USC Viterbi
School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Ming Hsieh Institute **Seminar Series**

Center for Systems and Control – CommNetS

Wasserstein Gradient Flows for Modeling Strategic Distribution Shift

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Abstract: We propose a novel framework for analyzing the dynamics of distribution shift in real-world systems that captures the feedback loop between learning algorithms and the distributions on which they are deployed. We propose a coupled partial differential equation model that captures fine-grained changes in the distribution over time by accounting for complex dynamics that arise due to strategic responses to algorithmic decision-making, non-local endogenous population interactions, and other exogenous sources of distribution shift. We prove convergence results in 3 settings for min-max optimization problems over measures, as well as in a cooperative setting, addressing a recent open problem posed in (Wang and Chizat 2024, Convergence of single-timescale mean-field Langevin descent-ascent for two-player zero-sum games).

Bio: **Lauren Conger** is a PhD candidate in Control and Dynamical Systems at Caltech, advised by Franca Hoffmann, Eric Mazumdar, and John Doyle. Her research is at the intersection of partial differential equations (PDE) analysis, game theory, and control theory. She studies systems of gradient flow PDEs through the lens of game theory with applications in machine learning, and works on system level synthesis, a new control parameterization, in a variety of contexts, including distributed optimization and PDE control.

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