

The Self-Normalized Estimator for Counterfactual Learning

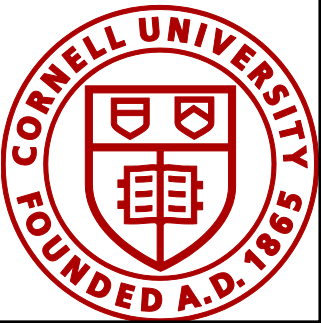
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210 C #59

This estimator dominates the Horvitz-Thompson estimator when learning from bandit feedback because it avoids propensity overfitting

Software: <http://www.cs.cornell.edu/~adith/POEM/>



Setting: Batch Learning from Bandit Feedback

Use $\langle x_i, y_i, \delta_i \rangle$ logs to find good policy $h(y|x)$



Easier



Supervised learning

Harder



Off-policy RL

Not



Online Contextual Bandit
(explore-exploit)

Approach: Counterfactual Risk Minimization

Risk estimation via Importance Sampling:

$$\hat{R}(h) = \frac{1}{n} \sum_i \delta_i \frac{1}{\Pr(y_i|x_i)} h(y_i|x_i)$$

Feedback

Propensity

New policy

Learning via ERM:

$$\operatorname{argmin}_h \hat{R}(h) + \lambda \operatorname{Reg}(h)$$

Change the estimator, stop ERM cheating!

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