Package 'FrF2.catlg128'

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Title Catalogues of Resolution IV 128 Run 2-Level Fractional
Factorials Up to 33 Factors that Do Have 5-Letter Words

Version 1.2-2

Depends R(>= 2.13.0), FrF2(>= 1.4)

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Description Catalogues of resolution IV regular
fractional factorial designs in 128 runs are provided
for up to 33 2-level factors. The catalogues are complete,
excluding resolution IV designs without 5-letter words,
because these do not add value for a search for unblocked
clear designs. The previous package version
1.0 with complete catalogues up to 24 runs (24 runs and a
namespace added later) can be downloaded from the authors
website.

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LazyLoad yes

Encoding latin1

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https://prof.bht-berlin.de/groemping/

NeedsCompilation no

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R topics documented:

FrF2.catlg128-package | *Catalogues of resolution IV 128 run 2-level fractional factorials up to 33 factors that do have 5-letter words*

Description

Description: This package provides the complete catalogues of those resolution IV regular fractional factorial designs in 128 runs for up to 33 2-level factors that do have length 5 words (i.e. are not even). For 8 to 11 factors, the best design (resolution higher than IV, i.e. all two-factor interactions are clear) is included only.

Details

The complete set of designs on which these catalogues are based has been provided by Xu (2009) for up to 25 factors and by Mee (2012) for 26 to 33 factors. The designs provided in this package are useful for special tasks to be accomplished with package **FrF2**. The catalogues are separately provided here, because they are very large and should not be forced upon **FrF2** users who do not need them.

The main reason for providing the catalogues is to support estimability requirements for clear two-factor interactions in package **FrF2**. According to Wu, Mee and Tang (2012), resolution IV designs with no 5-letter words do not add value (there is always a better design that can accomodate the same clear two-factor interactions). Therefore, starting with version 1.1, resolution IV designs without 5-letter words have been omitted from the catalogues, and the title of the package has been changed accordingly, from the previous "Complete catalogues of resolution IV 128 run 2-level fractional factorials up to 24 factors". The previously available complete catalogues of designs can be downloaded from the author's website. Designs for 25 to 33 factors have been added with version 1.2 of the package.

Author(s)

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References

Mee, R. (2012) *Personal communication*. Wu, H., Mee, R. and Tang, B. (2012) Fractional Factorial Designs With Admissible Sets of Clear Two-Factor Interactions. *Technometrics* **54**, 191-197. Xu, H. (2009) Algorithmic Construction of Efficient Fractional Factorial Designs With Large Run Sizes. *Technometrics* **51**, 262-277.

See Also

Catalogues

Catalogues *Catalogues of regular 128 run designs of various factor numbers*

Description

Catalogues of regular 128 run designs of various factor numbers

Usage

```
catlg128.8to15
catlg128.16
catlg128.17
catlg128.18
catlg128.19
catlg128.20
catlg128.21
catlg128.22
catlg128.23
catlg128.24
catlg128.25
catlg128.26to33
```

Details

The files contain catalogues for regular fractional factorial designs in 128 runs; the numbers after the period indicate the number(s) of factors covered by the respective catalogue. All the catalogues are lists of class `catlg`. They are provided in support of package **FrF2**.

Originally, their main intention was to support automatic search of clear designs with options `estimable` and `clear=TRUE` in function `FrF2`. For this purpose, in principle, a complete catalogue of resolution IV designs in 128 runs would be needed. The catalogues come from Xu (2009; supplement on his website up to 25 factors) or Mee (2012, personal communication) and have been enriched by information on clear interactions (entry `clear.2fis` for each element).

Since version 2 of package **FrF2**, the catalogues can also support blocking of designs by the method proposed by Godolphin (2020), automated as described in Groemping (2021); with this method, blocking can (but need not) be combined with requiring specific 2fis to be clear. A few catalogue elements that are useful for that method have been added to the catalogue `catlg` in package **FrF2**. If a desired blocked design cannot be obtained in adequate quality by using entries from `catlg` or from the suitable catalogue from this package, one may have to resort to the larger catalogues that are available from the author's website (see also next paragraph).

For the search of clear designs, Wu, Mee and Tang (2012) proved that one need not consider designs with no 5-letter words, as they are always dominated by a better design that can clearly accomodate the same two-factor interactions. Therefore, as of version 1.1 of this package, the resolution IV designs in the catalogues have been reduced to those that do have 5-letter words. For the search for clear designs, it even suffices to search dominating designs only. These are identified by the dominating element of each catalogue entry. The previous complete catalogues of designs can be

downloaded from the author's website. Catalogues for 25 to 33 factors have been made available with version 1.2 of the package.

If one of these catalogues is used in the select.catlg option of function [FrF2](), the function is guaranteed to find the best clear design in 128 runs for the requested number of factors, when used with its option estimable.

For earlier versions of the package, the catalogues had to be loaded with a data() command. This is no longer required, and not even supported; the catalogues will now be automatically loaded on first use.

Author(s)

Ulrike Groemping

References

Godolphin, J. (2020). Construction of Blocked Factorial Designs to Estimate Main Effects and Selected Two-Factor Interactions. *J. Roy. Statist. Soc.* B **83**, 5-29. Groemping, U. (2021). An algorithm for blocking regular fractional factorial 2-level designs with clear two-factor interactions. *Computational Statistics & Data Analysis* **153**, 1-18. Mee, R. (2012) Catalogues of even/odd designs produced by Robert Block. *Personal communication*. Wu, H., Mee, R. and Tang, B. (2012) Fractional Factorial Designs With Admissible Sets of Clear Two-Factor Interactions. *Technometrics* **54**, 191-197. Xu, H. (2009) Algorithmic Construction of Efficient Fractional Factorial Designs With Large Run Sizes. *Technometrics* **51**, 262-277.

See Also

See Also [FrF2](), [catlg]()

Examples

```
catlg128.8to15[1:5]


## example of using a catalogue from this package with function FrF2
## for keeping interactions clear
## the design in the example will also be found with the default catalogue
    ## because arrays for all compromise plans with up to 24 factors
    ## have been added to catlg with FrF2 version 1.1-1
plan <- FrF2(128, 23, estimable=compromise(23,1:2)$requirement, select.catlg=catlg128.23)
summary(plan)
length(catlg128.23)

## example of using a catalogue from this package with function FrF2
## for blocking a design
requirement <- compromise(13,1)$requirement
## loop through designs from catlg
nn1 <- names(catlg128.8to15[nruns(catlg128.8to15)==128 & nfac(catlg128.8to15)==13])
for (nam in nn1){
  suppressMessages(
    des128fromcatlg <- try(
```

```
          FrF2(design=nam, blocks=32,
              factor.names=Letters[15:27], estimable=requirement,
              alias.block.2fis = TRUE, select.catlg=catlg128.8to15),
          silent=TRUE)
    )
  ## stop at first success
  if (!"try-error" %in% class(des128fromcatlg)) break
}
summary(des128fromcatlg)
```

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