Package 'DTK'

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Type Package

Title Dunnett-Tukey-Kramer Pairwise Multiple Comparison Test Adjusted for Unequal Variances and Unequal Sample Sizes

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Description This package was created to analyze multi-level one-way experimental designs. It is designed to handle vectorized observation and factor data where there are unequal sample sizes and population variance homogeneity can not be assumed. To conduct the Dunnett modified Tukey-Kramer test (a.k.a. the T3 Procedure), create two vectors: one for your observations and one for the factor level of each observation. The function, gl.unequal, provides a means to more conveniently produce a factor vector with unequal sample sizes. Next, use the DTK.test function to conduct the test and save the output as an object to input into the DTK.plot function, which produces a confidence interval plot for each of the pairwise comparisons. Lastly, the function TK.test conducts the original Tukey-Kramer test.

License GPL (>= 2)

LazyLoad yes

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DTK-package *Dunnett-Tukey-Kramer Pairwise Multiple Comparison Test Adjusted for Unequal Variances and Unequal Sample Sizes*

Description

Functions for conducting and plotting Dunnett's (1980) modified Tukey-Kramer pairwise multiple comparison test accounting for unequal variance and unequal sample sizes.

Details

Package:	DTK
Type:	Package
Version:	3.5
Date:	2013-07-01
License:	GPL version 2 or newer
LazyLoad:	yes

This package was created to analyze multi-level one-way experimental designs. It is designed to handle vectorized observation and factor data where there are unequal sample sizes and population variance homogeneity can not be assumed. To conduct the Dunnett modified Tukey-Kramer test (a.k.a. the T3 Procedure), create two vectors: one for your observations and one for the factor level of each observation. The function, gl.unequal, provides a means to more conveniently produce a factor vector with unequal sample sizes. Next, use the DTK.test function to conduct the test and save the output as an object to input into the DTK.plot function, which produces a confidence interval plot for each of the pairwise comparisons. Lastly, the function TK.test conducts the original Tukey-Kramer test.

Note

I would like to acknowledge the invaluable help of Professor Brent Burch in the Department of Mathematics and Statistics at Northern Arizona University and suggestions by multiple R- users: including M. Nunez, B. Roustan and S. Marshall.

Author(s)

Matthew K. Lau, Department of Biological Sciences, Northern Arizona University, AZ

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References

Dunnett, C.W. (1980) Pairwise Multiple Comparisons in the Unequal Variance Case. Journal of the American Statistical Association. 75 (372): 796-800.

See Also

gl.unequal, DTK.test, DTK.plot, TK.test

DTK.plot *DTK Test Confidence Interval Plot*

Description

Produces a plot of the confidence intervals produced by the function DTK.test.

Usage

```
DTK.plot(x = "DTK.test output")
```

Arguments

x	DTK.test output list object.

Details

Produces a formatted plot of all confidence intervals of pairwise comparisons of means. The itervals are plotted in red (=significant) and black (=non-significant) with grey dashed lines to help distinguish the comparisons.

Value

SEE EXAMPLE.

Author(s)

Matthew K. Lau, Department of Biological Sciences, Northern Arizona University, AZ

See Also

DTK.test, TK.test, TukeyHSD, qtukey

Examples

```
x=c(rnorm(25,5,2),rnorm(30,5,5),rnorm(35,15,5))
f<-gl.unequal(n=3,k=c(25,30,35))
DTK.result<-DTK.test(x=x,f=f,a=0.05)
DTK.result
DTK.plot(DTK.result)
```

DTK.test *Dunnett's Modified Tukey-Kramer Pairwise Multiple Comparison Test*

Description

Conducts a pairwise multiple comparison test (using the C procedure) for mean differences with unequal sample sizes and no assumption of equal population variances.

Usage

```
DTK.test(x = "data vector", f = "factor vector", a = "alpha level")
```

Arguments

x	Numeric data vector.
f	Factored level vector.
a	Alpha, significance level. DEFAULT=0.05

Details

Input data as vectors.

Value

[[1]]	"a" or the alpha significance level
[[2]]	Matrix containing the pair-waise comparisons as row names and the pairwise mean differences and lower and upper confidence interval values in columns, respectively

Note

In the case of equal sample sizes and equal population variances, Dunnett's test (the T3 Procedure) produces slightly wider (i.e. more conservative) confidence intervals than the Tukey-Kramer procedure. This is because of differences in the degrees of freedom used for determining the Studentized Range values. In cases where variances are unequal, however, the Tukey-Kramer test, which uses the pooled variance, will spread variance across levels and produce misleading results.

Author(s)

Matthew K. Lau, Department of Biological Sciences, Northern Arizona University, AZ

References

Dunnett,C.W. (1980) Pairwise Multiple Comparisons in the Unequal Variance Case. Journal of the American Statistical Association. 75 (372): 796-800.

See Also

DTK.plot, gl.unequal, TK.test, TukeyHSD, qtukey

Examples

```
x=c(rnorm(25,5,2),rnorm(30,5,5),rnorm(35,15,5))
f<-gl.unequal(n=3,k=c(25,30,35))
DTK.result<-DTK.test(x=x,f=f,a=0.05)
DTK.result
DTK.plot(DTK.result)
```

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gl.unequal *Generate Levels with Unequal Sample SIzes*

Description

Produces a vector of samples of unequal sizes. Useful when observations are already sorted into groups by levels.

Usage

```
gl.unequal(n = "number of levels", k = "numeric vector of sample sizes")
```

Arguments

n	Scalar determining the number of levels.
k	Numeric vector specifying the sample size at each level.

Value

Produces a factored vector.

Note

Be sure that you precisely specify the above arguments to correspond to your observation vector.

Author(s)

Matthew K. Lau, Department of Biological Sciences, Northern Arizona University, AZ

See Also

gl, rep

Examples

```
gl.unequal(n=3,k=c(25,30,35))
```

TK.test *Tukey's Honestly Significant Difference Test*

Description

This is a reformatted function for DTK.test function-like inputs to use the TukeyHSD function.

Usage

```
TK.test(x = "data vector", f = "factor vector", a = "alpha level")
```

Arguments

x	Data vector
f	Factor vector
a	Alpha, significance level. DEFAULT=0.05

Value

TukeyHSD list output.

Author(s)

Matthew K. Lau, Department of Biological Sciences, Northern Arizona University, AZ

See Also

DTK.test, DTK.plot, TukeyHSD, qtukey

Examples

```
x=c(rnorm(25,5,2),rnorm(30,5,5),rnorm(35,15,5))
f<-gl.unequal(n=3,k=c(25,30,35))
DTK.result<-DTK.test(x=x,f=f,a=0.05)
TK.result<-TK.test(x=x,f=f,a=0.05)
DTK.result
TK.result
```

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