford, CA

2007–2010 Senior Member of Technical Staff, Server Technology/Business Intelligence, Oracle USA, Inc., Redwood Shores, CA

1998–2000 Financial Software Engineer, Kamakura Corporation, Singapore

1997–1998 Systems Analyst, Warburg Dillon Read, Union Bank of Switzerland, Singapore

**Products**.

**FIVE PRODUCTS MOST CLOSELY RELATED**

1. Smith, A. M., Katz, D. S., Niemeyer, K. E, and FORCE11 Software Citation Working Group (2016). Software Citation Principles, PeerJ Computer Science, Volume 2, e86.
2. Katz, D., Choi, S.-C. T., Lapp, H., Maheshwari, K., Loffler, F., Turk, M., Hanwell, M., Wilkins-Diehr, N., Hetherington, J., Howison, J., Swenson, S., Allen, G., Elster, A., Berriman, B., and Venters, C. (2014). Summary of the First Workshop on Sustainable Software for Science: Practice and Experiences (WSSSPE1). Journal of Open Research Software, Volume 2, Number 1, e6.
3. Choi, S.-C. T. (2014). MINRES-QLP Pack and Reliable Reproducible Research via Supportable Scientific Software, Journal of Open Research Software, Volume 2, Issue 1, 1–7.
4. Choi, S.-C. T., Ding, Y., Hickernell, F. J., Jiang, L., Jimenez Rugama, L. A., Li, D., Rathinavel, J., Tong, X., Zhang, K., Zhang, Y., and Zhou, X. (2017). GAIL: Guaranteed Automatic Integration Library (Version 2.2) [Software]. Available from http://gailgithub.github.io/GAIL\_Dev/
5. Choi, S.-C. T., Paige, C. C., and Saunders, M. A. (2011). MINRES-QLP: A Krylov subspace method for indefinite or singular symmetric systems, SIAM J. Sci. Comput., Volume 33, Number 4, 1810–1836. (Won the 2012 SIAM Linear Algebra Prize.)

**FIVE FURTHER PRODUCTS**

1. Choi, S.-C. T., Lin, Y., and Mulrow, E. (2017). Comparison of Public-Domain Software and Services for Probabilistic Record Linkage and Address Standardization. In Towards Integrative Machine Learning and Knowledge Extraction: BIRS Workshop, Banff, AB, Canada, July 24-26, 2015, Springer International Publishing, Cham, 51–66.
2. Choi, S.-C. T., Ding Y., Hickernell, F. J., and Tong, X. (2017). Local adaption for approximation and minimization of univariate functions, Journal of Complexity, Volume 40, 17–33.
3. Hickernell, F. J., Choi, S.-C. T., Jiang, L., and Jimenez Rugama, L. A. (2017). Monte Carlo simulation, automatic stopping criteria for, Wiley StatsRef: Statistics Reference Online, accepted.
4. Choi, S.-C. T., and Saunders, M. A. (2014). ALGORITHM 937: MINRES-QLP for Singular Symmetric and Hermitian Linear Equations and Least-Squares Problems, ACM TOMS, Volume 40, Number 2, 16:1–16:12.
5. Donoho, D. L., Flesia, A., Huo, X., Levi, O, Choi, Choi, S.-C. T., and Shi, D. (2003). BEAMLAB (Version 200) [Software]. Available from <http://www-stat.stanford.edu/~beamlab/>

**Synergistic Activities**

1. Since 2013, I have served as a mentor to 12 graduate (8 doctoral and 4 master’s) students who are Applied Mathematics majors at the Illinois Institute of Technology (IIT). I have guided them on various aspects of reliable reproducible research in computational mathematics and statistics. I also served as thesis committee members for two of the students. The research and mentoring efforts have resulted in publications of multiple papers and presentations in conferences and journals, as well as an ongoing software package called GAIL. Four of our PhD graduates are now working in either academia or industries. At least one MS student went on to pursue PhD degree in mathematical sciences. We continue to collaborate with our current students as well as alumni working in both industries and academia.
2. I taught four research seminar courses at IIT and the University of Chicago (UC) between 2013 and 2016. Each course has between one to eight students at undergraduate or master’s levels from applied mathematics or computer science. We explored, for instance, modern machine learning methods for problems and big data sets stemming from computational social sciences. In Summer 2017, a group of my students examined Chicago crime rates and city safety at geographical blocks, each of which has an area of approximately 0.24 square miles. We won a second prize in a poster competition organized by the IIT College of Science.
3. I have been collaborating with an undergraduate student from the Department of Mathematics, University of Chicago on a research project related to probabilistic record linkage of big datasets and address standardization since Summer 2017. I seeded the student with some research ideas from a paper my coauthors and I had published. The student was able to enhance the code base quickly. Starting this Fall, we have extended the code with new methodology based on neural networks showing highly accurate classification results of address components. We have involved a mathematically well-prepared high school student since Dec 2017 to test and refine the computational results for submission to a major conference in 2018.
4. I have given over 78 scientific talks locally and internationally in the past ten years. Three of them are plenary talks at international conferences. At least twenty of them are invited talks at various intuitions or conferences. I have also co-organized multiple international conferences (e.g., WSSSPE1 to WSSSPE4, which are annual conferences on sustainable scientific software from 2013 to 2016) and (co-)hosted at least eight mini-symposiums in major conferences organized by, for example, the Society of Industrial and Applied Mathematics (SIAM), the American Mathematical Society (AMS), and the International Linear Algebra Society (ILAS) over the years in order to encourage exchange of ideas among researchers in computational sciences and research software.
5. I offer scientific consulting services to public members or private corporations on problems related to my research expertise in computational sciences and algorithms. For instance, in the past few years, I received inquiries from members of Stanford University and Peking University, China on questions related to my mathematical software MINRES-QLP Pack. I helped debug the researcher’s programs and discussed potentially more efficient approaches to solve their problems. These researchers have applied my algorithms to enhance nonlinear algorithms such as deep learning or for solving complex problems arising in studies of nanophysics. Another example involves my consulting services offered to Allstate Corporation between Jun 2016 to Dec 2017 that used multi-core machines to perform parallel computations of risk modeling as well as instantaneous traffic and incident analysis for over 20 million road segments in America. I also collaborate with Stanford University on a challenging project related to rea-time collision risk prediction over immediate time horizons using multi-core GPU machines; the work has resulted in a paper accepted by the 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2018). A third example is a recent ongoing collaboration with Professor Chrystal Ho Pao, a biologist from a local university, to develop an interdisciplinary approach for teaching a biology and statistics research course at undergraduate level; we plan to publish a paper in an education journal.