PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Yuekai Sun, assistant professor of statistics, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of statistics, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:
Ph.D.   2015   Stanford University
B.A.   2010   Rice University

Professional Record:
2016-Present   Assistant Professor, Department of Statistics, University of Michigan, Ann Arbor
2015-2016   Neyman Visiting Assistant Professor, University of California, Berkeley

Summary of Evaluation:
Teaching: Professor Sun has taught three undergraduate courses at Michigan (Stats 413, 415, and 451), a larger than typical number, and one Ph.D. course. His main undergraduate course is Stats 413, a core major course on linear regression, which has experienced dramatic growth in enrollment in recent years, resulting in students with very different levels of preparation all taking this class together. Professor Sun's approach to Stats 413 focuses on concepts and learning outcomes; it is considered thoughtful and rigorous by the department, with the recognition that students often find it challenging. His student evaluations reflect improvement over time, and he is a dedicated, hands-on mentor outside the classroom. Professor Sun has mentored a large number of Ph.D. students, advising or co-advising six so far, and publishing many joint papers with students. He has also supervised two undergraduate research projects.

Research: Professor Sun works in the intersection of statistics and computer science known as machine learning. He has an excellent publication record, publishing in a mix of statistics journals and machine learning conference proceedings, which are peer-reviewed and very competitive. He has an excellent funding record, far above average for his career stage. Professor Sun has made major contributions to algorithmic fairness, working on group vs. individual fairness, on auditing algorithms for fairness, and on learning from one population for the purpose of prediction on a different one (distribution shift), contributing both practical algorithms and deep theoretical insights. He has also made major contributions to federated learning (distributed across many machines), optimization, and post-selection inference. These are timely contributions, and Professor Sun has already established his leadership in a growing new area.

Recent and Significant Publications:

Maity, S., Sun, Y., Banerjee, M. (2022). Minimax optimal approaches to the label shift problem. *Journal of Machine Learning Research*, *23*(346), 1-45.

Maity, S., Sun, Y., Banerjee, M. (2022). Meta-analysis of heterogeneous data: integrative sparse regression in high-dimensions. *Journal of Machine Learning Research*, *23*(198), 1-50.

Damle, A. & Sun, Y. (2020). Uniform bounds for invariant subspace perturbations. *SIAM Journal of Matrix Analysis and Applications*, *41*(3), 1,208-1,236.

Xue, S., Yurochkin, M., & Sun, Y. (2020). Auditing ML models for individual bias and unfairness. *Proceedings of the 23rd International Conference on Artificial Intelligence and Statistics*, *(AISTATS 2020)*, *PMLR*, *108*, 4,552-4,562.

Service: Professor Sun has served on both the Ph.D. and master's admissions committees, advised master's and undergraduate students, and served as seminar chair several times, including the difficult transition to virtual. His record of professional service includes reviewing, editorial board membership, professional society service, and conference organizing. Finally, his research on algorithmic fairness directly contributes to DEI. Overall, his service record is strong and meets all expectations.

External Reviewers:

Reviewer (A): "Ensuring fairness for machine learning algorithms is obviously an important goal in practice and the problems require a careful and systematic study by statisticians. Dr. Sun is one of the very few experts in statistics who have done deep work on individual fairness, which is different from the more commonly studied notion of group fairness."

Reviewer (B): "Dr. Sun has been pursuing problems that are on everyone's mind right now—how do we leverage multiple data sources and bring results from one situation to another while keeping predictions fair, and estimates accurate and statistically consistent? It is a timely topic, and Dr. Sun is clearly a leading expert on this."

Reviewer (C): "Despite the lack of detailed personal knowledge of [Professor Sun] that I mentioned in my opening paragraph, from my reading of his papers and documentation I have formed a very positive impression of his level of scholarship. I have rarely encountered such breadth in someone at his career stage."
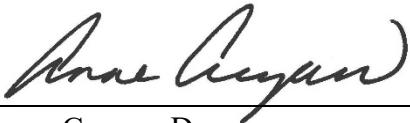
Reviewer (D): "Professor Sun has embarked on an exciting research program at the intersection of CS and statistics…I would say he is very well positioned within his peers. "

Reviewer (E): "He deals with challenging problems and he finds rigorous solutions. His papers have a nice mix of methodology and theory. In summary, after reviewing this case, I am quite impressed with Dr Sun's work."

Reviewer (F): "Dr. Sun has worked on a number of topics which are highly relevant and timely, connecting both statistical and computer science points of view. I always found his approach refreshing and enjoyed reading his research papers…His research covers some of the most important facets of individual fairness."

<u>Summary of Recommendation</u>:

Professor Yuekai Sun is a highly productive and versatile scholar in a modern and growing area of machine learning. His work on algorithmic fairness is especially noteworthy for its high societal impact and contribution to DEI. He is a responsible teacher with high standards, and an excellent Ph.D. advisor. He contributes diligently to the department and the profession through service. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Assistant Professor Yuekai Sun be promoted to the rank of associate professor of statistics, with tenure, College of Literature, Science, and the Arts.

Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

May 2023