Package 'CallEshotgun'

August 20, 2021

Type Package

Title Providing an Interface to the e-Shotgun Algorithm for Bayesian Optimization

Version 0.2.0

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Description A set of tools for the usage of the e-shotgun algorithm for Bayesian optimization. The e-shotgun was originally developed by ``George De Ath, Richard M. Everson, Jonathan E. Fieldsend, and Alma A. M. Rahat. 2020.
e-shotgun : e-greedy Batch Bayesian Optimisation. In Genetic and Evolutionary Computation Conference (GECCO '20), July 8–12, 2020, Cancún, Mexico.
ACM, New York, NY, USA, 9 pages." <doi:10.1145/3377930.3390154>.

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Repository CRAN

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R topics documented:

`branin` *branin*

Description

BRANIN FUNCTION # # Authors: Sonja Surjanovic, Simon Fraser University # Derek Bingham, Simon Fraser University # Questions/Comments: Please email Derek Bingham at dbingham@stat.sfu.ca. # # Copyright 2013. Derek Bingham, Simon Fraser University. # # THERE IS NO WARRANTY, EXPRESS OR IMPLIED. WE DO NOT ASSUME ANY LIABILITY # FOR THE USE OF THIS SOFTWARE. If software is modified to produce # derivative works, such modified software should be clearly marked. # Additionally, this program is free software; you can redistribute it # and/or modify it under the terms of the GNU General Public License as # published by the Free Software Foundation; version 2.0 of the License. # Accordingly, this program is distributed in the hope that it will be # useful, but WITHOUT ANY WARRANTY; without even the implied warranty # of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU # General Public License for more details. # # For function details and reference information, see: # http://www.sfu.ca/~ssurjano/ # ## # # INPUTS: # # xx = c(x1, x2) # a = constant (optional), with default value 1 # b = constant (optional), with default value 5.1/(4*pi^2) # c = constant (optional), with default value 5/pi # r = constant (optional), with default value 6 # s = constant (optional), with default value 10 # t = constant (optional), with default value 1/(8*pi) #

Usage

```
branin(xx, a = 1, b = 5.1/(4 * pi^2), c = 5/pi, r = 6, s = 10, t = 1/(8 * pi))
```

Arguments

xx	vector
a	double
b	double
c	double
r	double
s	double
t	double

Value

a one single double

`callEshotgun` *Call the e-shotgun Version 1 with Pareto front selection function in python*

Description

The function checks the passed parameter and than calls the e-shotgun Python implementation and returns a matrix with the evaluated points.

Usage

```
callEshotgun(Xtr, Ytr, f_lb, f_ub, q = 10L, epsilon = 0.1, pf = FALSE)
```

Arguments

`Xtr`	a matrix containing the initial points
`Ytr`	a matrix containing the evaluation of Xtr with a given function
`f_lb`	a vector with the values of the lower bounds
`f_ub`	a vector with the values of the upper bounds
`q`	the amount if points that the e-shotgun should evaluate
`epsilon`	the epsilon value of the e-shotgun
`pf`	boolean that decides if pareto front is used

Details

George De Ath, Richard M. Everson, Jonathan E. Fieldsend, and Alma A. M. Rahat. 2020. e-shotgun : e-greedy Batch Bayesian Optimisation. In Genetic and Evolutionary Computation Conference (GECCO '20), July 8–12, 2020, Cancún, Mexico. ACM, New York, NY, USA, 9 pages. https://doi.org/10.1145/3377930.3390154 https://github.com/georgedeath/eshotgun

Value

a matrix or a vector

callEshotgunV2 *Call the e-shotgun version 2 with random selection function in python*

Description

The function checks the passed parameter and than calls the e-shotgun Python implementation and returns a matrix with the evaluated points.

Usage

```
callEshotgunV2(Xtr, Ytr, f_lb, f_ub, q = 10L, epsilon = 0.1, pf = FALSE)
```

Arguments

Xtr	a matrix containing the initial points
Ytr	a matrix containing the evaluation of Xtr with a given function
f_lb	a vector with the values of the lower bounds
f_ub	a vector with the values of the upper bounds
q	the amount if points that the e-shotgun should evaluate
epsilon	the epsilon value of the e-shotgun
pf	boolean that decides if pareto front is used

Details

George De Ath, Richard M. Everson, Jonathan E. Fieldsend, and Alma A. M. Rahat. 2020. e-shotgun : e-greedy Batch Bayesian Optimisation. In Genetic and Evolutionary Computation Conference (GECCO '20), July 8–12, 2020, Cancún, Mexico. ACM, New York, NY, USA, 9 pages. https://doi.org/10.1145/3377930.3390154 https://github.com/georgedeath/eshotgun

Value

a matrix or a vector

checkLibraries *Check for required Library and Python Packages*

Description

The function will download all required Python Packages that are rquired for the e-shotgun to run properly.

Usage

```
checkLibraries(method = "auto", conda = "auto")
```

Arguments

`method`	method of installation
`conda`	environment

Examples

```
checkLibraries()
```

`egg` *egg*

Description

EGGHOLDER FUNCTION # # Authors: Sonja Surjanovic, Simon Fraser University # Derek Bingham, Simon Fraser University # Questions/Comments: Please email Derek Bingham at dbingham@stat.sfu.ca. # # Copyright 2013. Derek Bingham, Simon Fraser University. # # THERE IS NO WARRANTY, EXPRESS OR IMPLIED. WE DO NOT ASSUME ANY LIABILITY # FOR THE USE OF THIS SOFTWARE. If software is modified to produce # derivative works, such modified software should be clearly marked. # Additionally, this program is free software; you can redistribute it # and/or modify it under the terms of the GNU General Public License as # published by the Free Software Foundation; version 2.0 of the License. # Accordingly, this program is distributed in the hope that it will be # useful, but WITHOUT ANY WARRANTY; without even the implied warranty # of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU # General Public License for more details. # # For function details and reference information, see: # http://www.sfu.ca/~ssurjano/ # ## # # INPUT: # # xx = c(x1, x2) #

Usage

```
egg(xx)
```

Arguments

`xx`	Vector with two elements xx = c(x1, x2)

Value

y an single double

`levy` *levy*

Description

LEVY FUNCTION # # Authors: Sonja Surjanovic, Simon Fraser University # Derek Bingham, Simon Fraser University # Questions/Comments: Please email Derek Bingham at dbingham@stat.sfu.ca. # # Copyright 2013. Derek Bingham, Simon Fraser University. # # THERE IS NO WARRANTY, EXPRESS OR IMPLIED. WE DO NOT ASSUME ANY LIABILITY # FOR THE USE OF THIS SOFTWARE. If software is modified to produce # derivative works, such modified software should be clearly marked. # Additionally, this program is free software; you can redistribute it # and/or modify it under the terms of the GNU General Public License as # published by the Free Software Foundation; version 2.0 of the License. # Accordingly, this program is distributed in the hope that it will be # useful, but WITHOUT ANY WARRANTY; without even the implied warranty # of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU # General Public License for more details. # # For function details and reference information, see: # http://www.sfu.ca/~ssurjano/ # ## # # INPUT: # # xx = c(x1, x2, ..., xd) #

Usage

```
levy(xx)
```

Arguments

`xx`	vector

Value

a dounle

`modifiedBranin` *modifiedBranin*

Description

The Branin Function applied to a matrix

Usage

```
modifiedBranin(x)
```

Arguments

`x`	matrix with the initial points

Value

m a matrix

`modifiedEgg` *modifiedEgg*

Description

The Eggholder Function applied to a matrix

Usage

```
modifiedEgg(x)
```

Arguments

`x`	matrix with the inital points

Value

a matrix

`modifiedLevy` *modifiedlevy*

Description

The Levy Funciton applied to a matrix

Usage

```
modifiedLevy(x)
```

Arguments

`x`	vector

Value

a matrix

`modifiedschwef` *modifiedschwef*

Description

The schwefel Function applied to a matrix

Usage

```
modifiedschwef(x)
```

Arguments

`x`	matrix with the initial points

Value

a matrix

`runSampleOpt` *runSampleOpt*

Description

Optimizing a function with the e-shotgun.

Usage

```
runSampleOpt(fn, budget = 100)
```

Arguments

`fn`	function of the testproblem
`budget`	budget for the run

schwef *schwef*

Description

SCHWEFEL FUNCTION # # Authors: Sonja Surjanovic, Simon Fraser University # Derek Bingham, Simon Fraser University # Questions/Comments: Please email Derek Bingham at dbingham@stat.sfu.ca. # # Copyright 2013. Derek Bingham, Simon Fraser University. # # THERE IS NO WARRANTY, EXPRESS OR IMPLIED. WE DO NOT ASSUME ANY LIABILITY # FOR THE USE OF THIS SOFTWARE. If software is modified to produce # derivative works, such modified software should be clearly marked. # Additionally, this program is free software; you can redistribute it # and/or modify it under the terms of the GNU General Public License as # published by the Free Software Foundation; version 2.0 of the License. # Accordingly, this program is distributed in the hope that it will be # useful, but WITHOUT ANY WARRANTY; without even the implied warranty # of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU # General Public License for more details. # # For function details and reference information, see: # http://www.sfu.ca/~ssurjano/ # ## # # INPUT: # # xx = c(x1, x2, ..., xd) #

Usage

```
schwef(xx)
```

Arguments

xx	vector

Value

a double

sphere *sphere*

Description

SPHERE FUNCTION, MODIFIED # # Authors: Sonja Surjanovic, Simon Fraser University # Derek Bingham, Simon Fraser University # Questions/Comments: Please email Derek Bingham at dbingham@stat.sfu.ca. # # Copyright 2013. Derek Bingham, Simon Fraser University. # # THERE IS NO WARRANTY, EXPRESS OR IMPLIED. WE DO NOT ASSUME ANY LIABILITY # FOR THE USE OF THIS SOFTWARE. If software is modified to produce # derivative works, such modified software should be clearly marked. # Additionally, this program is free software; you can redistribute it # and/or modify it under the terms of the GNU General Public License as # published by the

Free Software Foundation; version 2.0 of the License. # Accordingly, this program is distributed in the hope that it will be # useful, but WITHOUT ANY WARRANTY; without even the implied warranty # of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU # General Public License for more details. # # For function details and reference information, see: # http://www.sfu.ca/~ssurjano/ # ## # # INPUT: # # xx = c(x1, x2, x3, x4, x5, x6) # ##

Usage

```
sphere(x)
```

Arguments

x	Vector x = c(x1, x2, x3, x4, x5, x6)

Value

a matrix with the sphere function applied to each row

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