Package 'AcceptanceSampling'

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Type Package

Title Creation and Evaluation of Acceptance Sampling Plans

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Description Provides functionality for creating and
evaluating acceptance sampling plans. Sampling plans can be single,
double or multiple.

Depends methods, R(>= 2.4.0), stats

Imports graphics, utils

License GPL (>= 3)

LazyLoad yes

NeedsCompilation no

Author Andreas Kiermeier [aut, cre],
Peter Bloomfield [ctb]

Maintainer Andreas Kiermeier <Andreas.Kiermeier@gmail.com>

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R topics documented:

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assess-methods   *Assessment methods for the class family "OC2c" and "OCvar".*

Description

Assess whether the sampling plan can meet the specified *Producer Risk Point (PRP)* and/or *Consumer Risk Point (CRP)*.

Arguments

object	An object of class `OC2c` or `OCvar`.
PRP	The Producer Risk Point in the form of a two element numeric vector of the form `c(pd, pa)`. The first element specifies, pd, determines the quality level at which to evaluate the plan. The second element, pa, indicates the *minimum* probability of acceptance to be achieved by the plan.
CRP	The Consumer Risk Point in the form of a two element numeric vector of the form `c(pd, pa)`. The first element specifies, pd, determines the quality level at which to evaluate the plan. The second element, pa, indicates the *maximum* probability of acceptance to be achieved by the plan.
print	Logical indicating whether to print a summary of the assessment or not. Defaults to `TRUE`

Methods

object="OC2c" Assess whether the sampling plan can meet the provided producer and/or consumer risk point(s).

Usage

assess(object, PRP, CRP, print)

Author(s)

Andreas Kiermeier

See Also

[OC2c](), [OCvar]()

find.plan	*Utility function for finding sampling plans.*

Description

Find the sampling plan with smallest sample size (single sample only) such that specified *Producer Risk Point (PRP)* and *Consumer Risk Point (CRP)* are both met.

Arguments

PRP	The Producer Risk Point in the form of a two element numeric vector of the form c(pd, pa). The first element, pd, specifies the quality level at which to evaluate the plan. The second element, pa, indicates the *minimum* probability of acceptance to be achieved by the plan.
CRP	The Consumer Risk Point in the form of a two element numeric vector of the form c(pd, pa). The first element, pd, specifies the quality level at which to evaluate the plan. The second element, pa, indicates the *maximum* probability of acceptance to be achieved by the plan.
type	The distribution which the sampling plan is based on. Possible values are binomial, hypergeom, poisson and normal.
N	The size of the population from which samples are drawn. Only applicable for type="hypergeom".
s.type	The type of the standard deviation. A value of known results in a sampling plan based on the population standard deviation, while a value of unknown results in the use of the sample standard deviation.

Usage

find.plan(PRP, CRP, type="binomial")

find.plan(PRP, CRP, type="hypergeom", N)

find.plan(PRP, CRP, type="normal", s.type="unknown")

Author(s)

Andreas Kiermeier

See Also

OC2c, OCvar

OC2c   *Operating Characteristics of an Acceptance Sampling Plan*

Description

The preferred way of creating new objects from the family of ″OC2c″ classes.

Usage

```
OC2c(n,c,r=if (length(c)<=2) rep(1+c[length(c)], length(c)) else NULL,
  type=c("binomial","hypergeom", "poisson"), ...)
```

Arguments

n	A vector of length k giving the sample size at each of the k stages of sampling, e.g. for double sampling k=2.
c	A vector of length k giving the **cumulative** acceptance numbers at each of the k stages of sampling.
r	A vector of length k giving the **cumulative** rejection numbers at each of the k stages of sampling.
type	The possible types relate to the distribution on which the plans are based on, namely, binomial, hypergeom, and poisson.
...	Additional parameters passed to the class generating function for each type. See Details for options.

Details

Typical usages are:

```
OC2c(n, c)
OC2c(n, c, r, pd)
OC2c(n, c, r, type="hypergeom", N, pd)
OC2c(n, c, r, type="poisson", pd)
```

The first and second forms use a default type of "binomial". The first form can calculate r *only* when n and c are of length 1 or 2.

The second form provides a the proportion of defectives, pd, for which the OC function should be calculated (default is pd=seq(0, 1, 0.01).

The third form states that the OC function based on a Hypergeometric distribution is desired. In this case the population size N also needs to be specified. In this case, pd indicates the proportion of population defectives, such that pd*N gives the actual number of defectives in the population. If N or pd are not specified they take defaults of N=100 and pd=seq(0, 1, 0.01). A warning is issued if N and D=N*pd are not integers by checking the value, not the object type.

Value

An object from the family of `OC2c-class`, namely of class `OCbinomial`, `OChypergeom`, or `OCpoisson`.

See Also

OC2c-class

Examples

```
## A standard binomial sampling plan
x <- OC2c(10,1)
x ## print out a brief summary
plot(x) ## plot the OC curve
plot(x, xlim=c(0,0.5)) ## plot the useful part of the OC curve

## A double sampling plan
x <- OC2c(c(125,125), c(1,4), c(4,5), pd=seq(0,0.1,0.001))
x
plot(x) ## Plot the plan

## Assess whether the plan can meet desired risk points
assess(x, PRP=c(0.01, 0.95), CRP=c(0.05, 0.04))

## A plan based on the Hypergeometric distribution
x <- OC2c(10,1, type="hypergeom", N=5000, pd=seq(0,0.5, 0.025))
plot(x)

## The summary
x <- OC2c(10,1, type="hypergeom", N=5000, pd=seq(0,0.5, 0.1))
summary(x, full=TRUE)

## Plotting against a function which generates P(defective)
xm <- seq(-3, 3, 0.05) ## The mean of the underlying characteristic
x <- OC2c(10, 1, pd=1-pnorm(0, mean=xm, sd=1))
plot(xm, x) ## Plot P(accept) against mean
```

OC2c-class   *Class Family "OC2c".*

Description

The family `"OC2c"` ("Operating Characteristic" function) of classes provides methods for creating, plotting, printing and assessing single, double, and multiple acceptance sampling plans based on the Binomial (`"OCbinomial"`), Hypergeometric (`"OChypergeom"`), and Poisson (`"OCpoisson"`) distributions.

Objects from the Class

The `"OC2c"` class is a virtual Class: No objects may be created from it.

However, objects from the derived classes can be created by calls of the form `new("OCbinomial", ...)`, for example, or preferably using the creator function `OC2c`.

Slots

`n:` Object of class `"numeric"`. A vector of length k giving the sample size at each of the k stages of sampling, e.g. for double sampling k=2.

`c:` Object of class `"numeric"`. A vector of length k giving the **cumulative** acceptance numbers at each of the k stages of sampling.

`r:` Object of class `"numeric"`. A vector of length k giving the **cumulative** rejection numbers at each of the k stages of sampling.

`type:` Object of class `"character"`. The possible types relate to the distribution on which the plans are based on, namely, `binomial`, `hypergeom`, and `poisson`

`pd:` Object of class `"numeric"`. A numeric vector indicating the quality for which a probability of acceptance is calculated under the specified sampling plan. Meaning differs for the different `types`.

For `"OCbinomial"` this relates to the proportion of defectives created by the process.

For `"OChypergeom"` this relates to the proportion of population defectives created by the process.

For `"OCpoisson"` this relates to the rate of defects (per item) created by the process.

`N:` Object of class `"numeric"`. Only for class `"OChypergeom"`, a number giving the population (lot) size from which the sample is drawn.

`paccept:` Object of class `"numeric"`. A numeric vector with the probability of acceptance which correspond to the quality as given by pd.

Methods

plot `signature(x="OCbinomial", y="missing")`,
`signature(x="numeric", y="OCbinomial")`,
`signature(x="OChypergeom", y="missing")`,
`signature(x="numeric", y="OChypergeom")`,
`signature(x="OCpoisson", y="missing")` or
`signature(x="numeric", y="OCpoisson")`: Plot the OC curve.

show `signature("OC2c")` or `signature("OChypergeom")`: Show the details of the sampling plan.

summary `signature("OC2c")` or `signature("OChypergeom")`: Summarise the sampling plan. Optional argument `full` (defaults to `FALSE`) will show the details at all quality values (pd) supplied when the object was created.

assess `signature(objqect="OC2c")`: Assess whether the sampling plan can meet the specified *Producer Risk Point (PRP)* and/or *Consumer Risk Point (CRP)*. For details see `assess,OC2c-method`

Author(s)

Andreas Kiermeier

References

Hald, A. (1981), *Statistical theory of sampling inspection by attributes*, Academic Press.

See Also

[OC2c](OC2c)

OCvar	*Operating Characteristics of an Acceptance Sampling Plan*

Description

The preferred way of creating new objects from the family of `"OCvar"` classes.

Usage

```
OCvar(n, k, type=c("normal"), ...)
```

Arguments

n	A vector of length 1 giving the sample size.
k	A vector of length 1 giving the absolute distance, in units of the standard deviation, between the specification limit (based on the distribution of the items) and the acceptance limit (based on the distribution of the sample mean). See Schilling (1982) page 226 for details.
type	The possible types relate to the distribution on which the plans are based on, namely, `normal`.
...	Additional parameters passed to the class generating function for each type. See Details for options.

Details

Typical usages are:

```
OCvar(n, k, s)
OCvar(n, k, pd, s)
OCvar(n, k, pd, s, s.type)
```

The two forms use a default `type` of "normal". Note that for the normal distribution the value of the standard deviation must be given. It is assumed to be the population standard deviation; this can be changed by letting `s.type="unknown"`.

The second form provides a the proportion of defectives, pd, for which the OC function should be calculated (default is pd=seq(0, 1, 0.01).

Value

An object from the family of `OCvar-class`, namely of class `OCnormal`.

References

Schilling, E. G. (1982), *Acceptance Sampling in Quality Control*, Dekker

Guenther, W. C (1977), *Sampling Inspection in Statistical Quality Control*, Charles Griffin and Co Ltd

See Also

OC2c-class

Examples

```
## A normal sampling plan - st. dev. known
x <- OCvar(14, 1.205)
x ## print out a brief summary
plot(x) ## plot the OC curve
plot(x, xlim=c(0,0.4)) ## plot the useful part of the OC curve

## Assess whether the plan can meet desired risk points
assess(x, PRP=c(0.05, 0.95), CRP=c(0.2, 0.1))

summary(x, full=TRUE)
```

OCvar-class   *Class Family "OCvar".*

Description

The family `"OCvar"` ("Operating Characteristic" function) of classes provides methods for creating, plotting, printing and assessing single acceptance sampling plans for variables, based on the Normal (`"OCnormal"`) distribution.

Objects from the Class

The `"OCvar"` class is a virtual Class: No objects may be created from it.

However, objects from the derived classes can be created by calls of the form `new("OCnormal", ...)`, for example, or preferably using the creator function OCvar.

Slots

n: Object of class `"numeric"`. A vector of length 1 giving the sample size.

k: Object of class `"numeric"`. A vector of length 1 giving the absolute distance, in units of the standard deviation, between the specification limit (based on the distribution of the items) and the acceptance limit (based on the distribution of the sample mean). See Schilling (1982) page 226 for details.

type: Object of class `"character"`. The possible types relate to the distribution on which the plans are based on. Currently the only supported distribution is `normal`.

pd: Object of class `"numeric"`. A numeric vector indicating the quality for which a probability of acceptance is calculated under the specified sampling plan. Meaning differs for the different `types`.

For `"OCnormal"` this relates to the proportion of defectives created by the process.

s: Object of class `"numeric"`. A vector of length 1 giving the population/sample standard deviation.

s.type: Object of class `"character"`. Only for class `"OCnormal"`, indicates whether the plan is based on the population (`s.type="known"`) or sample standard deviation (`s.type="known"`).

paccept: Object of class `"numeric"`. A numeric vector with the probability of acceptance which correspond to the quality as given by pd.

Methods

plot `signature(x="OCnormal", y="missing")`,
    `signature(x="numeric", y="OCnormal")`: Plot the OC curve.

show `signature("OCvar")`: Show the details of the sampling plan.

summary `signature("OCcar")`: Summarise the sampling plan. Optional argument `full` (defaults to `FALSE`) will show the details at all quality values (pd) supplied when the object was created.

assess `signature(object="OCvar")`: Assess whether the sampling plan can meet the specified *Producer Risk Point (PRP)* and/or *Consumer Risk Point (CRP)*. For details see `assess,OCvar-method`

Author(s)

Andreas Kiermeier

References

Guenther, W. C. (1977) *Sampling Inspection in statistical quality control*, Charles Griffin and Company Limited

Hald, A. (1981), *Statistical theory of sampling inspection by attributes*, Academic Press.

Schilling, E. G. (1982), *Acceptance Sampling in Quality Control*, Dekker

See Also

`OCvar`

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