Package ‘prc’

February 20, 2015

LazyLoad yes
LazyData yes
Version 2014.11-4
Title Paired Response Curve
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Depends R (>= 3.0.0), kyotil, nlme
Suggests RUnit, Rmosek, Matrix

Imports

Additional_repositories http://download.mosek.com/R/7

Description Estimation, prediction and testing for analyzing serial dilution assay data using paired response curve.
License GPL (>= 2)
NeedsCompilation yes
Repository CRAN

Date/Publication 2014-11-05 01:16:53

R topics documented:

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Example Dataset

Description
from MTCT correlates study

Usage
data(mtctNeg)

Format
A data frame with 248 observations on the following 2 variables.
- `v3_bioV3B_500` a numeric vector
- `v3_bioV3B_2500` a numeric vector

References
Permar et al.

Four Parameter Paired Response Curve

Description
Estimate four-parameter paired response curve using both total least squares and semiparametric methods.

Usage
```r
crc(xvar, dil.x, yvar, dil.y, model=c("4P","3P"), method=c("M-estimator","naive"),
    init.method=c("gnls","optim"), opt.method=c("gnls","optim"), reltol=1e-3, max.iter=50,
    init=NULL, verbose=FALSE)

crcsp (xvar, dil.x, yvar, dil.y, grid.density=200, init.method=c("gnls","optim"),
    reltol=1e-3, max.iter=20, model=c("4P"), init=NULL, try.additiona.support.sets=TRUE,
    verbose=FALSE)

mixlik (object, ...)
## S3 method for class 'prc'
mixlik(object, ...)
```
Arguments

- **xvar**: vector of numbers on the ln(FI) scale
- **dil.x**: numeric.
- **yvar**: vector of numbers on the ln(FI) scale
- **dil.y**: numeric.
- **init.method**: `gnls` uses `gnls` to find initial parameter estimate and `optim` uses `optim`. In the initial estimation, measurement errors in the xvar are ignored.
- **reltol**: relative tolerance convergence criterion used in optimization
**opt.method** | optimization method
---|---
**method** | M-estimator minimizes total least squares. Naive minimizes least squares, ignoring measurement errors in the xvar.
**model** | 4P is a four-parameter model proposed in Fong et al. 3P is a three-parameter model that assumes f=1 in 4P.
**max.iter** | maximum number of iterations to perform in optimization. Each iteration comprises finding the best r given theta and finding the best theta given r
**verbose** | Boolean. If TRUE, print messages during execution
**object** | an object of type prc
**new.dilution** | a new dilution
**type** | "b" for both points and line, "l" for line only
**add** | add to an existing plot or not
**lcol** | line color
**pcol** | points color
**col** | color
**diag.line** | whether to add a diagonal line
**log.axis** | whether the axis should be on the log scale
**xlab** | xlab
**ylab** | ylab
**lwd** | line width. Does not affect points
**x** | object of class prc or quad depending on the functions
**xx** | vector of numbers on the log scale
**k** | dilution ratio: dilution of x axis/dilution of y axis, e.g. 2500/500
**c** | parameter c in the four-parameter paired response model
**d** | parameter d in the four-parameter paired response model
**b** | parameter b in the four-parameter paired response model
**f** | parameter f in the four-parameter paired response model
**a** | parameter a in the quadratic model
**r** | the x axis of a point on the prc on the log scale
**init** | initial parameter value
**ret.sd** | whether to return standard deviation
**xlim** | xlim
**ylim** | ylim
**logc** | log(c) in the four-parameter paired response model
**logd** | log(d) in the four-parameter paired response model
**dil.r** | dilution ratio
**sigma.sq** | sigma square
**support** | the support of the distribution
try.additiona.support.sets
  boolean
stop.after.init
  Boolean. If true (not recommended), a naive curve estimate which pretends there is no measurement error in xvar is returned. If false, a proper least squares estimate accounting for errors-in-variables is returned.

x.range
  a pair of low and high
grid.density
  number of grid points
fix.sigma.sq
  whether to assume simgasq is fixed
...
  more args

Details

prc() operates on the scale on which the distance is defined. For example, for MBA/Luminex readouts, this is the log(FI) scale. s.dot.f() is created with deriv3 and it returns prc function value, as well as gradient and hessian at the point (r,s(r))
quadratic.eiv and quadratic.eiv.sp deal with a quadratic model as an illustration

Value

Both prc and prcsp return an object of type prc.

coefficients
  curve estimate
sigma.sq
  error variance estimate
dilution.ratio
  dilution.x/dilution.y
dilution.x
  sample dilution for the readouts plotted on the x axis
dilution.y
  sample dilution for the readouts plotted on the y axis
xvar
  observations on the x axis
yvar
  observations on the y axis
rvar
  closest point to (x,y) on the curve is (r,s(r))

Both quadratic.eiv and quadratic.eiv.sp return an object of type quad, which has a similar structure as type prc.

compute.A returns a matrix.

Author(s)

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References

Examples

# estimation
fit = prc (mtct.eg$V3_BioV3B_2500, 2500, mtct.eg$V3_BioV3B_500, 500, verbose=TRUE)
plot(fit)

# prediction
logfi.1000 = predict(fit, new.dilution=1000)
points(exp(fit$rvar), exp(logfi.1000), col=2, cex=.5)

theta = coef(fit)
four_pl_prc(theta["c"], theta["d"], theta["b"], theta["f"], log(500), k=5)
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