Package ‘UniIsoRegression’

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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 L_infty metric and other options.

Usage

```plaintext
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 L_infty 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/UnilsoRegression
References

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 unimodal
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)

---

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/UnilsoRegression

References


Examples

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

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

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