Package 'KenSyn'

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Version 0.3

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Title Knowledge Synthesis in Agriculture - From Experimental Network
to Meta-Analysis

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Depends R(>= 3.0.0)

Imports nlme, lme4, metafor

Description Demo and dataset accompaying the books :
De l'analyse des réseaux expérimentaux à la méta-analyse: Méthodes et applications avec le logiciel R pour les sciences agronomiques et environnementales (Published 2018-06-
28, Quae, for french version) by David Makowski, Francois Piraux and Francois Brun -
<https://www.quae.com/produit/1514/9782759228164/
de-l-analyse-des-reseaux-experimentaux-a-la-meta-analyse>
Knowledge Synthesis in Agriculture : from Experimental Network to Meta-
Analysis (in preparation for 2018-
06, Springer , for English version) by David Makowski, Francois Piraux and Francois Brun
A full description of all the material is in both books.
ACKNOWLEDGMENTS : The French network ``RMT modeling and data analysis for agriculture'' (<http://www.modelia.org>) have contributed to the development of this R package. This project and network are lead by ACTA (French Technical Institute for Agriculture) and was funded by a grant from the Ministry of Agriculture and Fishing of France.

License LGPL-3

Encoding UTF-8

LazyData true

LazyDataCompression xz

Type Package

URL <http://www.modelia.org>

RoxygenNote 6.1.1

NeedsCompilation no

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KenSyn-package   *Knowledge Synthesis in Agriculture - From Experimental Network to Meta-Analysis*

Description

Package:	KenSyn
Type:	Package
Version:	0.3
Date:	2019-04-08
License:	LGPL-3
LazyLoad:	yes
LazyData:	yes
Depends:	R(>= 3.0.0)
Imports:	nlme, lme4, metafor

KenSyn Knowledge Synthesis in Agriculture - From Experimental Network to Meta-Analysis.

Demo and dataset accompaying the books :

De l'analyse des réseaux expérimentaux à la méta-analyse: Méthodes et applications avec le logiciel R pour les sciences agronomiques et environnementales (Published 2018-06-28, Quae, for french version) by David Makowski, Francois Piraux and Francois Brun) https://www.quae.com/produit/1514/9782759228164/de-l-analyse-des-reseaux-experimentaux-a-la-meta-analyse

Knowledge Synthesis in Agriculture : from Experimental Network to Meta-Analysis (in preparation for 2018-06, Springer , for English version) by David Makowski, Francois Piraux and Francois Brun)

A full description of all the material is in both books.

Author(s)

Francois Brun (ACTA) <francois.brun@acta.asso.fr>, David Makowski (INRA), Francois Piraux (Arvalis)

References

Synthetiser la connaissance : de l'analyse de reseaux experimentaux a la meta-analyse http://www.modelia.org

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citrus	*Meta-analysis dataset: estimation the effectiveness of a fungicidal treatment to control Phyllosticta citricarpa, a citrus fungus.*

Description

The data set consists of the data collected from litterature for a meta-analysis. It contains the results of 16 trials conducted in different orchards located in different regions around the world. Each trial has two treatments: an untreated part (the control, $X = Fung\_Gp = 0$) and a part treated with a fungicide ($X = Fung\_Gp = 1$). In each treatment, 300 to 2000 fruits were observed, and the number of diseased fruits was counted.

Usage

```
organic
```

Format

a `RangedData` instance, 1 row per measurement. NbFruits : number of fruits observed, NbDiseasedF : number of diseased fruits, Code : code of the experiment, Fung_Gp : treatment (1: fungicid, 0: control)

Source

Makowski D., Vicent A., Pautasso M., Stancanelli G., Rafoss T. 2014. Comparison of statistical models in a meta-analysis of fungicide treatments for the control of citrus black spot caused by Phyllosticta citricarpa. European journal of plant pathology 139, 79-94

Examples

```
summary(citrus)
citrus$P_C<-citrus$NbDiseasedF[citrus$Fung_Gp==0]/citrus$NbFruits[citrus$Fung_Gp==0]
citrus$P_E<-citrus$NbDiseasedF[citrus$Fung_Gp==1]/citrus$NbFruits[citrus$Fung_Gp==1]
citrus=citrus[order(citrus$P_E),]
dotchart(citrus$P_E, xlab="Proportion of disease fruits",xlim=c(0,1),pch=19, ylab="experiment")
points(citrus$P_C,1:nrow(citrus))
legend("topleft",legend = c("treated", "control"),pch=c(19,1))
```

---

machines   *Workers testing a new machine.*

Description

The data set consists of measurements of performance of 6 workers on two differents machines A
and B The number of repetitions in each experiment is equal to three.

Usage

```
machines
```

Format

a `RangedData` instance, 1 row per measurement. Worker (1 to 6), Machine (A or B), score2 :
performance of the worker on the machine

Source

TODO F. PIRAUX ?

Examples

```
summary(machines)
```

N2O   *Meta-analysis dataset to estimate the response of N2O emissions to*
                                         the applied N fertilizer rate.

Description

The data set consists of the data collected from litterature for a meta-analysis to estimate the re-
sponse of N2O emissions (a greenhouse gas produced largely by agricultural activities, including
nitrogen fertilization) to the applied N fertilizer rate. This dataset contains measurements of N2O
emissions collected from 203 experimental studies (corresponding to different sites-years). In each
study (Ref_num), several fertilizer doses (N_rate) were applied to different experimental plots and
N2O emissions were measured (N2O, in kg ha-1 yr-1) on each. A total of 985 N2O emission data
are available.

Usage

```
N2O
```

Format

a RangedData instance, 1 row per measurement. Type: , Ref_num: , Climate: , Texture_class: , Tex_act: , Carbon_content: , Nitrogen_content: , pH: , CEC: , Bulk_density: , Drainage: , Annual_Precipitation: , Mean_annual_temp: , crop_type: , Fertilizer_type: , Mode_of_application: , Timing_of_application: , N_rate: , N2O: , log_N2O: , duree_expe: , Method_N2O: , Freq_N2O

Source

Philibert et al (2012), Gerber et al (2016), real data extracted from published papers. Philibert A., Loyce C., Makowski D. 2012. Quantifying uncertainties in N2O emission due to N fertilizer application in cultivated areas. Plos One 7(11): e50950. doi:10.1371/journal.pone.0050950. Gerber J.S., Kimberly M. C., Makowski D, Inaki Garcia de Cortazar-Atauri, Petr Havlik, Mario Herrero, Marie Launay, Nathaniel D. Mueller, Christine S. O'Connell, Pete Smith, Paul C. West. 2016. Spatially explicit estimates of N2O emissions from croplands suggest climate mitigation opportunities from improved fertilizer management. Global Change Biology 22 3383-3394.

Examples

```
summary(N2O)
# Examples of N2O emission measurements obtained on 9 experiments
# for different doses of N fertilizer applied.
par(mfrow=c(3,3), mar=c(4.1,4.1,1,1))
ListNum<-c(12,363,312,232,158,226,87,21,17)
null<-sapply(ListNum, function(Num){plot(N2O$N_rate[N2O$Ref_num==Num],N2O$N2O[N2O$Ref_num==Num],
xlab="Dose engrais N (kg/ha)", ylab="Emission de N2O (kg/ha/an)", pch=19, xlim=c(0,350))})
```

---

organic	*Meta-analysis dataset on comparison of organic to conventional crop systems.*

Description

The data set consists of the data collected from litterature for a meta-analysis to compare crop yield in organic system to conventionnal system conducted by Seufert et al (2012). It contains 65 studies. Each study contains values of yield to organic and conventionnal system compared in field experiment. The studies cover different geographical places, years and crops.

Usage

```
organic
```

Format

a `RangedData` instance, 1 row per measurement. Study, Crop_species, Country, Y_coord, X_coord, Continent, Developed, Development, Latitude, Crop_type, Perennial, Legume, Org_N_input, Conv_N_input, Org_fertilizer_type, Green_manure_org, Animal_manure_org, Irrigation, Moisture, Soil_carbon, Soil_pH, Yield_conv, SD_conv, N_conv, Yield_org, SD_org, N_org, Yield_unit, lnR, Var_lnR

Source

Seufert et al (2012), real data extracted from published papers Seufert, V., N. Ramankutty, and J.A. Foley. 2012. Comparing the yields of organic and conventional agriculture. Nature 485: 229-232.

Examples

```
summary(organic)
```

---

wheatyield	*Wheat Yield at a regional scale (fake data).*

Description

Wheat yield. The data set consists of 45 measurements of wheat yields from 15 experimental sites (one year) in a fictive agricultural region. In this dataset, a study represents a site-year with 2 to 4 blocks. Each block corresponds to an experimental plot on which the yield of the crop (expressed in t.ha-1) was measured. Thus, each study contains 2 to 4 measurements of yields

Usage

```
wheatyield
```

Format

a `RangedData` instance, 1 row per measurement. Site : experimental site, Rdt : Wheat Yield (ton/hectare)

Source

fake data

Examples

```
summary(wheatyield)
# NOT RUN example of analysis with mixted model on this dataset
# demo(package="KenSyn", "ch01_mixedmodel_nlme")
```

| wheat_var | *Network of experiment to evaluate Wheat varieties on one single year.* |

Description

The data set consists of measurements of wheat yields from a network of field experiments designed to evaluate and compare performances of 10 different varieties (v1 to v10). It contains 5 different experiments (experiment 1 to 5) corresponding to five different places. The choice of places was made so that they are representative of the variability observed in the study area. All the experiments took place in the same year. The experimental designs used are complete random block designs. The number of repetitions in each experiment is equal to three (block 1 to 3).

Usage

```
wheat_var
```

Format

a `RangedData` instance, 1 row per measurement. experimentation : experiment name, variete : variety, bloc : block of the design, rendement : Wheat Yield (ton/hectare)

Source

Arvalis - institut du vegetal, real data, but anonymized (place and variety)

Examples

```
summary(wheat_var)
```

| wheat_var_itk | *Network of experiment to evaluate Wheat varieties on one single year with different cropping systems.* |

Description

The data set consists of measurements of wheat yields from a network of field experiments with different cropping systems designed to evaluate and compare performances of different varieties or varietal mixtures. This extract consists of 5 different experiments corresponding to five different places and 12 varieties or varietal mixtures. ITK2 cropping system : "normal" inputs according to regional recommandations ITK3 cropping system : aims for a lower yield goal with reduced inputs (seeding rates, nitrogen fertilization (-30 uN / ha) and reduced protection against diseases and pests) The experimental designs used are complete random block designs TODO : CHECK The number of repetitions in each experiment is equal to three.

Usage

```
wheat_var_itk
```

Format

a `RangedData` instance, 1 row per measurement. annee : year, lieu : place, experimentation : experiment name, variete : variety, bloc : block of the design, rdt : Wheat Yield (ton/hectare)

Source

Arvalis - institut du vegetal, INRA, Chambres Agricultures et CIVAM, real data, but anonymized (place and variety). Description of complete database : Felix et al. (2016)

Examples

```
summary(wheat_var_itk)
```

---

wheat_var_soil   *Network of experiment to evaluate Wheat varieties on two contrasted soils.*

Description

The data set consists of measurements of wheat yields from a network of field experiments designed to evaluate and compare performances of different varieties or varietal mixtures. This extract consists of 10 different experiments where 6 varieties or varietal mixtures where compared. TODO : CHECK The experimental designs used are complete random block designs TODO : CHECK The number of repetitions for a variety in each experiment varies from 3 to 4 (n_blocs).

Usage

```
wheat_var_soil
```

Format

a `RangedData` instance, 1 row per measurement. variete: variety, experimentation:experiment, rendement:Wheat Yield (ton/hectare), MSE:, ddl: ,n_blocs:number of repetition sol

Source

Arvalis - institut du vegetal, real data, but anonymized (variety and experiment).

Examples

```
summary(wheat_var_soil)
```

---

wheat_var_years	*Network of experiment to evaluate Wheat varieties on several years (2005-2010).*

Description

The data set consists of measurements of wheat yields from a network of field experiments designed to evaluate and compare performances of different varieties or varietal mixtures. This extract consists of 113 different experiments corresponding to 54 different places and 6 years (2005 to 2010). 80 varieties (v1 to v80) or varietal mixtures where compared. TODO : CHECK The experimental designs used are complete random block designs TODO : CHECK The number of repetitions for a variety in each experiment varies from 2 to 6 (n_blocs).

Usage

```
wheat_var_itk
```

Format

a `RangedData` instance, 1 row per measurement. rendement: Wheat Yield (ton/hectare), variete: variety, experimentation: experiment name, lieu: place, annee: year, Vmoyj:???

Source

Arvalis - institut du vegetal, real data, but anonymized (variety).

Examples

```
summary(wheat_var_years)
```

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