R documentation

of 'Qn_new-package.rd'

August 1, 2023

Qn_new-package *Robust Qn Location-Free Scale Estimate More Efficient than MAD*

Description

Compute the robust scale estimator Q_n, an efficient alternative to the MAD. By default, $Q_n(x_1, \ldots, x_n)$ is the k^t order statistic (a quantile) of the $choose(n, 2)$ absolute differences $|x_i - x_j|$, (for $1 \leq i < j \leq n$), where by default (originally only possible value) $k = choose(n/2 + 1, 2)$ which is about the first quartile (25% quantile) of these pairwise differences. See the references for more.

Usage

```
Qn_New(x, iAlgo, iWithError)
```

Arguments

x	x numeric vector of observations.
iAlgo	if set to 0, algorithm is automatically chosen from options 1, 2 or 3 depending on the data and on n, the size of the data. If set to 1 corresponds to a pseudo naive approach. if set to 2 corresponds to a naive algorithm on compressed data. If set to 3 corresponds to the new algorithm developed in Fahmy (ACM Toms, 2022). If set to 4, corresponds to a translation from fortran into c++ of the Croux and Rousseeuw (1993) algorithm/code provided.
iWithError	set iWithError to 0 to return the Qn statistic scaled using accurate constants. Set iWithError to 1 to use the erroneous constants that are used in the original articles of Croux and Rousseeuw (1992, 1993). Set iWithError to 2 to use the erroneous constants that are used in the ISO 13528-2015 document (2015).

Details

Package:	Qn_new
Type:	Package
Version:	1.0.0
First version Date:	2022-11-23
Last version Date:	2022-11-23

Value

Qn() returns a number, the Qn robust scale estimator, scaled to be consistent for sigma^2 and i.i.d. Gaussian observations.

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Examples

```
## Qn value for a random normal sample
set.seed(123)
Qn_new(rnorm(80), 0, 0)

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\Tabular{l}{
Addinsoft. 2021. dn constants for n between 2 and 100. Addinsoft. https://xlst.at/iso-13528-en
Croux, C., & Rousseeuw, P.J (1992). Time-efficient algorithms for two highly robust estimators of scale. In Proceedi
Fahmy, T. (2022, accepted). Algorithm X: An accelerated algorithm to compute the Qn robust statistic, with correctio
International Standards Organisation (2015). ISO 13528:2015(E), Statistical methods for use in proficiency testing
Rousseeuw, P.J., & Croux, C. 1993. Alternatives to the Median Absolute Deviation. AmerStatAssoc, 88, 424 (Dec. 1993)

Qn
Robust
Statistic
Descriptive
Scale
Breakpoint
Profiling
Sensory
}
```