



Deep Learning Program Opening Workshop August 12-16, 2019

SPEAKER TITLES/ABSTRACTS

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“Statistical Inference for Online Decision Making via Stochastic Gradient Descent”

Online decision making aims to learn the optimal decision rule by making personalized decisions and updating the decision rule recursively. It has become easier than before with the help of big data, but new challenges also come along. Since the decision rule should be updated once per step, an offline update which uses all the historical data is inefficient in computation and storage. To this end, we propose a completely online algorithm that can make decisions and update the decision rule online via stochastic gradient descent.

It is not only efficient but also supports all kinds of parametric reward models. Focusing on the statistical inference of online decision making, we establish the asymptotic normality of the parameter estimator produced by our algorithm and the online inverse probability weighted value estimator we used to estimate the optimal value. Online plugin estimators for the variance of the parameter and value estimators are also provided and shown to be consistent, so that interval estimation and hypothesis test are possible using our method.

The proposed algorithm and theoretical results are tested by simulations and a real data application to news article recommendation.