Package 'ALSM'

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Type Package

Title Companion to Applied Linear Statistical Models

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Description Functions and Data set presented in Applied Linear Statistical Models Fifth Edition (Chapters 1-9 and 16-25), Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li, 2005. (ISBN-10: 0071122214, ISBN-13: 978-0071122214) that do not exist in R, are gathered in this package. The whole book will be covered in the next versions.

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LazyData TRUE

Depends R (>= 3.0.0), stats, graphics, leaps, SuppDists, car

RoxygenNote 5.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

ABTElectronicsCorporation *ABT Electronics Corporation*

Description

ABT Electronics Corporation dataset

Usage

```
data("ABTElectronicsCorporation")
```

Format

A data frame with 40 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(ABTElectronicsCorporation)
## maybe str(ABTElectronicsCorporation) ; plot(ABTElectronicsCorporation) ...
```

AICp *Calculate AIC*

Description

Akaike's information criterion

$$AIC = n * ln(SSEp) - n * ln(n) + 2 * p$$

Usage

```
AICp(model)
```

Arguments

`model`	model of regression

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. page 360

See Also

cpc,SBCp,pressc

Examples

```
#### example page 360
AICp(lm(lny~x4,SurgicalUnit))
```

`aligned.dot.plot2` *Aligned dot plot specific variable correspond to two factor*

Description

Aligned dot plot specific variable correspond to two factor

Usage

```
aligned.dot.plot2(y, factor1, factor2)
```

Arguments

`y`	variable based on plot aligned dot plot
`factor1`	first factor variable
`factor2`	second factor variable

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition.

Examples

```
library('ALSM')
y=CashOffers$y
A=CashOffers$A
B=CashOffers$B
aligned.dot.plot2(y,A,B)
```

ApexEnterprises *ApexEnterprises*

Description

ApexEnterprises

Usage

```
data("ApexEnterprises")
```

Format

A data frame with 20 observations on the following 3 variables.

`y` a numeric vector

`officer` a numeric vector

`candidate` a numeric vector

References

neter

Examples

```
data(ApexEnterprises)
## maybe str(ApexEnterprises) ; plot(ApexEnterprises) ...
```

AuditorTraining_10 *Auditor Training (10 block)*

Description

Auditor Training (10 block)

Usage

```
data("AuditorTraining_10")
```

Format

A data frame with 30 observations on the following 3 variables.

`y` a numeric vector

`block` a numeric vector

`factor` a numeric vector

`x` covariate

Examples

```
data(AuditorTraining_10)
## maybe str(AuditorTraining_10) ; plot(AuditorTraining_10) ...
```

`AuditorTraining_5` *Auditor Training (5 block)*

Description

Auditor Training (5 block)

Usage

```
data("AuditorTraining_5")
```

Format

A data frame with 30 observations on the following 4 variables.

`y` a numeric vector

`block` a numeric vector

`factor` a numeric vector

`num` a numeric vector

Examples

```
data(AuditorTraining_5)
## maybe str(AuditorTraining_5) ; plot(AuditorTraining_5) ...
```

`BestSub` *Automatic Search Procedures for Model Selection; Best Subsets Algorithms*

Description

best subsets according to a specified criterion are identified without requiring the fitting of all of the possible subset regression models.

Usage

```
BestSub(x,y,method=c('r2','r2adj','sse','cp','press','aic','sbc'),num=2)
```

Arguments

x	matrix of predictors
y	response vector
method	best subsets according to this specified criterion. R2,R2adj,sse,cp,press,aic and sbc.
num	number of best subset model per number of predictor variable.

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition.chapter 9

Examples

```
## page 363
library("leaps")
BestSub(SurgicalUnit[,1:8],SurgicalUnit[,10],method='r2',num=2)
```

---

bftest *Brown-Forsythe Test between two group*

Description

Tests for Constancy of Error Variance between two group

Usage

```
bftest(fit,group,alpha=.05)
```

Arguments

fit	model of regression
group	vector, determine two group
alpha	Type I error level

Details

length group and number of observations should be equal

Value

test statistic, p.value, alpha and degree of freedom

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 116

Examples

```
################### EXAMPLE PAGE 117


### Group
g<-rep(1,25)
g[TolucaCompany$x<=70]=0
### TEST
bftest(lm(y~x,TolucaCompany),g)
```

`BodyFat` *Body Fat dataset*

Description

study of the relation of amount of body fat (Y) to several possible predictor variables, based on a sample of 20 healthy females 25-34 years old

Usage

```
data("BodyFat")
```

Format

A data frame with 20 observations on the following 4 variables.

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

`y` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .TABLE 7.1 page 257

Examples

```
data(BodyFat)
## maybe str(BodyFat) ; plot(BodyFat) ...
```

boxcox.sse *Box-Cox Transformations (SSE)*

Description

transformation from the family of power transformations on Y. box-cox transformation according to SSE.

also plot SSE against lambda

Usage

```
boxcox.sse(x,y,l=seq(-2,2,.1))
```

Arguments

x	vector predictor variable
y	vector response variable
l	vector, Different values of lambda

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition.page 134

Examples

```
### table 3.9 & figure 3.17 (page 136)
boxcox.sse(Plasma[,1],Plasma[,2])

### table 18.6 page 792
boxcox.sse(factor(ServoData[,2]),ServoData[,1])
```

CashOffers *Cash Offers*

Description

Cash Offers dataset

Usage

```
data("CashOffers")
```

Format

A data frame with 36 observations on the following 3 variables.

`y` response variable

`A` factor variable

`B` factor variable

`num` index corresponding to each response

`x` covariate

Examples

```
data(CashOffers)
## maybe str(CashOffers) ; plot(CashOffers) ...
```

CastleBakery *Castle Bakery*

Description

Castle Bakery data set

Usage

```
data("CastleBakery")
```

Format

A data frame with 12 observations on the following 4 variables.

`y` a numeric vector

`A` a numeric vector

`B` a numeric vector

`num` a numeric vector

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. Table 19.7

Examples

```
data(CastleBakery)
## maybe str(CastleBakery) ; plot(CastleBakery) ...
```

`ci.reg` *Estimation and confidence interval of Mean Response and Prediction of New Observation in regression model*

Description

Estimation of Mean Response and Prediction of New Observation:

Interval Estimation of EY_h

Confidence Region for Regression Surface. WorkingHotelling confidence band

Simultaneous Confidence Intervals for Several Mean Responses (Working-Hotelling, Bonferroni confidence limit)

Prediction of New Observation Yh(new)

Prediction of Mean of m New Observations at Xh

Predictions of g New Observations. Simultaneous Scheffe prediction limits for g new observations at g different levels X_h

Usage

```
ci.reg(model, newdata, type = c("b", "s","w","n","m","nm","gn"), alpha = 0.05,m=1)
```

Arguments

`model`	model of regression
`newdata`	Data frame, New data on which the point estimate and confidencr interval is calculated.
`type`	Type of confidence interval
`alpha`	Confidence interval calculate with 1-α percent
`m`	When use "type=nm", m is equal, new observations are to be selected at the same levels x_h

Details

Type values:

`b` Simultaneous Confidence Intervals for Several Mean Responses by Bonferroni simultaneous confidence intervals.

`s` Simultaneous Scheffe prediction limits for g new observations at g different levels x_h

`w` Confidence Region for Regression Surface or Simultaneous Confidence Intervals for Several Mean Responses

`n` Prediction of New Observation.

`m` Mean response of New Observation.

`nm` When In new observations are to be selected at the same levels X_h and their mean Yh(new) is to be predicted

`gn` Simultaneous Bonferroni prediction limits for g new observations at g different levels X_h

NOTE: for the rest of the type states, m = 1.

Value

calculate estimation and cofidence interval

Note

by default, type is 'b'

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition

Examples

```
#### problem 6.14.a page 250
d<-data.frame(282000,7.1,0)
ci.reg(lm(y~x1+x2+x3,GroceryRetailer),d,type='nm',m=3)

#### problem 6.13.b page 250
d<-data.frame(c(230000,250000,280000,340000),c(7.5,7.3,7.1,6.9),c(0,0,0,0))
ci.reg(lm(y~x1+x2+x3,GroceryRetailer),d,type='gn')

#### problem 6.12.a page 250
d<-data.frame(c(302000,245000,280000,350000,295000),c(7.2,7.4,6.9,7,6.7),c(0,0,0,0,1))
ci.reg(lm(y~x1+x2+x3,GroceryRetailer),d,type='b')

### example page 158
d<-data.frame(c(30,65,100))
ci.reg(lm(y~x,TolucaCompany),d,type='w',alpha=.1)

### example page 54
d<-data.frame(65)
ci.reg(lm(y~x,TolucaCompany),d,type='m',alpha=.1)

### example page 59
d<-data.frame(100)
ci.reg(lm(y~x,TolucaCompany),d,type='n',alpha=.1)
```

CoinOperatedTenninals *Coin Operated Tenninals*

Description

Coin Operated Tenninals

Usage

```
data("CoinOperatedTenninals")
```

Format

A data frame with 8 observations on the following 3 variables.

`y` a numeric vector

`A` a numeric vector

`B` a numeric vector

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. problem 20.2

Examples

```
data(CoinOperatedTenninals)
## maybe str(CoinOperatedTenninals) ; plot(CoinOperatedTenninals) ...
```

ComputerizedGame *Computerized Game*

Description

Computerized Game dataset

Usage

```
data("ComputerizedGame")
```

Format

A data frame with 80 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(ComputerizedGame)
## maybe str(ComputerizedGame) ; plot(ComputerizedGame) ...
```

cpc *Calculate cp critera*

Description

Mallows' Cp Criterion

Usage

```
cpc(r,f)
```

Arguments

r	Reduced model
f	Full model

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 358

See Also

AICp,SBCp,pressc

Examples

```
#### example page 358

cpc(lm(lny~x4,SurgicalUnit),lm(lny~x1+x2+x3+x4,SurgicalUnit))
```

CrackerPromotion *CrackerPromotion*

Description

CrackerPromotion

Usage

```
data("CrackerPromotion")
```

Format

A data frame with 15 observations on the following 4 variables.

`y` a numeric vector

`x` a numeric vector

`treatment` a numeric vector

`store` a numeric vector

Examples

```
data(CrackerPromotion)
## maybe str(CrackerPromotion) ; plot(CrackerPromotion) ...
```

DiskDriveService *Disk Drive Service*

Description

DiskDriveService

Usage

```
data("DiskDriveService")
```

Format

A data frame with 45 observations on the following 4 variables.

`y` a numeric vector

`A` a numeric vector

`B` a numeric vector

`num` a numeric vector

Examples

```
data(DiskDriveService)
## maybe str(DiskDriveService) ; plot(DiskDriveService) ...
```

FillingMachines *Filling Machines*

Description

Filling Machines dataset

Usage

```
data("FillingMachines")
```

Format

A data frame with 120 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(FillingMachines)
## maybe str(FillingMachines) ; plot(FillingMachines) ...
```

GroceryRetailer *Grocery Retailer dataset*

Description

A large, national grocery retailer tracks productivity and costs of its facilities closely.

Usage

```
data("GroceryRetailer")
```

Format

A data frame with 52 observations on the following 4 variables.

`y` a numeric vector

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .problem 6.9 page 249

Examples

```
data(GroceryRetailer)
## maybe str(GroceryRetailer) ; plot(GroceryRetailer) ...
```

`GrowthHormone` *GrowthHormone*

Description

GrowthHormone

Usage

```
data("GrowthHormone")
```

Format

A data frame with 14 observations on the following 4 variables.

`y` a numeric vector

`A` a numeric vector

`B` a numeric vector

`num` a numeric vector

Examples

```
data(GrowthHormone)
## maybe str(GrowthHormone) ; plot(GrowthHormone) ...
```

HayFeverRelief *Hay Fever Relief*

Description

Hay Fever Relief dataset

Usage

```
data("HayFeverRelief")
```

Format

A data frame with 36 observations on the following 4 variables.

`y` response variable

`A` factor A variable

`B` factor B variable

`row` index corresponding to each response

Examples

```
data(HayFeverRelief)
## maybe str(HayFeverRelief) ; plot(HayFeverRelief) ...
```

HelicopterService *Helicopter Service*

Description

Helicopter Service dataset

Usage

```
data("HelicopterService")
```

Format

A data frame with 80 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(HelicopterService)
## maybe str(HelicopterService) ; plot(HelicopterService) ...
```

JobProficiency *Job Proficiency dataset*

Description

A personnel officer in a governmental agency administered four newly developed aptitude tests to each of 25 applicants for entry-level clerical positions in the agency

Usage

```
data("JobProficiency")
```

Format

A data frame with 25 observations on the following 5 variables.

`y` a numeric vector

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

`x4` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .problem 9.10 page 377

Examples

```
data(JobProficiency)
## maybe str(JobProficiency) ; plot(JobProficiency) ...
```

JobProficiencyAdditional
Job Proficiency Additional dataset

Description

25 additional applicants for entry-level clerical positions in the ,agency were similarly tested and hired irrespcctive of their test scores.

Usage

```
data("JobProficiencyAdditional")
```

Format

A data frame with 25 observations on the following 5 variables.

`y` a numeric vector

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

`x4` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .problem 9.22 page 380

Examples

```
data(JobProficiencyAdditional)
## maybe str(JobProficiencyAdditional) ; plot(JobProficiencyAdditional) ...
```

KentonFoodCompany *Kenton Food Company*

Description

Kenton Food Company dataset

Usage

```
data("KentonFoodCompany")
```

Format

A data frame with 19 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(KentonFoodCompany)
## maybe str(KentonFoodCompany) ; plot(KentonFoodCompany) ...
```

MLS *MLS*

Description

MLS

Usage

```
MLS(MSE1, df1, c1, MSE2, df2, c2, alpha = 0.05)
```

Arguments

MSE1	mse1
df1	df1
c1	c1
MSE2	mse2
df2	df2
c2	c2
alpha	a

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. chapter 25.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- ==>  Define data, use random,
##--or do  help(data=index)  for the standard data sets.

## The function is currently defined as
function (MSE1, df1, c1, MSE2, df2, c2, alpha = 0.05)
{
    f1 = qf(1 - alpha/2, df1, Inf)
    f2 = qf(1 - alpha/2, df2, Inf)
    f3 = qf(1 - alpha/2, Inf, df1)
    f4 = qf(1 - alpha/2, Inf, df2)
    f5 = qf(1 - alpha/2, df1, df2)
    f6 = qf(1 - alpha/2, df2, df1)
    g1 <- 1 - 1/f1
    g2 <- 1 - 1/f2
    g3 <- (((f5 - 1)^2) - ((g1 * f5)^2) - ((f4 - 1)^2))/f5
    g4 <- f6 * ((((f6 - 1)/f6)^2) - 1 * (((f3 - 1)/f6)^2) - g2^2)
    hl <- sqrt(((g1 * c1 * MSE1)^2) + (((f4 - 1) * c2 * MSE2)^2) -
        1 * ((g3 * c1 * c2 * MSE1 * MSE2)))
```

```
  hu <- sqrt((((f3 - 1) * c1 * MSE1)^2) + ((g2 * c2 * MSE2)^2) -
      1 * ((g4 * c1 * c2 * MSE1 * MSE2)))
  l = c1 * MSE1 + c2 * MSE2
  L = sum(l)
  lower <- L - hl
  upper <- L + hu
  return(cbind(estimate = L, lower = lower, upper = upper))
}
```

`model.s` *Criteria for Model Selection*

Description

SSEp, R2.p, R2.adj.p, Cp, AICp, SBCp and PRESSP Values for All Possible Regression Modes

Usage

```
model.s(x,y)
```

Arguments

`x`	matrix of predictors
`y`	response vector

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .chapter 9

Examples

```
### table 9.2, page 353
library("leaps")
model.s(SurgicalUnit[,1:4],SurgicalUnit[,10])
```

modelval *Model Validation*

Description

Compare (estimation, SE estimation, PRESSp, AICp, SBSp, R2 , R2.adj, MSE) Training and validition data

Usage

```
modelval(building.set,response.building, prediction.set, response.prediction)
```

Arguments

building.set	matrix predictor Training data
response.building	vector response Training data
prediction.set	matrix predictor Validation data
response.prediction	vector response Validation data

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .chapter 9

Examples

```
#### page 373 (table)
b<-SurgicalUnit
p<-SurgicalUnitAdditional

modelval(b[,c(1,2,3,8)],b[,10],p[,c(1,2,3,8)],p[,10])
modelval(b[,c(1,2,3,5,6,8)],b[,10],p[,c(1,2,3,5,6,8)],p[,10])
```

normal.cor.test *normal correation test*

Description

normal correation test

Usage

```
normal.cor.test(residuals, MSE)
```

Arguments

residuals	residual
MSE	MSE

References

neter

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- ==>  Define data, use random,
##--or do  help(data=index)  for the standard data sets.

## The function is currently defined as
function (residuals, MSE)
{
    w <- 1:length(residuals)
    r <- cor(sort(residuals), sqrt(MSE) * (qnorm((w - 0.375)/(length(residuals) +
        0.25))))
    return(r)
  }
```

---

onerandom *one random effect model*

Description

onerandom effect model.

Usage

```
onerandom(y, treatment, alpha)
```

Arguments

y	y
treatment	tr
alpha	a

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. chapter 25.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- ==>  Define data, use random,
##--or do  help(data=index)  for the standard data sets.

## The function is currently defined as
function (y, treatment, alpha)
{
    treatment <- factor(treatment)
    aov = Anova(lm(y ~ treatment), type = 2)
    mse2 <- aov[, 1]/aov[, 2]
    mse <- mse2[2]
    mstr <- mse2[1]
    r <- aov[1, 2] + 1
    n <- (aov[2, 2] + r)/r
    s <- sqrt(mstr/(r * n))
    lower <- mean(y) - qt(1 - alpha/2, r - 1) * s
    upper <- mean(y) + qt(1 - alpha/2, r - 1) * s
    out.mu <- cbind(estimate = mean(y), lower = lower, upper = upper)
    l = ((mstr/mse) * (1/qf(1 - alpha/2, r - 1, r * (n - 1))) -
        1)/n
    u = ((mstr/mse) * (1/qf(alpha/2, r - 1, r * (n - 1))) - 1)/n
    lower <- l/(l + 1)
    upper <- u/(1 + u)
    out.prop.sigma2.mu <- cbind(lower = lower, upper = upper)
    lower <- (r * (n - 1) * mse)/(qchisq(1 - alpha/2, r * (n -
        1)))
    upper <- (r * (n - 1) * mse)/(qchisq(alpha/2, r * (n - 1)))
    out.sigma2 <- cbind(lower = lower, upper = upper)
    out1 <- satterthwaite(c = c(1/n, -1/n), MSE = c(mstr, mse),
        df = c(r - 1, r * (n - 1)), alpha = alpha)
    out2 <- MLS(MSE1 = mstr, df1 = r - 1, c1 = 1/n, MSE2 = mse,
        df2 = r * (n - 1), c2 = -1/n, alpha = alpha)
    o <- list(anova = aov, mu = out.mu, prop.sigma2.mu = out.prop.sigma2.mu,
        sigma2 = out.sigma2, sigma2.mu.satterthwaite = out1,
        sigma2.mu.MLS = out2)
    return(o)
  }
```

---

oneway *Single-Factor ANOVA*

Description

Fitting of ANOVA Model

Analysis of Variance (test & table)

Test and confidence interval for Single Factor level Mean

inferences for Difference between Two Factor level Means

Contrast of Factor level Means

test and confidence interval for linear Combination of Factor level Means

Analysis of Means (CI for treatment effects)

***** Tests for Constancy of Error Variance: *****

Hartley Test

Brown-Forsythe Test

***** Simultaneos Inference Procedures: *****

Tukey multiple comparison procedure

Scheffe multiple comparison procedure

Bonferroni multiple comparison procedure

***** Nonparametric *****

Nonparametric Rank F Test and multiple Pairwise Testing Procedure

*****A variety of residuals in the output: *****

residuals

semistudentized residuals

studentized residuals

studentized deleted residuals

***** PLOT *****

boxplot by factors

Line Plot of Estimated Factor Level Mean

Bar Graph and Main Effects Plot

bar graph and the main etfects plot of factor level means is to display the confidence limits

***** PLOT for residuals: *****

against fitted value

Aligned Residual Dot Plot

Normal Q-Q plot

histogram

boxplot

Usage

```
oneway(y, group, alpha=0.05,MSE=NULL, c.value=0, mc=NULL, residual,omission.variable=NULL)
```

Arguments

y	vector, response variable
group	vector INTEGER, group variable
alpha	Confidence interval calculate with 1-alpha percent
MSE	mean squre of error

c.value	c value for single factor test. H_0: mu_i=c
mc	Matrix contrast(s), Each row was included in a contrast
residual	Type of residuals. simple (default), semistudentized, studentized or studentized.deleted
omission.variable	numeric vector. Omission of Important Explanatory Variables. Residual analysis may also be used to study whether or not the single-factor ANOVA model is an adequate model.

Value

test & CI

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. chapter 16, 17 and 18

Examples

```
library('ALSM')
library('SuppDists')

with(KentonFoodCompany,oneway(y,group,mc=matrix(c(.5,.5,-.5,-.5),1,4)))
```

Plasma *plasma level of a polyamine*

Description

Data on age (X) and plasma level of a polyamine (Y) for a portion of the 25 healthy children in a study

Usage

```
data("Plasma")
```

Format

A data frame with 25 observations on the following 3 variables.

`x` a numeric vector

`y` a numeric vector

`log.y` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .TABLE 3.8 page 133

Examples

```
data(Plasma)
## maybe str(Plasma) ; plot(Plasma) ...
```

---

plotmodel.s *plot Criterias for Model Selection*

Description

plot R2.p, R2.adj.p, Cp, AICp, SBCp and PRESSP Values for All Possible Regression Modes

Usage

```
plotmodel.s(x,y)
```

Arguments

x	matrix of predictors
y	response vector

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .chapter 9

Examples

```
### figure 9.4, page 356
plotmodel.s(SurgicalUnit[,1:4],SurgicalUnit[,10])
```

PortraitStudio *Portrait Studio dataset*

Description

Dwaine Studios, Inc., operates portrait studios in 21 cities of medium size. These studios specialize in p0l1raits of children

Usage

```
data("PortraitStudio")
```

Format

A data frame with 21 observations on the following 3 variables.

`x1` a numeric vector

`x2` a numeric vector

`y` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 237

Examples

```
data(PortraitStudio)
## maybe str(PortraitStudio) ; plot(PortraitStudio) ...
```

PremiumDistribution *Premium Distribution*

Description

Premium Distribution

Usage

```
data("PremiumDistribution")
```

Format

A data frame with 100 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(PremiumDistribution)
## maybe str(PremiumDistribution) ; plot(PremiumDistribution) ...
```

`pressc` *calculate PRESS*

Description

prediction sum of squares

Usage

```
pressc(fit)
```

Arguments

`fit`	model of regression

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 360

Examples

```
######## example page 361
pressc(lm(lny~x2+x3+x4,SurgicalUnit))
```

`ProductivityImprovement`
Productivity Improvement

Description

Productivity Improvement dataset

Usage

```
data("ProductivityImprovement")
```

Format

A data frame with 27 observations on the following 4 variables.

`y` response variable

`group` factor variable

`num` index corresponding to each response

`x` covariate

Examples

```
data(ProductivityImprovement)
## maybe str(ProductivityImprovement) ; plot(ProductivityImprovement) ...
```

`ProgrammerRequirements`

Programmer Requirements

Description

Programmer Requirements dataset

Usage

```
data("ProgrammerRequirements")
```

Format

A data frame with 24 observations on the following 4 variables.

`y` response variable

`A` factor A variable

`B` factor B variable

`row` index corresponding to each response

Examples

```
data(ProgrammerRequirements)
## maybe str(ProgrammerRequirements) ; plot(ProgrammerRequirements) ...
```

QuestionnaireColor *Questionnaire Color*

Description

Questionnaire Color

Usage

```
data("QuestionnaireColor")
```

Format

A data frame with 15 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(QuestionnaireColor)
## maybe str(QuestionnaireColor) ; plot(QuestionnaireColor) ...
```

RehabilitationTherapy *Rehabilitation Therapy*

Description

Rehabilitation Therapy

Usage

```
data("RehabilitationTherapy")
```

Format

A data frame with 24 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(RehabilitationTherapy)
## maybe str(RehabilitationTherapy) ; plot(RehabilitationTherapy) ...
```

RiskPremium *Risk Premium*

Description

Risk Premium

Usage

```
data("RiskPremium")
```

Format

A data frame with 15 observations on the following 3 variables.

`y` a numeric vector

`block` a numeric vector

`factor` a numeric vector

Examples

```
data(RiskPremium)
## maybe str(RiskPremium) ; plot(RiskPremium) ...
```

RoadPaintWear *RoadPaintWear*

Description

RoadPaintWear

Usage

```
data("RoadPaintWear")
```

Format

A data frame with 40 observations on the following 3 variables.

`y` a numeric vector

`location` a numeric vector

`paint` a numeric vector

Examples

```
data(RoadPaintWear)
## maybe str(RoadPaintWear) ; plot(RoadPaintWear) ...
```

RustInhibitor *RustIn hibitor*

Description

RustIn hibitor dataset

Usage

```
data("RustInhibitor")
```

Format

A data frame with 40 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(RustInhibitor)
## maybe str(RustInhibitor) ; plot(RustInhibitor) ...
```

SalableFlowers *Salable Flowers*

Description

Salable Flowers

Usage

```
data("SalableFlowers")
```

Format

A data frame with 24 observations on the following 5 variables.

`y` a numeric vector

`x` a numeric vector

`A` a numeric vector

`B` a numeric vector

`num` a numeric vector

Examples

```
data(SalableFlowers)
## maybe str(SalableFlowers) ; plot(SalableFlowers) ...
```

`satterthwaite` *satterthwaite*

Description

satterthwaite

Usage

```
satterthwaite(c, MSE, df, alpha = 0.05)
```

Arguments

`c`	c
`MSE`	mse
`df`	df
`alpha`	a

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. chapter 25.

Examples

```
##---- Should be DIRECTLY executable !! ----
##-- ==>  Define data, use random,
##--or do  help(data=index)  for the standard data sets.

## The function is currently defined as
function (c, MSE, df, alpha = 0.05)
{
    l = c * MSE
    L = sum(c * MSE)
    dff <- ((L^2)/sum((l^2)/df))
    lower <- (dff * L)/(qchisq(1 - alpha/2, round(dff)))
    upper <- (dff * L)/(qchisq(alpha/2, round(dff)))
    return(cbind(estimate = L, df = round(dff), lower = lower,
        upper = upper))
  }
```

SBCp *Calculate SBC*

Description

Schwarz' Bayesian criterion

$$SBC = n * ln(SSEp) - n * ln(n) + ln(n) * p$$

Usage

```
SBCp(model)
```

Arguments

model	model of regression

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 360

Examples

```
##################use data Surgical Unit, page 360

SBCp(lm(lny~x4,SurgicalUnit))
```

ServoData *Servo Data*

Description

Servo Data dataset

Usage

```
data("ServoData")
```

Format

A data frame with 15 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(ServoData)
## maybe str(ServoData) ; plot(ServoData) ...
```

`SolutionConcentration` *SolutionCon centration*

Description

Solution Concentration

Usage

```
data("SolutionConcentration")
```

Format

A data frame with 15 observations on the following 2 variables.

`y` a numeric vector

`x` a numeric vector

Examples

```
data(SolutionConcentration)
## maybe str(SolutionConcentration) ; plot(SolutionConcentration) ...
```

`ssea.oneway` *Planning of Sample Sizes with Estimation Approach Single factor ANOVA*

Description

This approach is to specify the major comparisons of interest. Determine the expected widths of the confidence intervals for various sample sizes, given standard deviation (sigma).

Usage

```
ssea.oneway(number.group,mc,sigma,n.weight,ci.width,type=c("s", "b"), alpha = 0.05)
```

Arguments

number.group	number of treatments.
mc	matrix of contrast. each row determine one contrast.
sigma	Standard deviation.
n.weight	weight of sample size Corresponding to each treatment.
ci.width	width of confidence interval Corresponding to each contrast.
type	type of calculate confidence interval.
alpha	Confidence interval calculate with 1-alpha percent

Value

sample size obtain based on confidence interval.

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. page 759.

Examples

```
mc=matrix(c(1,-1,0,0,.5,.5,-.5,-.5,1/3,1/3,1/3,-1),byrow=TRUE,nrow = 3)
ssea.oneway(4,mc,sigma=2,n.weight=c(1,1,1,1),ci.width=c(2.61,1.85,2.14)*2,type='s')
#### page 761
mc=matrix( c(1,0,0,-1,0,1,0,-1,0,0,1,-1),byrow=TRUE,nrow = 3)
ssea.oneway(4,mc,2,n.weight=c(1,1,1,2),ci.width=c(1,1,1)*2,type='b',alpha=.1)

#### problem 17.25 page 772
mc=matrix(c(1,-1,0,0,0,0,
            .5,.5,-.5,-.5,0,0,
            0,0,1,-1,0,0,
            .25,.25,.25,.25,-.5,-.5),byrow=TRUE,nrow=4)
ssea.oneway(6,mc,.15,n.weight=rep(1,6),ci.width=rep(2*0.08,4),type='b',alpha=.05)
```

SurgicalUnit *Surgical Unit dataset*

Description

A hospital surgical unit was interested in predicting survival in patients undergoing a particular of type of liver operation.

Usage

```
data("SurgicalUnit")
```

Format

A data frame with 54 observations on the following 10 variables.

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

`x4` a numeric vector

`x5` a numeric vector

`x6` a numeric vector

`x7` a numeric vector

`x8` a numeric vector

`y` a numeric vector

`lny` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 350

Examples

```
data(SurgicalUnit)
## maybe str(SurgicalUnit) ; plot(SurgicalUnit) ...
```

`SurgicalUnitAdditional`

Surgical Unit Additional dataset

Description

54 additional data for SurgicalUnit dataset.

Usage

```
data("SurgicalUnitAdditional")
```

Format

A data frame with 54 observations on the following 10 variables.

`x1` a numeric vector

`x2` a numeric vector

`x3` a numeric vector

`x4` a numeric vector

`x5` a numeric vector

`x6` a numeric vector

`x7` a numeric vector

`x8` a numeric vector

`y` a numeric vector

`lny` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .TABLE 9.5 page 374

Examples

```
data(SurgicalUnitAdditional)
## maybe str(SurgicalUnitAdditional) ; plot(SurgicalUnitAdditional) ...
```

`TaskCompletion` *Task Completion*

Description

Task Completion

Usage

```
data("TaskCompletion")
```

Format

A data frame with 16 observations on the following 4 variables.

`y` a numeric vector

`block` a numeric vector

`factor` a numeric vector

`num` a numeric vector

Examples

```
data(TaskCompletion)
## maybe str(TaskCompletion) ; plot(TaskCompletion) ...
```

TelephoneCommunications *Telephone Communications*

Description

Telephone Communications datas set

Usage

```
data("TelephoneCommunications")
```

Format

A data frame with 30 observations on the following 3 variables.

`y` a numeric vector

`group` a numeric vector

`num` a numeric vector

Examples

```
data(TelephoneCommunications)
## maybe str(TelephoneCommunications) ; plot(TelephoneCommunications) ...
```

TolucaCompany *Toluca Company dataset*

Description

The Toluca Company manufactures refrigeration equipment as well as many replacement parts. In the past, one of the replacement parts has been produced periodically in lots of varying sizes. When a cost improvement program was undertaken, company officials wished to determine the optimum lot size for producing this part.

Usage

```
data("TolucaCompany")
```

Format

A data frame with 25 observations on the following 2 variables.

`x` a numeric vector

`y` a numeric vector

Source

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition .page 19

Examples

```
data(TolucaCompany)
## maybe str(TolucaCompany) ; plot(TolucaCompany) ...
```

`towway.ci` *Confidence intervals for tow way ANOVA*

Description

Confidence intervals for tow way ANOVA.

Estimation and confidense interval of Factor Level Mean.

Estimation and confidense interval of Contrast of Factor Level Means

Estimation and confidense interval of linear Combination of Factor level Means

Multiple Pairwise Comparisons and confidense interval of Factor level Means (Tukey and Bonferroni Procedurs)

Multiple Contrasts and confidense interval of Factor Level Means (scheffe and Bonferroni Procedurs)

Etimates and confidense interval Based on Treatment Means

Interactions Are Important:

Multiple Pairwise Comparisons of Treatment Means(Tukey and Bonferroni Procedure.)

Multiple Contrasts of Treatment Means(Scheffe and Bonferroni Procedure.)

Usage

```
towway.ci(y, x1, x2, mc = NULL, mp = NULL,mt=NULL, mse= NULL,alpha = 0.05)
```

Arguments

`y`	response variabel
`x1`	first factor
`x2`	second factor
`mc`	matrix of contrast(s)
`mp`	matrix of pairwise. each row is one pairwise
`mt`	matrix of treatment means. (interaction NOT important)
`mse`	MSE of model
`alpha`	Confidence intervals calculate with 1-alpha percent

References

Michael H. Kutner; Christopher J. Nachtsheim; John Neter; William Li. Applied Linear Statistical Models Fifth Edition. chapter 19.

Examples

```
library('ALSM')
y=HayFeverRelief$y
A=HayFeverRelief$A
B=HayFeverRelief$B

m=matrix(c(1,2,3,0,0,0,.5,-1,.5),byrow = TRUE,nrow = 3)
towway.ci(y,A,B,mc=m)
```

WindingSpeeds *Winding Speeds*

Description

In a completely randomized design to study the effect of the speed of winding thread (1: slow; 2: normal; 3: fast; 4: maximum) onto 75-yard spools, 16 runs of 10,000 spools each were made at each of the four winding speeds. The response variable is the number of thread breaks during, the production run.

Usage

```
data("WindingSpeeds")
```

Format

A data frame with 64 observations on the following 3 variables.

`y` response variable

`group` factor variable

`row` index corresponding to each response

Examples

```
data(WindingSpeeds)
## maybe str(WindingSpeeds) ; plot(WindingSpeeds) ...
```

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