# Package 'KONPsurv'

October 12, 2022

**Type** Package

**Title** KONP Tests: Powerful K-Sample Tests for Right-Censored Data

**Version** 1.0.4

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**Description** The K-sample omnibus non-proportional hazards (KONP) tests are powerful non-parametric tests for comparing K (>=2) hazard functions based on right-censored data (Gorfine, Schlesinger and Hsu, 2020, <doi:10.1177/0962280220907355>). These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

**License** GPL (>= 2)

**Imports** survival,Rcpp (>= 0.12.16)

**LinkingTo** Rcpp

**RoxygenNote** 7.0.0

**Encoding** UTF-8

**Suggests** testthat

**NeedsCompilation** yes

**Repository** CRAN

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## R topics documented:

## KONPsurv-package *KONP Tests for Testing the Equality of K Distributions for Right-Censored Data*

### Description

An implementation of the $K$-sample omnibus non-proportional hazrds (KONP) tests.

The KONP tests are powerful non-parametric tests for comparing $K$ (>=2) hazard functions based on right-censored data. These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

### Details

The package contains one function:

`konp_test`: non-parametric tests for equality of $K$ distributions using right-censored data.

### Author(s)

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Author: Malka Gorfine <gorfinem@tauex.tau.ac.il>

### References

Gorfine, M., Schlesinger, M., & Hsu, L. (2020). $K$-sample omnibus non-proportional hazards tests based on right-censored data. Statistical Methods in Medical Research, 29(10), 2830–2850. doi: 10.1177/0962280220907355

### Examples

```
# gastric cancer data
data(gastric)

konp_test(gastric$time, gastric$status, gastric$group, n_perm=10^3)
```

## carcinoma *Urothelial carcinoma.*

### Description

Survival data from a trial comparing chemotherapy versus atezolizumab in the treatment of Urothelial carcinoma.

### Usage

```
data(carcinoma)
```

### Format

A data frame with 625 observations (316 in the atezolizumab group and 309 chemotherapy group) with the following 3 columns:

**time** the observed follow-up times in days.

**status** the event indicators, 0=right censored, 1= event.

**group** the group labels, 1 = atezolizumab, 2 = chemotherapy.

### References

Powles T, Dura?n I, van der Heijden MS, et al. Atezolizumab versus chemotherapy in patients with platinum-treated locally advanced or metastatic urothelial carcinoma (IMvigor211): a multicentre, open-label, phase 3 randomised controlled trial. Lancet 2018; 391: 748-757.

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## gastric *Gastric Cancer Data.*

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### Description

Survival data from a trial comparing chemotherapy versus combined chemotherapy plus radiotherapy in the treatment of gastric cancer.

### Usage

```
data(gastric)
```

### Format

A data frame with 90 observations (45 in each treatment group) with the following 3 columns:

**time** the observed follow-up times in days.

**status** the event indicators, 0=right censored, 1= event.

**group** the group labels, 1 = chemotherapy, 2 = chemotherapy plus radiotherapy.

### Source

Stablein, D. M. and Koutrouvelis, I. A. (1985) A two-sample test sensitive to crossing hazards in uncensored and singly censored data. Biometrics 41, 643–652. (Page 649).

### References

Gastrointestinal Tumor Study Group: Schein, P. D., Stablein, D. M., Bruckner, H. W., Douglass, H. O., Mayer, R., et al. (1982). A comparison of combination chemotherapy and combined modality therapy for locally advanced gastricarcinoma. Cancer 49, 1771-1777.

konp_test *KONP tests are $K$-sample Omnibus Non-Proportional hazards tests for right-censored data.*

## Description

KONP tests are $K$-sample Omnibus Non-Proportional hazards tests for right-censored data.

## Usage

```
konp_test(time, status, group, n_perm, n_impu = 1)
```

## Arguments

| | |
|---|---|
| time | A vector of the observed follow-up times. |
| status | A vector of event indicators, 0=right censored, 1= event at time. |
| group | A vector denoting the group labels, must contain at least two different values. |
| n_perm | The number of permutations. |
| n_impu | The number of imputations, for each imputation n_perm permutations will be executed. |

## Details

The KONP tests are powerful non-parametric tests for comparing $K$ (>=2) hazard functions based on right-censored data. These tests are consistent against any differences between the hazard functions of the groups. The KONP tests are often more powerful than other existing tests, especially under non-proportional hazard functions.

## Value

Three test statistics and their respective p-values are returned:

pv_chisq - returns the p-value based on the KONP test chi-square statistic.
pv_lr - returns the p-value based on the KONP test likelihood ratio statistic.
pv_cauchy - returns the p-value based on the KONP-based Cauchy-combination test statistic.
chisq_test_stat - returns the KONP test chi-squared test statistic.
lr_test_stat - returns the KONP test likelihood-ratio test statistic.
cauchy_test_stat - returns the KONP-based Cauchy-combination test statistic.

## Examples

```
# gastric cancer data
data(gastric)

konp_test(gastric$time, gastric$status, gastric$group, n_perm=10^3)
```

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