

TrapRCBD_clerids_block_test.R

John

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```
# TrapRCBD_clerids_block_test.R
# Likelihood ratio test for block variance

# Load necessary libraries
library(lme4)

## Loading required package: Matrix

# Read in data set
trapdata <- read.table(header=T,colClasses=c("factor","factor","numeric"),text="
block treat count
1 AP 4
1 BLANK 0
1 FRAP 79
1 IDAP 7
1 ISAP 10
2 AP 1
2 BLANK 0
2 FRAP 124
2 IDAP 13
2 ISAP 20
3 AP 0
3 BLANK 0
3 FRAP 14
3 IDAP NA
3 ISAP 2
4 AP 0
4 BLANK 0
4 FRAP 15
4 IDAP 11
4 ISAP 7
5 AP 0
5 BLANK 0
5 FRAP 29
5 IDAP 7
5 ISAP 7
6 AP 2
6 BLANK 0
6 FRAP 70
6 IDAP 14
6 ISAP 20
")

# Apply transformations here
trapdata <- transform(trapdata,y=log(count+1))

# Print data
trapdata
```

```
##      block treat count      y
## 1      1      AP      4 1.6094379
## 2      1 BLANK      0 0.0000000
## 3      1 FRAP      79 4.3820266
## 4      1 IDAP      7 2.0794415
## 5      1 ISAP     10 2.3978953
## 6      2      AP      1 0.6931472
## 7      2 BLANK      0 0.0000000
## 8      2 FRAP     124 4.8283137
## 9      2 IDAP     13 2.6390573
## 10     2 ISAP     20 3.0445224
## 11     3      AP      0 0.0000000
## 12     3 BLANK      0 0.0000000
## 13     3 FRAP     14 2.7080502
## 14     3 IDAP     NA      NA
## 15     3 ISAP      2 1.0986123
## 16     4      AP      0 0.0000000
## 17     4 BLANK      0 0.0000000
## 18     4 FRAP     15 2.7725887
## 19     4 IDAP     11 2.4849066
## 20     4 ISAP      7 2.0794415
## 21     5      AP      0 0.0000000
## 22     5 BLANK      0 0.0000000
## 23     5 FRAP     29 3.4011974
## 24     5 IDAP      7 2.0794415
## 25     5 ISAP      7 2.0794415
## 26     6      AP      2 1.0986123
## 27     6 BLANK      0 0.0000000
## 28     6 FRAP     70 4.2626799
## 29     6 IDAP     14 2.7080502
## 30     6 ISAP     20 3.0445224
```

```
# Delete blank traps before analysis
trapdata2 <- subset(trapdata,subset=treat!="BLANK")

# H0 true - no block effect
lmH0 <- lm(y~treat,data=trapdata2)
summary(lmH0)
```

```
##
## Call:
## lm(formula = y ~ treat, data = trapdata2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.19213 -0.44574  0.08673  0.53431  1.10250
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.5669     0.2865   1.979 0.062539 .
## treatFRAP     3.1589     0.4052   7.797 2.45e-07 ***
## treatIDAP     1.8313     0.4249   4.310 0.000378 ***
## treatISAP     1.7239     0.4052   4.255 0.000428 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 0.7018 on 19 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared: 0.7634, Adjusted R-squared: 0.726
## F-statistic: 20.43 on 3 and 19 DF, p-value: 3.627e-06

# H1 true - there is a block effect
lmeH1 <- lmer(y~treat+(1|block),data=trapdata2)
summary(lmeH1)

## Linear mixed model fit by REML ['lmerMod']
## Formula: y ~ treat + (1 | block)
## Data: trapdata2
##
## REML criterion at convergence: 39
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -1.46335 -0.57717  0.06696  0.52134  1.59231
##
## Random effects:
##  Groups   Name                Variance Std.Dev.
##  block    (Intercept)  0.3332     0.5773
##  Residual                    0.1831     0.4279
## Number of obs: 23, groups: block, 6
##
## Fixed effects:
##              Estimate Std. Error t value
## (Intercept)   0.5669     0.2933   1.932
## treatFRAP     3.1589     0.2470  12.788
## treatIDAP     1.6748     0.2624   6.383
## treatISAP     1.7239     0.2470   6.979
##
## Correlation of Fixed Effects:
##              (Intr) trFRAP trIDAP
## treatFRAP -0.421
## treatIDAP -0.396  0.471
## treatISAP -0.421  0.500  0.471

# Likelihood ratio test for variance component
anova(lmeH1,lmH0)

## refitting model(s) with ML (instead of REML)

## Data: trapdata2
## Models:
## lmH0: y ~ treat
## lmeH1: y ~ treat + (1 | block)
##      Df    AIC    BIC logLik deviance Chisq Chi Df Pr(>Chisq)
## lmH0   5 54.586 60.263 -22.293  44.586
## lmeH1  6 46.260 53.073 -17.130  34.260 10.326      1 0.001312 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```