

Software for implementing matching methods and propensity scores

R

- MatchIt <http://gking.harvard.edu/matchit>
 - Ho, D.E., Imai, K., King, G., and Stuart, E.A. (in press). MatchIt: Nonparametric preprocessing for parameteric causal inference. Forthcoming, *Journal of Statistical Software*.
 - Two-step process: does matching, then user does outcome analysis (integrated with [Zelig](#) package for R)
 - Wide array of estimation procedures and matching methods available: nearest neighbor, Mahalanobis, caliper, exact, full, optimal, subclassification
 - Built-in numeric and graphical diagnostics
- Matching <http://sekhon.berkeley.edu/matching>
 - Sekhon, J. S. (in press). Matching: Multivariate and propensity score matching with balance optimization. Forthcoming, *Journal of Statistical Software*.
 - Uses automated procedure to select matches, based on univariate and multivariate balance diagnostics
 - Primarily 1:M matching (where M is a positive integer), allows matching with or without replacement, caliper, exact
 - Includes built-in effect and variance estimation procedures
- twang <http://cran.r-project.org/web/packages/twang/index.html>
 - Ridgeway, G., McCaffrey, D., and Morral, A. (2006). twang: Toolkit for weighting and analysis of nonequivalent groups.
 - Functions for propensity score estimating and weighting, nonresponse weighting, and diagnosis of the weights
 - Primarily uses generalized boosted regression to estimate the propensity scores
- cem <http://gking.harvard.edu/cem/>
 - Iacus, S.M., King, G., and Porro, G. (2008). Matching for Causal Inference Without Balance Checking. Available [here](#).
 - Implements coarsened exact matching
 - Can also be implemented through [MatchIt](#)
- optmatch <http://cran.r-project.org/web/packages/optmatch/index.html>
 - Hansen, B.B., and Fredrickson, M. (2009). optmatch: Functions for optimal matching.
 - Variable ratio, optimal, and full matching
 - Can also be implemented through [MatchIt](#)
- PSAGraphics <http://cran.r-project.org/web/packages/PSAGraphics/index.html>
 - Helmreich, J.E. and Pruzek, R.M. (2009). PSAGraphics: An R Package to Support Propensity Score Analysis. *Journal of Statistical Software* 29(6). Available [here](#).
 - From webpage: "A collection of functions that primarily produce graphics to aid in a Propensity Score Analysis (PSA). Functions include: cat.psa and box.psa to test balance within strata of categorical and quantitative covariates, circ.psa for a representation of the estimated effect size by stratum, loess.psa that provides a graphic and loess based effect size estimate, and various balance functions that provide measures of the balance achieved via a PSA in a categorical covariate."

Stata

- psmatch2 <http://ideas.repec.org/c/boc/bocode/s432001.html>
 - Leuven, E. and Sianesi, B. (2003). psmatch2. Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing.
 - Allows k:1 matching, kernel weighting, Mahalanobis matching
 - Includes built-in diagnostics
 - Includes procedures for estimating ATT or ATE
- pscore <http://www.lrz-muenchen.de/~sobecker/pscore.html>
 - Becker, S.O. and Ichino, A. (2002). Estimation of average treatment effects based on propensity scores (2002) *The Stata Journal* 2(4): 358-377.
 - k:1 matching, radius (caliper) matching, and stratification (subclassification)
 - For estimating the ATT
- match http://www.economics.harvard.edu/faculty/imbens/software_imbens

Contact

About me

Research

My papers

Teaching

Miscellaneous

Data

Curriculum

Vitae

[Propensity](#)

[Score Software](#)

- Abadie, A., Drukker, D., Herr, J. L., and Imbens, G. W. (2004). Implementing matching estimators for average treatment effects in Stata. *The Stata Journal* 4 (3): 290-311. Available [here](#).
- Primarily k:1 matching (with replacement)
- Allows estimation of ATT or ATE, including robust variance estimators
- cem <http://gking.harvard.edu/cem/>
 - Iacus, S.M., King, G., and Porro, G. (2008). Matching for Causal Inference Without Balance Checking. Available [here](#).
 - Implements coarsened exact matching

SAS

- SAS usage note: <http://support.sas.com/kb/30/971.html>
- Greedy matching (1:1 nearest neighbor)
 - Parsons, L. S. (2001). Reducing bias in a propensity score matched-pair sample using greedy matching techniques. In SAS SUGI 26, Paper 214-26. Available [here](#).
 - Parsons, L.S. (2005). Using SAS software to perform a case-control match on propensity score in an observational study. In SAS SUGI 30, Paper 225-25. Available [here](#).
 - Kosanke, J., and Bergstralh, E. (2004). gmatch: Match 1 or more controls to cases using the GREEDY algorithm. <http://mayoresearch.mayo.edu/mayo/research/biostat/upload/gmatch.sas>
- 1:1 Mahalanobis matching within propensity score calipers
 - Feng, W.W., Jun, Y., and Xu, R. (2005). A method/macro based on propensity score and Mahalanobis distance to reduce bias in treatment comparison in observational study. www.lexjansen.com/pharmasug/2006/publichealthresearch/pr05.pdf
- Weighting
 - Leslie, S. and Thiebaud, P. (2006). Using propensity scores to adjust for treatment selection bias. <http://www.lexjansen.com/wuss/2006/Analytics/ANL-Leslie.pdf>
- Variable ratio matching, optimal matching algorithm
 - Kosanke, J., and Bergstralh, E. (2004). Match cases to controls using variable optimal matching. <http://mayoresearch.mayo.edu/mayo/research/biostat/upload/vmatch.sas>

SPSS

- Nearest neighbor matching <http://www.unc.edu/~painter/SPSSsyntax/propen.txt>
 - Painter, J. (2004). SPSS Syntax for nearest neighbor propensity score matching.
 - Seems to just do 1:1 matching without replacement

Software for performing analyses of sensitivity to an unobserved confounder

- R
 - rbounds: An R package for sensitivity analysis with matched data (L. Keele). <http://www.polisci.ohio-state.edu/faculty/leeele/rbounds.html>
 - sensitivity function in twang package (G. Ridgeway et al.). <http://rss.acs.unt.edu/Rdoc/library/twang/html/sensitivity.html>
- Stata
 - rbounds: Stata module to perform Rosenbaum sensitivity analysis for average treatment effects on the treated (M. Gangl) <http://econpapers.repec.org/software/bocbocode/s438301.htm>
- Excel
 - Love, T.E. (2008) Spreadsheet-based sensitivity analysis calculations for matched samples. Center for Health Care Research & Policy, Case Western Reserve University. <http://www.chrp.org/propensity/>, <http://www.chrp.org/propensity/sensitivitydocumentation.pdf>, <http://www.chrp.org/propensity/sensitivityspreadsheet.xls>