

Package ‘Blendstat’

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Type Package

Title Joint Analysis of Experiments with Mixtures and Random Effects

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Depends MASS, lattice

Description Performs a joint analysis of experiments with mixtures and random effects, taking on a process variable represented by a covariable.

License GPL (>= 2)

NeedsCompilation no

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R topics documented:

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Blend

Joint analysis of experiments with mixtures and random effects.

Description

Joint analysis of experiments with mixtures and random effects, taking on a process variable represented by a covariable.

Usage

```
Blend(exp, X, Y, conc = NULL, effects = NULL)
```

Arguments

| | |
|---------|--|
| exp | Vector with the names of the experiments. |
| X | Mixture variables (components), without the vector of the concentrations (covariable). |
| Y | Response variable. |
| conc | Vector with the concentrations (covariable) of the experiments. |
| effects | Vector of the effects of the mixtures in a reference mixture (example: centroid). |

Value

| | |
|--------|---|
| MPred | Matrix with the predicted and observed values. |
| MCPred | Matrix with the values predicted by components. |
| Mexp | Matrix with the design of the experiments. |
| theta | Vector with the theta estimates. |

Author(s)

Marcelo Angelo Cirillo
Paulo Cesar Ossani

References

Kalirajan, K. P. On the estimation of a regression model with fixed and random coefficients. *Journal of Applied Statistics*, 17(2): 237-244, 1990. doi:10.1080/757582835

Swamy, P. A. V. B. *Statistical Inference in Random Coefficient Regression Models*. Amsterdam: Springer Science & Business Media, 1971. 209 p.

See Also

[Plot.Blend](#)

Examples

```
data(DataNAT) # dataset

Exp <- DataNAT[,2] # identification of experiments

X <- DataNAT[,3:6] # independent variable
Y <- DataNAT[,11] # dependent variable

# effects of the blends in a reference mixture
Effects <- rep(c(-0.1,0,0.1,0.2,0.3,0.4,0.5,0.6,0.7),4)

Conc <- as.matrix(DataNAT[,7]) # covariate (process variable)

Res <- Blend(exp = Exp, X = X, Y = Y, conc = Conc, effects = Effects)

print("Predicted and observed values"); Res$MPred
print("Values predicted by components:"); Res$MCPred
print("Design of the experiments:"); Res$Mexp
print("Estimates of the linear model parameters:"); Res$theta

Tit <- c("Covariate (process variable)", "Variable")

Xlab = "effects" # label of the X axis
Ylab = "Predicted values" # label of the Y axis

Plot.Blend(Res, titles = Tit, posleg = 2, xlabel = Xlab,
           ylabel = Ylab, boxleg = TRUE, color = TRUE,
           expcolor = c("goldenrod3", "gray53", "red2", "blue2"),
           casc = TRUE)
```

Blendstat

Joint Analysis of Experiments with Mixtures and Random Effects.

Description

Joint analysis of experiments with mixtures and random effects, taking on a process variable represented by a covariable.

Details

| | |
|-----------|------------|
| Package: | Blendstat |
| Type: | Package |
| Version: | 1.0.4 |
| Date: | 2023-08-19 |
| License: | GPL(>= 2) |
| LazyLoad: | yes |

Author(s)

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References

Kalirajan, K. P. On the estimation of a regression model with fixed and random coefficients. *Journal of Applied Statistics*, 17(2): 237-244, 1990. doi:10.1080/757582835

Swamy, P. A. V. B. *Statistical Inference in Random Coefficient Regression Models*. Amsterdam: Springer Science & Business Media, 1971. 209 p.

DataCD

Dataset, peeled cherry coffee.

Description

Database of coffee blends of different varieties processed via wet (peeled cherry).

Usage

```
data(DataCD)
```

Format

Database of coffee blends of different varieties processed via wet (peeled cherry). Formed by the variables: Exp (code of the experiments); CEB (specialty Bourbon Yellow coffee produced at an altitude above 1,200m); CT (roasted commercial coffee); CC (Conillon coffee); CEA (Acaia specialty coffee produced at altitude below 1,100m); Conc (concentrations at 7% and 10% (m/v) of roasted and ground coffee beans in 100 ml of water). Response variables defined by the sensorial attributes: Body, Taste, Acidity, Bitterness, Score.

References

Project yield and research entitled by "Quality of blends of specialty and non-specialty coffees of the region of the Mantiqueira Mountains - treatment of discrepant scores in tests with consumers". CNPq for their aid via grant number 304974/2015-3.

Examples

```
data(DataCD) # dataset

Exp <- DataCD[,2] # identification of the experiments

X <- DataCD[,3:6] # independent variables (components)
Y <- DataCD[,11] # dependent variable (response Bitterness)
```

```

# effects o the mixtures in the reference mixture
Effects <- rep(c(-0.1,0,0.1,0.2,0.3,0.4,0.5,0.6,0.7),4)

Conc <- as.matrix(DataCD[,7]) # covariable (process variable)

Res <- Blend(exp = Exp, X = X, Y = Y, conc = Conc, effects = Effects)

print("Predicted and observed values"); Res$MPred
print("Values predicted by components:"); Res$MCPred
print("Design of the experiments:"); Res$MExp
print("Estimates of the linear model parameters:"); Res$theta

```

| | |
|---------|--|
| DataNAT | <i>Dataset, natural cherry coffee.</i> |
|---------|--|

Description

Database of coffee blends of different varieties processed by dry via.

Usage

```
data(DataNAT)
```

Format

Database of coffee blends of different varieties processed by dry via. Formed by the variables: Exp (code of the experiments); CEB (specialty Bourbon Yellow coffee produced at an altitude above 1,200m); CT (roasted commercial coffee); CC (Conillon coffee); CEA (Acaia specialty coffee produced at altitude below 1,100m); Conc (concentrations at 7% and 10% (w/v) of roasted and ground coffee beans in 100 ml of water). Variable responses defined by sensory attributes: Body, Taste, Acidity, Bitterness, Score.

References

Project yield and research entitled by "Quality of blends of specialty and non-specialty coffees of the region of the Mantiqueira Mountains - treatment of discrepant scores in tests with consumers". CNPq for their aid via grant number 304974/2015-3.

Examples

```

data(DataNAT) # dataset

Exp <- DataNAT[,2] # identification of the experiments

X <- DataNAT[,3:6] # independent variables (components)
Y <- DataNAT[,11] # dependent variable (response Bitterness)

```

```
# effects o the mixtures in the reference mixture
Effects <- rep(c(-0.1,0,0.1,0.2,0.3,0.4,0.5,0.6,0.7),4)

Conc <- as.matrix(DataNAT[,7]) # covariable (process variable)

Res <- Blend(exp = Exp, X = X, Y = Y, conc = Conc, effects = Effects)

print("Predicted and observed values"); Res$MPred
print("Values predicted by components:"); Res$MCPred
print("Design of the experiments:"); Res$MExp
print("Estimates of the linear model parameters:"); Res$Theta
```

Plot.Blend

Plots of the results.

Description

Plots of the results of the joint analysis of the experiments.

Usage

```
Plot.Blend(BL, titles = c(NA,NA), posleg = 2, xlabel = NA,
           ylabel = NA, boxleg = FALSE, color = TRUE, expcolor = NA,
           casc = TRUE)
```

Arguments

| | |
|----------|--|
| BL | Data of the Blend function. |
| titles | Titles for the plot of the effects of the concentrations and components. If it is not defined, it assumes the default text. |
| posleg | 1 for caption in the left upper corner, 2 for caption in the right upper corner (default), 3 for caption in the right lower corner, 4 for caption in the left lower corner. |
| xlabel | Names the X axis, if not set, assumes the default text. |
| ylabel | Names the Y axis, if not set, assumes the default text. |
| boxleg | Puts frame on the caption (default = TRUE). |
| color | Colorful plots (default = TRUE). |
| expcolor | Vector with the colors of the experiments. |
| casc | Cascade effect in the presentation of the plots (default = TRUE). |

Value

Return several plots.

Author(s)

Marcelo Angelo Cirillo
Paulo Cesar Ossani

See Also

[Blend](#)

Examples

```
data(DataCD) # dataset

Exp <- DataCD[,2] # identification of the experiments

X <- DataCD[,3:6] # independent variables (components)
Y <- DataCD[,11] # dependent variable (response Bitterness)

# effects o the mixtures in the reference mixture
Effects <- rep(c(-0.1,0,0.1,0.2,0.3,0.4,0.5,0.6,0.7),4)

Conc <- as.matrix(DataCD[,7]) # covariable (process variable)

Res <- Blend(exp = Exp, X = X, Y = Y, conc = Conc, effects = Effects)

print("Predicted and observed values"); Res$MPred
print("Values predicted by components:"); Res$MCPred
print("Design of the experiments:"); Res$MExp
print("Estimates of the linear model parameters:"); Res$Theta

Tit <- c("Covariable (process variable)", "Variable")

Xlab = "Effects" # label of the X axis
Ylab = "Predicted values" # label of the Y axis

Plot.Blend(Res, titles = Tit, posleg = 2, xlabel = Xlab,
           ylabel = Ylab, boxleg = TRUE, color = TRUE,
           expcolor = c("goldenrod3", "gray53", "red2", "blue2"),
           casc = TRUE)
```

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