Package 'SphereOptimize'

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Type Package

Title Optimization On A Unit Sphere

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Description This package provides a simple tool for numerical optimization on the unit sphere. This is achieved by combining the spherical coordinating system with L-BFGS-B optimization.

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LazyData true

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R topics documented:

`from.Sphere` *Converting spherical coordinates to Cartesian coordinates*

Description

The function from.Sphere convert a list of angles representing a point on a unit sphere to the corresponding Cartesian coordinates.

Usage

```
from.Sphere(theta)
```

Arguments

theta	A list of angles. The first item should be between 0 to pi, and the following items should be between 0 to 2*pi.

Value

A vector of the corresponding Cartesian coordinates.

Examples

```
from.Sphere(c(pi/3, pi/4, pi/5))
```

SphereOptimize *Conducting optimization on a unit sphere*

Description

The function SphereOptimize conducts optimization on a unit sphere. If the size of neighbor near the initial value is specified, the L-BFGS-B opitmization algorithm will be called. Otherwise this function searches the whole unit sphere using Nelder-Mead algorithm by default. Other optimization methods are allowed.

Usage

```
SphereOptimize(par, fn, neighbor = NULL, ...)
```

Arguments

par	Initial values for the parameters to be optimized over. Must be in Cartesian coordinates and on a unit sphere.
fn	A function to be minimized (or maximized).
neighbor	Radius of neighbor to search for the optimal results. If not specified, this function will search for the whole unit sphere.
...	Extra arguments that can be passed to optim().

Value

A list compose three items.

- par The optimal restuls found.
- value The value of fn corresponding to par.
- method The optimization algorithm used.

Examples

```
fn = function(s){
    return(sum(s^3))
}

s = c(sqrt(2)/2,sqrt(2)/2)
k = SphereOptimize(s, fn, control = list(fnscale = -1))
k$value
k$par
```

`to.Sphere` *Converting Cartesian coordinates to spherical coordinates*

Description

The function to.Sphere convert a list of Cartesian coordinates representing a point on a unit sphere to the corresponding spherical coordinates.

Usage

```
to.Sphere(s)
```

Arguments

s	A list of Cartesian coordinates.

Value

A vector of the corresponding angles in spherical coordinating system.

Examples

```
s = from.Sphere(c(pi/3, pi/4, pi/5))
theta = to.Sphere(s)
theta = round(theta, 5)
theta == round(c(pi/3, pi/4, pi/5), 5)
```

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