

Regression discontinuity designs from Bayesian perspective:

opportunities and challenges

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Regression discontinuity design (RDD) is a quasi-experimental design that aims at the causal effect estimation of an intervention that is assigned based on a cutoff criterion. Regression discontinuity design exploits the idea that close to the cutoff units below and above the cutoff are similar hence can be meaningfully compared. However, the causal effect can be estimated only locally at the cutoff point. In many experiments, the cutoff criterion serves only as a guideline rather than a strict rule. Nonetheless, the guidelines may not be publicly known, or the cutoff used in practice is shifted with respect to the official one. If the analysis is performed at a false cutoff point, it leads to meaningless results, but as the intervention assignment is binary, the location of the cutoff may be unclear. Through the Bayesian approach, we can incorporate prior knowledge and uncertainty about the cutoff location in the causal effect estimation. At the same time, RDD is a boundary point estimation problem, whereas the Bayesian model is fitted to the whole data. Therefore, a natural challenge arises: how to make Bayesian inference more local?