University of California, Irvine
Statistics Seminar

From Approximate Bayesian Inference to Neural Data Compression

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6011 Donald Bren Hall

In this talk, I will present surprising connections between Bayesian machine learning and (neural) data compression. According to ChatGPT, "Bayesian inference is like a magician who can predict what data will look like before it even arrives, while neural data compression is like a packrat who tries to fit as much data as possible into a tiny space." This talk will provide a more nuanced correspondence between these seemingly disconnected fields. In particular, I will show how variational autoencoders correspond to data compressors, how better Bayesian inference can improve compression performance, how posterior uncertainties give rise to novel quantization schemes, and how variational inference methods allow estimating the lossy compressibility of a data set.

Bio: Stephan Mandt is an Associate Professor of Computer Science and Statistics at the University of California, Irvine. From 2016 until 2018, he was a Senior Researcher and Head of the statistical machine learning group at Disney Research in Pittsburgh and Los Angeles. He held previous postdoctoral positions at Columbia University and Princeton University. Stephan holds a Ph.D. in Theoretical Physics from the University of Cologne, where he received the German National Merit Scholarship. He is furthermore a recipient of the NSF CAREER Award, the UCI ICS Mid-Career Excellence in Research Award, the German Research Foundation's Mercator Fellowship, a Kavli Fellow of the U.S. National Academy of Sciences, a member of the ELLIS Society, and a former visiting researcher at Google Brain. Stephan is an Action Editor of the Journal of Machine Learning Research and Transaction on Machine Learning Research and regularly serves as an Area Chair for NeurIPS, ICML, AAAI, and ICLR. His research is currently supported by NSF, DARPA, DOE, Disney, Intel, and Qualcomm.