L'inférence causale en présence de dépendance et de structure de réseau
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Causal Inference in the Presence of Dependence and Network Structure
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Bipartite causal inference with interference: estimating health impacts of power plant regulations

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A fundamental feature of evaluating causal health effects of air quality regulations is that air pollution moves through space, rendering health outcomes at a particular population location dependent upon regulatory actions taken at multiple, possibly distant, pollution sources. Motivated by studies of the public-health impacts of power plant regulations in the U.S., this talk introduces the novel setting of bipartite causal inference with interference, which arises when 1) treatments are defined on observational units that are distinct from those at which outcomes are measured and 2) there is interference between units in the sense that outcomes for some units depend on the treatments assigned to many other units. Interference in this setting arises due to complex exposure patterns dictated by physical-chemical atmospheric processes of pollution transport, with intervention effects framed as propagating across a bipartite network of power plants and residential zip codes. New causal estimands are introduced for the bipartite setting, and two possible estimation approaches are illustrated; one based on inverse-probability of treatment weighted estimators, and another based on generalized propensity scores. Both are deployed to estimate how emission-reduction technologies implemented at coal-fired power plants causally affect health outcomes among Medicare beneficiaries in the U.S.

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