Package ‘desirability’

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Title Function Optimization and Ranking via Desirability Functions
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Description

Functions implementing multivariate optimization and ranking using the desirability function approach described in Derringer and Suich (1980)
Usage

```r
## Default S3 method:
dMax(low, high, scale = 1, tol = NULL, ...)
## Default S3 method:
dMin(low, high, scale = 1, tol = NULL, ...)
## Default S3 method:
dTarget(low, target, high, lowScale = 1, highScale = 1, tol = NULL, ...)
## Default S3 method:
dArb(x, d, tol = NULL, ...)
## Default S3 method:
dBox(low, high, tol = NULL, ...)
## Default S3 method:
dCategorical(values, tol = NULL, ...)
## Default S3 method:
dOverall(...)
```

Arguments

- `low` a constant to define the desirability function for `dMax`, `dMin`, `dTarget` and `dBox`
- `high` a constant to define the desirability function for `dMax`, `dMin`, `dTarget` and `dBox`
- `target` a constant to define the desirability function for `dMax`, `dMin`, `dTarget` and `dBox`
- `scale` the scaling factor for `dMax` and `dMin`. Values less than one make the criteria more difficult to satisfy while values greater than one make it easier.
- `lowScale` the scaling factor for `dTarget`. This bends the curve between the points `low` and `target`. Values less than one make the criteria more difficult to satisfy while values greater than one make it easier.
- `highScale` the scaling factor for `dTarget`. This bends the curve between the points `high` and `target`. Values less than one make the criteria more difficult to satisfy while values greater than one make it easier.
- `x` a set of input values
- `d` a set of desirabilites between zero and one (inclusive) that match the length of `x`
- `values` a named numeric vector of possible values
- `tol` an optional tolerance for zero desirability. When this is non-null, zero desirabilities are replaced with this value
- `...` For `dOverall`, this is one or more desirability objects. For the other methods, this argument is not currently used

Details

The functions `dMax`, `dMin`, `dTarget` and `dOverall` are the basic equations used by Derringer and Suich (1980). `dBox` is a simple step function between two points. `dArb` can be used to create other shapes that do not fall into the other functional forms. See the package vignette or the references for more details.
predict.dMax

Value

a list. Common values are:

- `tol` the value specified by the `tol` argument
- `call` the original function call

Author(s)

Max Kuhn

References


See Also

- `predict.dMax`

Examples

```r
dMax.default(1L, 3)
dMax(1L, 3)
```

predict.dMax Predict method for desirability functions

Description

Predicted values based on desirability objects

Usage

```r
## S3 method for class 'dMax'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dMin'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dTarget'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dArb'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dBox'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dCategorical'
predict(object, newdata = NA, missing = object$missing, ...)
## S3 method for class 'dOverall'
predict(object, newdata = data.frame(NA, ncol = length(object$d)), all = FALSE, ...)
```
Arguments

object  a object of class: dMax, dMin, dTarget, dArb, dBox or dOverall
newdata values of the response for predicting desirability
all a logical (for predict.dOverall only); should the individual desirabilities also be returned?
missing a number between 0 and 1 for missing values (the internally estimated value is used by default)
... no currently used

Details

The responses are translated into desirability units.

Value

a vector, unless predict.dOverall is used with all=TRUE, in which case a matrix is returned.

Author(s)

Max Kuhn

References


See Also

dMax

Examples

d1 <- dMin(1,3)
d2 <- dTarget(1, 2, 3)
d3 <- dCategorical(c("a" = .1, "b" = .7))
dAll <- dOverall(d1, d2, d3)

outcomes <- data.frame(seq(0, 4, length = 10),
                       seq(0.5, 4.5, length = 10),
                       sample(letters[1:2], 10, replace = TRUE))
names(outcomes) <- c("x1", "x2", "x3")

predict(d1, outcomes[2])
predict(d2, outcomes[2])
predict(d3, outcomes[3])
predict(dAll, outcomes)
predict(dAll, outcomes, all = TRUE)
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