Package ‘UniIsoRegression’

October 12, 2022

Type Package
Version 0.0-0
Date 2017-10-25
Title Unimodal and Isotonic L1, L2 and Linf Regression
Author Zhipeng Xu <xzhipeng@umich.edu>, Chenkai Sun <sunchenk@umich.edu>, Aman Karunakaran <akarunak@umich.edu>, Quentin Stout <qstout@umich.edu>
Maintainer Zhipeng Xu <xzhipeng@umich.edu>
License GPL (>= 2)
Imports Rcpp (>= 0.12.11)
LinkingTo Rcpp
RoxygenNote 6.0.1
NeedsCompilation yes
Repository CRAN
Date/Publication 2017-11-07 18:15:14 UTC

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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

```r
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 available 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](https://github.com/xzp1995/UniIsoRegression)
**References**


**Examples**

```r
library(UniIsoRegression)

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

#_1_1 metric decreasing
temp=UniIsoRegression::reg_1d(y, weight, metric = 1, decreasing = TRUE)
print(temp)

#_1_2 metric unimodal
temp=UniIsoRegression::reg_1d(y, weight, metric = 2, unimodal = TRUE)
print(temp)

#_1_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**

```r
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


Examples

```r
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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