Imposing minimax and quantile constraints on optimal matching in observational studies

SOFTWARE NOTES

Paul R. Rosenbaum¹, University of Pennsylvania

The paper proposes a method for imposing a minimax constraint or a quantile constraint or a sequence of such constraints on an optimal match obtained by minimizing the total cost of a flow in a network. This additional constraint could be added to many different types of matched samples, and to several existing software packages.

To illustrate a simple version of the technique, I have written a simple automatic matching package in R called `aamatch`. Versions of this package are included with this manuscript submission.

The `aamatch` function in the `aamatch` package implements the idea in §2.5 of the manuscript. Specifically, `aamatch` forces fine or near-fine balance on the propensity score, then adds the constraint that the maximum within-pair robust Mahalanobis distance is minimized, then subject to those two constraints, it minimizes a total within-pair penalized covariate distance.

The example in the help file for the `matchfine3` function creates “match 4” in the paper. Match 4 has various features specific to the example in the current paper.

¹Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104. rosenbaum@wharton.upenn.edu. 22 July 2015. Supported by the US National Science Foundation.