

**University of California, Irvine
Statistics Seminar**

Reinforcement Learning for Respondent-Driven Sampling

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6011 DBH**

Respondent-driven sampling (RDS) is a network-based sampling strategy used to study hidden populations for which no sampling frame is available. In each epoch of an RDS study, the current wave of study participants are incentivized to recruit the next wave through their social connections. The success and efficiency of RDS can depend critically on attributes of incentives and the underlying (latent) network structure. We propose a reinforcement learning-based adaptive RDS design to optimize some measure of study utility, e.g., efficiency, treatment dissemination, reach, etc. Our design is based on a branching process approximation to the RDS process, however, our proposed post-study inferential procedures apply to general network models even when the network is not fully identified. Simulation experiments show that the proposed design provides substantial gains in efficiency over static and two-step RDS procedures.