

Inferences About Robust Correlations With a Percentile Bootstrap Method

A.F. Özdemir^{1*}

¹ Department of Statistics, Dokuz Eylül University, Turkey ; firat.ozdemir@deu.edu.tr

*Presenting author

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A measure of the linear association between two random variables X and Y is a fundamental component of statistical methods. It is clear that the most frequently applied choice in applied work is Pearson's correlation which is very weak in terms of robustness. A very small shift in one of the marginal distributions can have a large effect on it. ? classified robust analogs of Pearson's correlation into two types: those that protect against outliers among the marginal distributions without taking into account the overall structure of the data (type M), and those that take into account the overall structure of the data when looking for outliers (type O). Percentage bend, biweight, Winsorized, Spearman and Kendall's tau correlations are some members of the first class. On the other hand, the outlier projection (OP) correlation can be given as an example of the second class. All robust correlations given above have conventional hypothesis testing methods of independence but all those methods are sensitive to heteroscedasticity which refers to a situation where the conditional variance of Y varies with X . In this study, the performance of a hypothesis testing procedure based on a percentile bootstrap method which is insensitive to heteroscedasticity was investigated for those six robust correlations in terms of actual significance level and power.

References

- Bradley, J. V. (1994). Robustness?. *British Journal of Mathematical and Statistical Psychology*, **31**, 144–152.
- Hoaglin, D. C. (1985). Summarizing shape numerically: The g-and-h distribution. In: Hoaglin D., Mosteller F., Tukey J. editors. *Exploring data tables trends and shapes*. Wiley, New York, 461-515.
- Hogg, R. V. & Craig, A. T. (1970). *Introduction to mathematical statistics*. Mcmillan, New York.
- Wilcox, R. R. & Muska, J. (2001). *Inferences about correlations when there is het-*

- eroscedasticity. *British Journal of Mathematical and Statistical Psychology*, **54**, 39–47.
- Wilcox, R. R. (1994). The Percentage Bend Correlation Coefficient. *Psychometrika*, **59**(4), 601-616.
- Wilcox, R. R. (2004). Inferences based on a Skipped Correlation Coefficient. *Journal of Applied Statistics*, **31**(2), 131–143.
- Wilcox, R. R. (2012). Introduction to robust estimation and hypothesis testing (3rd edition), Elsevier Academic Press, San Diego, California.