

**Torti, Francesca; Perrotta, Domenico; Atkinson, Anthony C.; Riani, Marco**  
**Benchmark testing of algorithms for very robust regression: FS, LMS and LTS.** (English)  
[Zbl 1252.62033](#)  
*Comput. Stat. Data Anal.* 56, No. 8, 2501-2512 (2012).

Summary: The methods of very robust regression resist up to 50% of outliers. The algorithms for very robust regression rely on selecting numerous subsamples of the data. New algorithms for LMS and LTS estimators that have increased computational efficiency due to improved combinatorial sampling are proposed. These and other publicly available algorithms are compared for outlier detection. Timings and estimator quality are also considered. An algorithm using the forward search (FS) has the best properties for both size and power of the outlier tests.

**MSC:**

[62F35](#) Robustness and adaptive procedures (parametric inference)  
[62J99](#) Linear inference, regression  
[65C60](#) Computational problems in statistics (MSC2010)

Cited in **9** Documents

**Keywords:**

[combinatorial search](#); [concentration step](#); [forward search](#); [least median of squares](#); [least trimmed squares](#); [logistic plots of power](#); [masking](#); [outlier detection](#)

**Software:**

[LIBRA](#); [robustbase](#); [MersenneTwister](#)

**Full Text:** [DOI](#)

**References:**

- [1] Atkinson, A.C., Plots, transformations, and regression, (1985), Oxford University Press Oxford · [Zbl 0582.62065](#)
- [2] Atkinson, A.C.; Riani, M., Robust diagnostic regression analysis, (2000), Springer-Verlag New York · [Zbl 0964.62063](#)
- [3] Atkinson, A.C.; Riani, M., Exploratory tools for clustering multivariate data, *Computational statistics and data analysis*, 52, 272-285, (2007) · [Zbl 1452.62028](#)
- [4] Atkinson, A.C.; Riani, M.; Cerioli, A., Exploring multivariate data with the forward search, (2004), Springer-Verlag New York · [Zbl 1049.62057](#)
- [5] Atkinson, A.~C.; Riani, M.; Cerioli, A., The forward search: theory and data analysis (with discussion), *Journal of the Korean statistical society*, 39, 117-134, (2010) · [Zbl 1294.62149](#)
- [6] Cochran, W.~G., Sampling techniques, (1977), Wiley New York · [Zbl 0353.62011](#)
- [7] Cox, D.R.; Hinkley, D.V., Theoretical statistics, (1974), Chapman and Hall London · [Zbl 0334.62003](#)
- [8] Croux, C.; Rousseeuw, P.J., A class of high-breakdown scale estimators based on subranges, *Communications in statistics theory and methods*, 21, 1935-1951, (1992) · [Zbl 0774.62035](#)
- [9] Flores, S., On the efficient computation of robust regression estimators, *Computational statistics and data analysis*, 54, 3044-3056, (2010) · [Zbl 1284.62197](#)
- [10] García-Escudero, L.A.; Gordaliza, A.; Mayo-Iscar, A.; San Martín, R., Robust clusterwise linear regression through trimming, *Computational statistics and data analysis*, 54, 3057-3069, (2010) · [Zbl 1284.62198](#)
- [11] Hampel, F.~R., Beyond location parameters: robust concepts and methods, *Bulletin of the international statistical institute*, 46, 375-382, (1975) · [Zbl 0349.62029](#)
- [12] Knuth, D.~E., ()
- [13] Knuth, D., Generating all combinations and partitions, ()
- [14] Lehmer, D.H., The machine tools of combinatorics, (), 5-31 · [Zbl 0144.00304](#)
- [15] Li, L.M., An algorithm for computing exact least-trimmed squares estimate of simple linear regression with constraints, *Computational statistics and data analysis*, 48, 717-734, (2004) · [Zbl 1429.62296](#)
- [16] Maronna, R.A.; Martin, D.R.; Yohai, V.J., Robust statistics: theory and methods, (2006), Wiley New York · [Zbl 1094.62040](#)

- [17] Mastronardia, N.; O'Leary, D.P., Fast robust regression algorithms for problems with Toeplitz structure, *Computational statistics and data analysis*, 52, 1119-1131, (2007) · [Zbl 1452.62096](#)
- [18] Matsumoto, M.; Nishimura, T., Mersenne twister: a 623-dimensionally equidistributed uniform pseudo-random number generator, *ACM transactions on modeling and computer simulation*, 8, 3-30, (1998) · [Zbl 0917.65005](#)
- [19] Nunkesser, R.; Morell, O., An evolutionary algorithm for robust regression, *Computational statistics and data analysis*, 54, 3242-3248, (2010) · [Zbl 1284.62203](#)
- [20] Pison, G.; Van Aelst, S.; Willems, G., Small sample corrections for LTS and MCD, *Metrika*, 55, 111-123, (2002) · [Zbl 1320.62060](#)
- [21] Riani, M.; Atkinson, A.C., Fast calibrations of the forward search for testing multiple outliers in regression, *Advances in data analysis and classification*, 1, 123-141, (2007) · [Zbl 1301.62069](#)
- [22] Riani, M.; Atkinson, A.C.; Cerioli, A., Finding an unknown number of multivariate outliers, *Journal of the royal statistical society series: B*, 71, 447-466, (2009) · [Zbl 1248.62091](#)
- [23] Riani, M., Atkinson, A. C., Perrotta, D., 2011. Calibrated very robust regression. Technical Report NII1033-DAE, Isaac Newton Institute, Cambridge, UK. · [Zbl 1332.62245](#)
- [24] Riani, M., Atkinson, A. C., Perrotta, D., 2012. Calibrated very robust regression for mixtures of regression models (submitted for publication). · [Zbl 1252.62033](#)
- [25] Riani, M.; Cerioli, A.; Atkinson, A.; Perrotta, D.; Torti, F., Fitting mixtures of regression lines with the forward search, (), 271-286
- [26] Rousseeuw, P.J., Least Median of squares regression, *Journal of the American statistical association*, 79, 871-880, (1984) · [Zbl 0547.62046](#)
- [27] Rousseeuw, P.J.; Leroy, A.M., *Robust regression and outlier detection*, (1987), Wiley New York · [Zbl 0711.62030](#)
- [28] Rousseeuw, P.J.; Van Driessen, K., Computing LTS regression for large data sets, *Data mining and knowledge discovery*, 12, 29-45, (2006)
- [29] Tallis, G.M., Elliptical and radial truncation in normal samples, *Annals of mathematical statistics*, 34, 940-944, (1963) · [Zbl 0142.16104](#)
- [30] Torti, F., *Advances in the forward search: methodological and applied contributions*, (2011), Italian Statistical Society Padova
- [31] Verboven, S.; Hubert, M., LIBRA: a MATLAB library for robust analysis, *Chemometrics and intelligent laboratory systems*, 75, 127-136, (2005)
- [32] Verboven, S.; Hubert, M., Matlab library LIBRA, *WIREs computational statistics*, 2, 509-515, (2010)
- [33] Yohai, V.J.; Zamar, R.H., High breakdown-point estimates of regression by means of the minimization of an efficient scale, *Journal of the American statistical association*, 83, 406-413, (1988) · [Zbl 0648.62036](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.