

# Imposing minimax and quantile constraints on optimal matching in observational studies

## SOFTWARE NOTES

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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 and should become available from the journal's homepage. The package is currently available from my web-page <http://www-stat.wharton.upenn.edu/~rosenbap/>. The package is not currently at `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 `matchfine3` reproduce some of the examples from the paper. The name, `aamatch` stands for “artless, automatic match;” that is, the package documents specific examples, but is *not* recommended for general use.

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.

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

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## References

- [1] Lalive, R., Van Ours, J. and Zweimüller, J. (2006), “How changes in financial incentives affect the duration of unemployment,” *Review of Economic Studies*, 73, 1009-1038.