University of California, Irvine
Statistics Seminar

Towards Trustworthy Machine Learning in Medicine and the Role of Uncertainty

Katherine Heller
Research Scientist
Google Brain

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6011 Donald Bren Hall

As ML is increasingly used in society, we need methods that we have confidence that we can rely on, particularly in the medical domain. In this talk I discuss 3 pieces of work, the role uncertainty plays in understanding and combating issues with generalization and bias, and particular mitigations that we can take into consideration.

1) Sepsis Watch - I present a Gaussian Process (GP) + Recurrent Neural Network (RNN) model for predicting sepsis infections in Emergency Department patients. I will discuss the benefit of uncertainty given by the GP. I will then discuss the social context in introducing such a system into a hospital setting.

2) Uncertainty and Electronic Health Records (EHR) - I will discuss Bayesian RNN models developed for mortality prediction, and the distinction between population level predictive performance and individual level predictive performance, and its implications for bias.

3) Underspecification and the credibility implications of hyperparameter choices in ML models -- I will discuss medical imaging applications and how using the uncertainty of model performance conditioned on choice of hyperparameters can help identify situations in which methods may not generalize well outside the training domain.