Causal Regularization

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Causality is the holy grail of science, but humankind has struggled to operationalize it for millennia. In recent decades, a number of more successful ways of dealing with causality in practice, such as propensity score matching, the PC algorithm, and invariant causal prediction, have been introduced. However, approaches that use a graphical model formulation tend to struggle with computational complexity, whenever the system gets large. Finding the causal structure typically becomes a combinatorial-hard problem.

In our causal inference approach, we build forth on ideas present in invariant causal prediction and the causal Dantzig and anchor regression, by replacing combinatorial optimization with a continuous optimization using a form of causal regularization. This makes our method applicable to large systems. Furthermore, our approach allows a precise formulation of the trade-off between in-sample and out-of-sample prediction error.

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