Package: UniIsoRegression (via r-universe)

Type Package

Version 0.0-0

Date 2017-10-25

Title Unimodal and Isotonic L1, L2 and Linf Regression

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Description Perform L1 or L2 isotonic and unimodal regression on 1D
weighted or unweighted input vector and isotonic regression on
2D weighted or unweighted input vector. It also performs L
infinity isotonic and unimodal regression on 1D unweighted
input vector. Reference: Quentin F. Stout (2008)
<doi:10.1016/j.csda.2008.08.005>. Spouge, J., Wan, H. & Wilbur,
W.(2003) <doi:10.1023/A:1023901806339>. Q.F. Stout (2013)
<doi:10.1007/s00453-012-9628-4>.

License GPL (>= 2)

Imports Rcpp (>= 0.12.11)

LinkingTo Rcpp

RoxygenNote 6.0.1

URL https://github.com/xzp1995/UniIsoRegression

NeedsCompilation yes

Date/Publication 2017-11-07 09:06:00

Repository https://xzp1995.r-universe.dev

RemoteUrl https://github.com/xzp1995/uniisoregression

RemoteRef HEAD

RemoteSha 266a40cb852d0b89a147193335061d7b1d1870bc

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reg_1d   *Isotonic and Unimodal Regression on 1D input.*

Description

Isotonic and unimodal regression on weighted or unweighted 1D input with L1, L2 and Linf metric and other options.

Usage

```
reg_1d(y_vec, w_vec, metric, unimodal = FALSE, decreasing = FALSE)
```

Arguments

y_vec	The vector of input data that we use to regression. It must be the same size as the w_vec argument.
w_vec	The vector of the weight of the input data. The default value is 1 for every entry. It must be the same size as y_vec. It's only avaliable for L1 and L2.
metric	This is an integer input, metric = 1 stands for using L1 metric, metric = 2 stands for using L2 metric, metric = 3 stands for using Linf metric.
unimodal	This is a boolean input, unimodal = false or 0 stands for isotonic regression and unimodal = true or 1 stands for unimodal regression
decreasing	This is a boolean input, decreasing = false or 0 stands for increasing model and decreasing = true or 1 stands for decreasing model.

Details

See the paper about unimodal regression via prefix isotonic regression in the reference.

Value

A vector of the regression result which has the same size of y_vec.

Error Messages

- The size of y_vec is 0: Empty data.
- The size of w_vec doesn't match the size of y_vec: Data and weight have different number of entries
- The entry of w_vec has negative value: Negative weight detected
- Metric input is not in 1,2,3: Metric does not exist

Author(s)

Zhipeng Xu, Chenkai Sun, Aman Karunakaran, Quentin Stout <xzhipeng@umich.edu> https://github.com/xzp1995/UniIsoRegression

References

Quentin F.Stout; Unimodal Regression via Prefix Isotonic Regression Computational Statistics and Data Analysis 53 (2008), pp. 289-297; Spouge, J., Wan, H. & Wilbur, W. Journal of Optimization Theory and Applications (2003) 117: 585-605 doi.org/10.1023/A:1023901806339

Examples

```
library(UniIsoRegression)

#===1d monotonic===
y=c(1,3,6,7,-1)
weight=c(1,3,4,9,10)

#l_1 metric decreasing
temp=UniIsoRegression::reg_1d(y, weight, metric = 1, decreasing = TRUE)
print(temp)

#l_2 metric unimodel
temp=UniIsoRegression::reg_1d(y, weight, metric = 2, unimodal = TRUE)
print(temp)

#l_infinity metric increasing
temp=UniIsoRegression::reg_1d(y, weight, metric = 3)
print(temp)
```

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reg_2d   *Isotonic Regression on 2D input.*

Description

Isotonic regression on weighted or unweighted 2D input with L1, L2 metric and other options.

Usage

```
reg_2d(y_vec, w_vec, metric)
```

Arguments

y_vec	The 2D NumericMatrix of input data that we use to regression. It must be the same size as the w_vec argument.
w_vec	The 2D NumericMatrix of the weight of the input data. The default value is 1 for every entry. It must be the same size as y_vec.
metric	This is an integer input, metric = 1 stands for using L1 metric, metric = 2 stands for using L2 metric

Details

See the paper about 2D regression in the reference.

Value

A 2D NumericMatrix of the regression result which has the same size of y_vec.

Error Messages

- The size of y_vec is 0: Empty data.
- The rows of w_vec doesn't match the rows of y_vec: Data and weight have different number of rows
- The columns of w_vec doesn't match the rows of y_vec: Data and weight have different number of columns
- The entry of w_vec has negative value: Negative weight detected
- Metric input is not in 1,2,3: Metric does not exist

Author(s)

Zhipeng Xu, Chenkai Sun, Aman Karunakaran, Quentin Stout <xzhipeng@umich.edu> https://github.com/xzp1995/UniIsoRegression

References

Q.F. Stout, Isotonic median regression via partitioning, Algorithmica 66 (2013), pp. 93-112 doi.org/10.1007/s00453-012-9628-4

Examples

```
library(UniIsoRegression)
#===2d monotonic===
y=matrix(c(2, 4, 3, 1, 5, 7,9,0), nrow=2, ncol=4, byrow = TRUE)
weight=matrix(c(1, 10, 3, 9, 5, 7,9,10), nrow=2, ncol=4, byrow = TRUE)

#l_1 metric
temp=UniIsoRegression::reg_2d(y, weight, metric = 1)
print(temp)

#l_2 metric
temp=UniIsoRegression::reg_2d(y, weight, metric = 2)
print(temp)
```

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