Package 'statr'

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Type Package

Title Matt Galloway Personal R Package

Version 0.1.0

Description This is a personal R package. It contains a number of various R functions for organization and convenience purposes.

URL https://github.com/MGallow/statr

BugReports https://github.com/MGallow/statr/issues

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ByteCompile TRUE

NeedsCompilation yes

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

Depends Rcpp (>= 0.12.10),
 RcppArmadillo,
 dplyr,
 MASS,
 alr4,
 formatR,
 devtools,
 RcppParallel,
 gmodels,
 glasso,
 magrittr

LinkingTo Rcpp,
 RcppArmadillo,
 RcppParallel

Suggests testthat

SystemRequirements GNU make

R topics documented:

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bsearch   *Bisection search*

Description

Minimizes a univariate strictly pseudoconvex function over the interval [a, b]. This is augmented code from Adam Rothman's STAT 8054 course (2017).

Usage

```
bsearch(dg, a, b, L = 1e-07, quiet = FALSE)
```

Arguments

dg	the derivative of the function to minimize, where dg(u, ...) is the function evaluated at u.
a	left endpoint of the initial interval of uncertainty.
b	right endpoint of the initial interval of uncertainty.
L	the maximum length of the final interval of uncertainty.
quiet	should the function stay quiet?
...	additional argument specifications for dg

Value

returns the midpoint of the final interval of uncertainty.

Examples

```
bsearch(dg, -10, 10, quiet = T)
```

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data_gen   *Normal Linear Data Generator*

Description

True beta values are generated from p independent draws from N(0, 1/p) distribution. X_-1 are n independent draws from (p - 1) multivariate normal N(0, Sigma) where Sigma has (j, k) entry theta^abs(j - k).

Y is then generated using the X = (1, X_-1) and true beta values with an iid error term that follows distribution N(0, var). We can specify the desired number of replications (reps).

Usage

```
data_gen(n, p, theta, var = 0.5, reps = 200)
```

Arguments

n	desired sample size
p	desired dimension
theta	parameter used to generate covariance matrix
var	variance of generated y values
reps	number of replications

Value

generated design matrix (X), response values (Y)(matrix if reps > 1), true beta values

Examples

```
data_gen(1000, 10, 0.5)
```

---

derivative   *Derivative*

Description

Takes the approximate derivative for a given function

Usage

```
derivative(g, x, delta = 1e-07)
```

Arguments

g	the derivative of the function to minimize, where dg(u, ...) is the function evaluated at u.
x	value to evaluate the derivative at
delta	defaults to 10e-8

Examples

```
g = function(x){x^2}
derivative(x, g)
```

---

diagnostic	*Diagnostic*

Description

This function simply streamlines the process of creating diagnostic plots with ggplot

Usage

```
diagnostic(data., x., y.)
```

Arguments

data.	data frame
x.	x-axis
y.	y-axis

Value

a residual plot and QQ plot

Examples

```
diagnostic(iris, Sepal.Length, Sepal.Width)
```

---

dsearch	*Dichotomous search*

Description

Minimizes a univariate strictly quasiconvex function over the interval [a, b]. This is augmented code from Adam Rothman's STAT 8054 course (2017).

Usage

```
dsearch(g, a, b, L = 1e-07, eps = (L/2.1), quiet = FALSE)
```

Arguments

g	the function to minimize, where g(u, ...) is the function evaluated at u.
a	left endpoint of the initial interval of uncertainty.
b	right endpoint of the initial interval of uncertainty.
L	the maximum length of the final interval of uncertainty.
eps	search parameter, must be less than L/2
quiet	should the function stay quiet?
...	additional argument specifications for g

Value

returns the midpoint of the final interval of uncertainty.

Examples

```
dsearch(g, -10, 10, quiet = T)
```

LDA   *Linear Discriminant Analysis*

Description

this function fit the LDA model

Usage

```
LDA(X, y, method = c("MLE", "diagonal", "ridge"), lam = NULL)
```

Arguments

X	n x p matrix where the ith row is the values of the predictor for the ith case
y	n entry response vector where the ith entry is the response category in 1, ..., C for the ith case

Value

returns a list with the parameter estimates

Examples

```
LDA(X, y, method = 'ridge', lam = seq(0.1, 2, 0.1))
```

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multiplot   *Multiple Plot*

Description

Taken from: http://www.cookbook-r.com/Graphs/Multiple_graphs_on_one_page_(ggplot2)/

Usage

```
multiplot(..., plotlist = NULL, file, cols = 1, layout = NULL)
```

Arguments

...	object can be passed in
cols	number of columns in layout
layout	a matrix specify the layout. If present, 'cols' is ignored

Value

plots

Examples

```
multiplot(p1, p2, cols = 1)
```

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predict_QDA   *Predict QDA*

Description

this function classifies test data using a fitted QDA model

Usage

```
predict_QDA(fit, Xtest)
```

Arguments

fit	this is a list with elements pi.hats, mu.hats, and Sigma.hats where pi.hats is a list of C response category sample proportions, mu.hats is a list of C p-dimensional sample mean proportions, Sigma.hats is a list of C p by p Sample covariance matrices
Xtest	this is a matrix with ntest rows and p column, each row is a test case

Value

returns a vector of ntest entries, where the ith entry is the estimated response category (some value in 1, ..., C) for the ith test case.

Examples

```
predict_QDA(model, Xtest)
```

QDA   *Quadratic Discriminant Analysis*

Description

this function fit the QDA model

Usage

```
QDA(X, y, method = c("MLE", "diagonal", "ridge"), lam = NULL)
```

Arguments

X	n x p matrix where the ith row is the values of the predictor for the ith case
y	n entry response vector where the ith entry is the response category in 1, ..., C for the ith case

Value

returns a list with the parameter estimates

Examples

```
QDA(X, y, method = 'ridge', lam = seq(0.1, 2, 0.1))
```

---

scatter	*Scatter*

Description

This function simply streamlines the process of creating a scatterplot with ggplot

Usage

```
scatter(data., x., y.)
```

Arguments

data.	data frame
x.	x-axis
y.	y-axis

Value

a scatterplot

Examples

```
scatter(iris, Sepal.Length, Sepal.Width)
```

---

tidy	*Tidy*

Description

tidys package R code and updates package documentation. Directly uses Yihui Xie's 'formatR' package.

Usage

```
tidy()
```

Examples

```
tidy()
```

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timeit   *Time-It*

Description

Simple function that prints the computation time of a function

Usage

```
timeit(f)
```

Arguments

f   the function to time

Value

returns the elapsed time

Examples

```
timeit(lm(dist ~ speed, cars))
```

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tridiag   *Generate tri-diagonal matrices*

Description

Generate p-dimensional matrices so that its inverse is tri-diagonal.

Usage

```
tridiag(p = 8, base = 0.7, n = 100, X = FALSE)
```

Arguments

p   desired dimension
base   base multiplier

Examples

```
tridiag(p = 10, base = 0.7)
```

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