SCHOOL OF NATURAL SCIENCES

SEMINAR SERIES

Homeless Arrest and Population Dynamics: Investigating Homelessness Through Modelling, Machine Learning, and PDEs

Homelessness has heavy societal costs and is poorly understood. We explore the problem mathematically from multiple angles with reference to Los Angeles, where there are approximately 40,000 homeless. We first study the sensitive topic of homeless arrests and find that police records are well described by a compartment model that takes into account levels of arrest-proneness. The modeling also sheds light onto the fluidity of the population and suggests geographic location may affect the nature of arrests. Then, by combining annual homeless counts and demographic data, we build a series of models correlating estimated homeless populations with local city features. Methods include topic modelling for qualitative descriptions, neural networks to forecast degrees of population change, and a continuum PDE population model. The PDE is a nonlocal, nonlinear diffusion equation, which can qualitatively describe encampment formation. We provide numerical simulations and state rigorous results of the solution's behaviors and existence.

Tuesday, 2/25/2020	3:15pm - 4:30pm	Granite Pass, Rm. 135	For more information, contact: Professor Mayya Tokman at mtokman@ucmerced.edu

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Mike Lindstrom is an applied mathematican, currently working at UCLA as an Adjunct Assistant Professor for the Program in Computing. He completed his PhD in Mathematics at the University of British Columbia in Vancouver, BC, Canada, studying the design of a nuclear fusion reactor. Mike's research interests include partial differential equations, modelling physical systems, and employing techniques of data science for fitting models and interpreting data. Some of his recent/ongoing applications include homelessness, particle-laden thin-film flow, and Alzheimer's disease.