**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**

2020–present Chief Data Scientist, Kamakura Corporation, Chicago, IL

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

2018–2020 Lead Researcher, 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

2014–2016 Senior Statistician, NORC at the University of Chicago, 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. Choi, SCT, Hickernell, FJ, McCourt, M, Rathinavel, J, and Sorokin, A. (2020) QMCPy: A quasi-Monte Carlo Python Library. [Python Software]. Available from <https://qmcsoftware.github.io/QMCSoftware/>.
2. Choi, SCT, Ding, Y, Hickernell, FJ, Jiang, L, Jimenez Rugama, LA, Li, D, Rathinavel, J, Tong, X, Zhang, K, Zhang, Y, and Zhou, X. (2020). GAIL: Guaranteed Automatic Integration Library (Version 2.3.1) [MATLAB Software]. Available from <http://gailgithub.github.io/GAIL_Dev/>.
3. Choi, SCT, Ding Y, Hickernell, FJ, and Tong, X. (2017). Local adaption for approximation and minimization of univariate functions, Journal of Complexity, Volume 40, 17–33.
4. Hickernell, FJ, Choi, SCT, Jiang, L, and Jimenez Rugama, LA. (2018). Monte Carlo simulation, automatic stopping criteria for, Wiley StatsRef: Statistics Reference Online.
5. Choi, SCT, Paige, CC, and Saunders, MA (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, SCT, and Saunders, MA. (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.
2. Katz, D, Choi, SCT, 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. Wulfe, B, Chintakindi, S, Choi, SCT, Hartong-Redden, R, Kodali, A, and Kochenderfer, MJ. (2018). Real-Time Prediction of Intermediate-Horizon Automotive Collision Risk. 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2018)
4. Choi, SCT, 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.
5. Donoho, DL, Flesia, A, Huo, X Levi, O, Choi, Choi, SCT and Shi, D. (2003). BEAMLAB (Version 200) [MATLAB 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 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 two software packages, QMCPy and GAIL. Seven of our PhD graduates are now working in either academia or industries. We continue to collaborate with our current students and alumni working in industries and academia.
2. I taught six research seminar courses at IIT and the University of Chicago (UC) between 2013 and 2020. 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 finance or social sciences. In Summer 2019, with three undergraduates visiting IIT from Beijing, China, we developed a paper by applying conditional generative adversarial networks (cGANs) on asset price prediction; it has been recently submitted for publication. Four of the students applied for graduate schools with my recommendation and two of them received multiple offers from Columbia University, Northwestern University, University of San Diego, California, and New York University. 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 0.25 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 research ideas from a paper my coauthors and I had published. The student was able to enhance the code base quickly. Starting last Fall, we have extended the code with new methodology based on neural networks showing highly accurate classification results of address components. We have involved another undergraduate at IIT since Summer 2018 and a mathematically well-prepared high-school student since Dec 2017 to test and refine the computational results. We presented a poster in SIAM Computational Science and Engineering conference in Feb 2019.
4. I have given over 80 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 ten 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, US 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 in the prestigious software Theano 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 collaborated 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).