ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Distributionally Robust Logistic Regression

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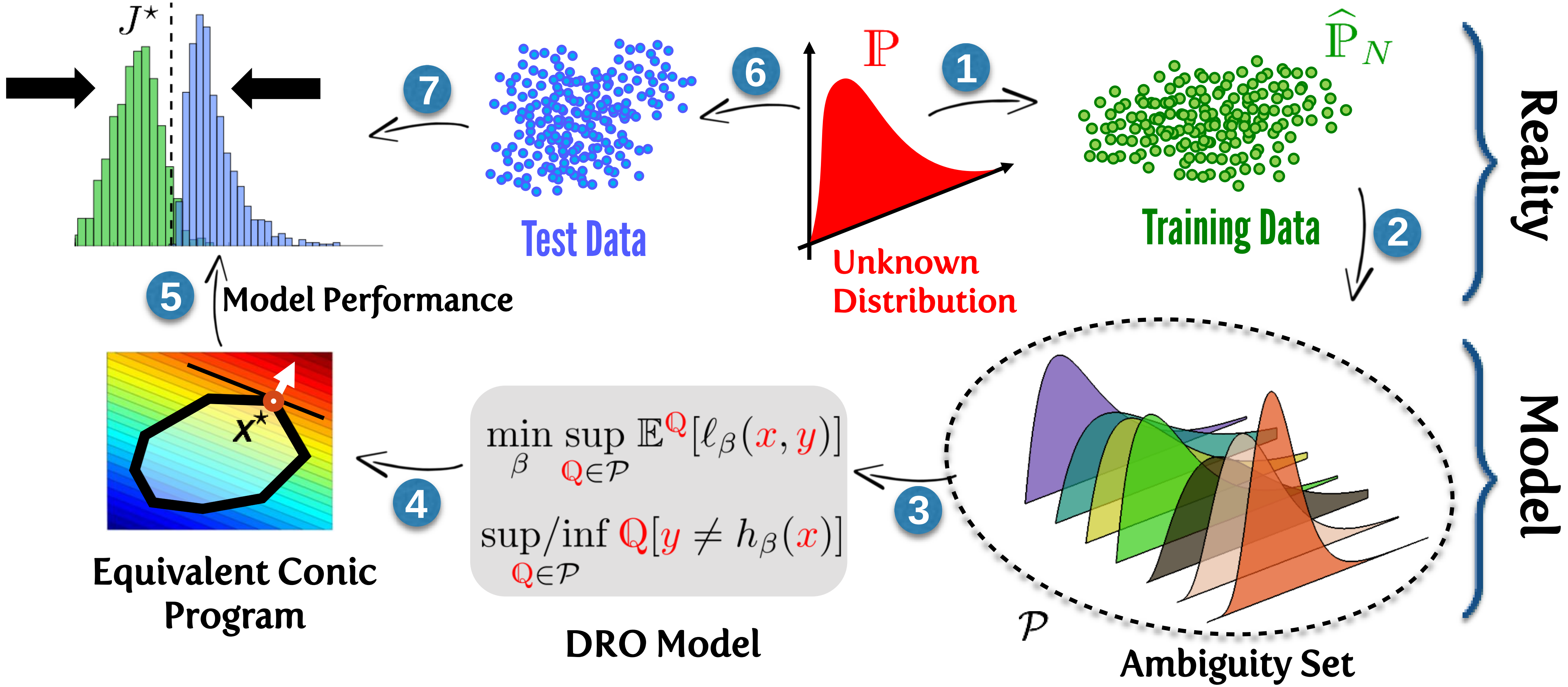
NIPS 2015

ML-Estimation

Risk Estimation

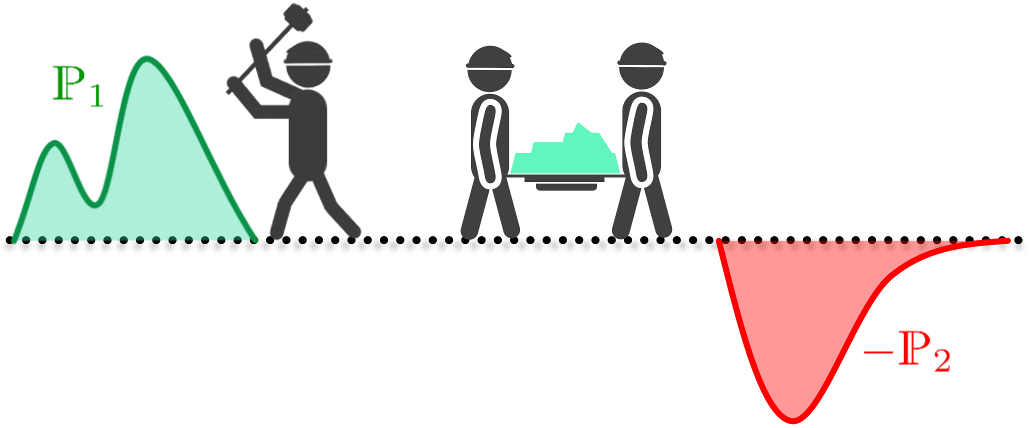
$$J^\star = \min_\beta \mathbb{E}^{\mathbb{P}}[\ell_\beta(x, y)]$$

$$\mathbb{P}[y \neq h_\beta(x)]$$



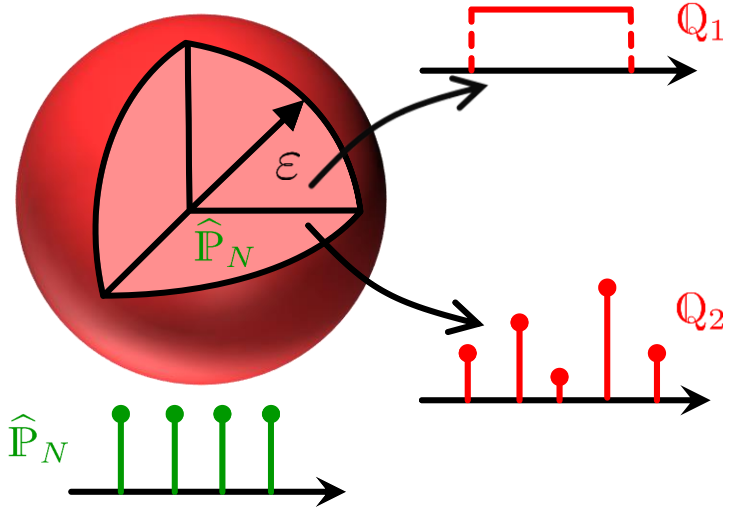
$$\mathcal{P} = \{\widehat{\mathbb{P}}_N\} \implies \text{Classical Logistic Regression}$$

Wasserstein Distance



$$d(\mathbb{P}_1, \mathbb{P}_2) = \text{Minimum Transportation Cost}$$

Wasserstein Ambiguity Set

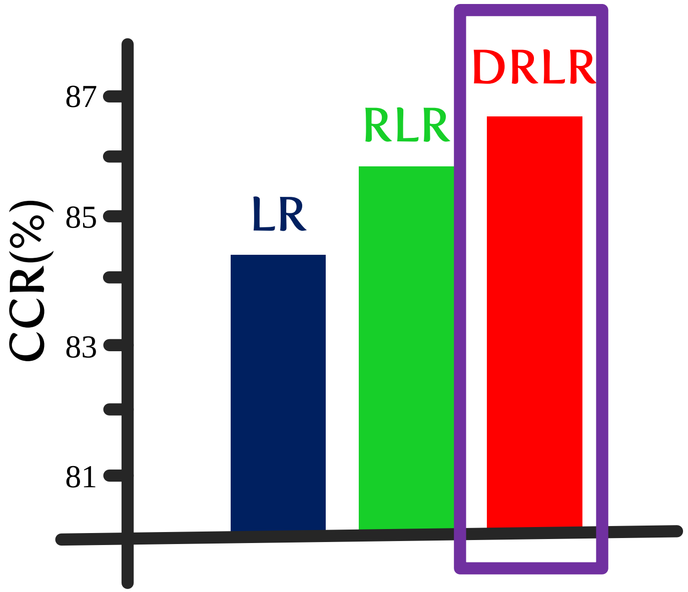


Benefits of DRO Model

- Out-of-Sample Guarantee
- Tractability
- Asymptotic Consistency
- Probabilistic Interpretation of Regularization

[1]

UCI Machine Learning Repository



Ionosphere Data Set

[1] https://archive.ics.uci.edu/ml/datasets/Ionosphere