Imposing minimax and quantile constraints on optimal matching in observational studies

SOFTWARE NOTES

Paul R. Rosenbaum\textsuperscript{1}, 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 \texttt{R} called \texttt{aamatch}. Versions of this package are included with this manuscript submission and should become available from the journal’s homepage. The package is currently available from my web-page \url{http://www-stat.wharton.upenn.edu/~rosenbap/}. The package is not currently at \texttt{cran}, so you must install it from local files. It is intended as a supplement to the paper, not a general tool: it is limited in scope and has not been optimized for speed. The examples described in the help page for \texttt{matchfine3} reproduce some of the examples from the paper. The name, \texttt{aamatch} stands for “artless, automatic match;” that is, the package documents specific examples, but is \textit{not} recommended for general use.

The \texttt{aamatch} function in the \texttt{aamatch} package implements the idea in §2.5 of the manuscript. Specifically, \texttt{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 \texttt{matchfine3} function creates “match 4” in the paper. Match 4 has various features specific to the example in the current paper.

The package has six items with documentation, namely \texttt{aamatch}, \texttt{matchfine3}, \texttt{addcaliper}, \texttt{netfine}, \texttt{smahal}, and \texttt{lalive}. Specifically, \texttt{lalive} contains data from [1] that is used in the examples. You MUST load the \texttt{optmatch} package to use the \texttt{aamatch} package.

\textsuperscript{1}Department of Statistics, The Wharton School, University of Pennsylvania, Philadelphia, PA 19104. rosenbaum@wharton.upenn.edu. 11 November 2015. Supported by the US National Science Foundation.
References