Package 'rrat'

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Type Package

Title Robust Regression with Asymmetric Heavy-Tail Noise Distributions

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Description Implementation of Robust Regression tailored to deal with Asymmetric noise Distribution, which was originally proposed by Takeuchi & Bengio & Kanamori (2002) <doi:10.1162/08997660260293300>. In addition, this implementation is extended as introducing potential feature regularization by LASSO etc.

Depends R(>= 2.10), quantreg

License GPL (>= 2)

RoxygenNote 6.1.1

NeedsCompilation no

Repository CRAN

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Contents

`rrat` *Robust Regression with Asymmetric Heavy-Tail Noise Distributions*

Description

`rrat` implements Robust Regression approach tailored to deal with Asymmetric Tail noise distribution. The main idea is to learn most of the parameters of the model using conditional quantile estimators (which are biased but robust estimators of the regression) and then to learn a few remaining parameters to combine and correct these estimators, in order to minimize the average squared error in an unbiased way in the end.

Usage

```
rrat(x, y, taus = 0.5, ...)
```

Arguments

x	a data frame of predictors in training data. Similar as design matrix style but without intercept.
y	a numeric vector of response.
taus	candidate quantiles of underlying robust regression.
...	optional parameters to be passed to the low level function rq.

Details

Moreover than the original RRAT paper, our implementation is extended to be able to conduct feature regularization of LASSO by adding parameter method as lasso, as well as tuning the value of the additional penalty parameter lambda in the function.

Such feature regularization is employed in all the underlying base quantile models simultaneously. The architecture and combination of these underlying base quantile models should be designed according to the asymmetric tail pattern of the noise distribution.

Value

An object of class rrat, which is a list with the following components:

taus	candidate quantiles of underlying robust regression.
rrat_coefficients	a named vector of coefficients
rq_coefficients	a named matrix of coefficients from underlying quantile regressions bases
bias_correction	a number to correct the combinations of underlying quantile regressions bases

Author(s)

Yi He and Yuelin Zhao

References

Takeuchi, Ichiro & Bengio, Y. & Kanamori, Takafumi. (2002). "Robust Regression with Asymmetric Heavy-Tail Noise Distributions". *Neural computation*. 14. 2469-96. 10.1162/08997660260293300.

Examples

```
rrat_1 <- rrat(x=iris[,2:4], y=iris[,1], taus = 0.5)
```

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