Channel Islands
CALIFORNIA STATE UNIVERSITY

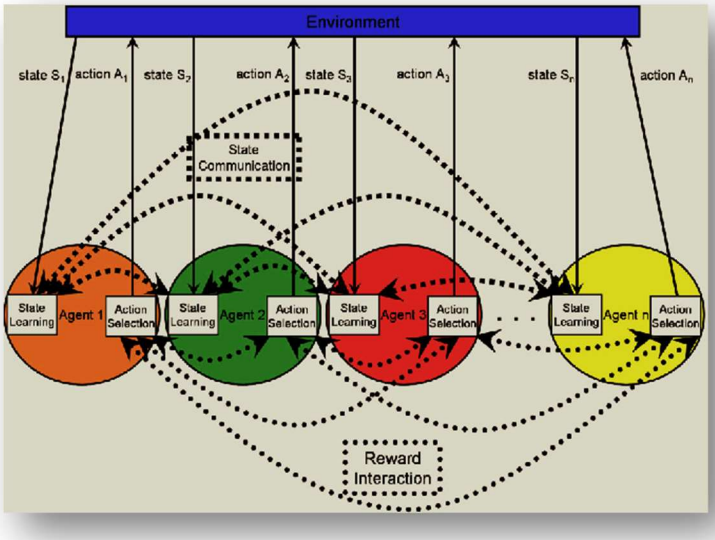
California State University
INSTRUCTIONALLY RELATED ACTIVITIES
CHANNEL ISLANDS

Graduate Mathematics Seminar

Learning Interaction Laws in Multi-Agent Systems from Data

Dr. Sui Tang

University of California, Santa Barbara



Abstract: Multi-agent systems are ubiquitous in science, from the modeling of particles in Physics to prey-predator in Biology, to opinion dynamics in economics and social sciences, where the interaction law between agents yields a rich variety of collective dynamics. Inferring the interaction laws between agents from observational trajectory data is a fundamental task for modeling and prediction. Given abundant data sampled from multiple trajectories, we use tools from statistical/machine learning to construct estimators for interaction kernels with provably good statistical and computational properties, under the minimal assumptions that the interaction kernels only depend on pairwise distance. In particular, we show that despite the high-dimensionality of the systems, optimal learning rates can still be achieved, equal to that of a one-dimensional regression problem. Numerical simulations on a variety of examples suggest the learnability of kernels in models used in practice, and that our estimators are robust to noise, and produced accurate predictions of collective dynamics in relative large time intervals, even when they are learned from data collected in short time intervals. This talk is based on the joint work with Fei Lu, Mauro Maggioni, Jason Miller, and Ming Zhong.

When: Monday, November 9, 2020, 6:00 – 7:00 pm

Where: CSUCI, Zoom