# Package 'compareC'

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**Type** Package

**Title** Compare Two Correlated C Indices with Right-Censored Survival Outcome

**Version** 1.3.3

**Date** 2025-4-25

**Description** Proposed by Harrell, the C index or concordance C, is considered an overall measure of discrimination in survival analysis between a survival outcome that is possibly right censored and a predictive-score variable, which can represent a measured biomarker or a composite-score output from an algorithm that combines multiple biomarkers. This package aims to statistically compare two C indices with right-censored survival outcome, which commonly arise from a paired design and thus resulting two correlated C indices.

**License** GPL (>= 2.0)

**NeedsCompilation** yes

**Repository** CRAN

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## Contents

compareC *Testing the difference between two correlated overall* C *indices*

## Description

This is a function used to test if the difference in two correlated overall *C* indices is statistically significant

## Usage

```
compareC(timeX, statusX, scoreY, scoreZ)
```

## Arguments

| | |
|---|---|
| timeX | The vector of actual survival time *X*, one survival time for each observation |
| statusX | The matching vector of event indicator for time *X*, 1 if occured and 0 otherwise |
| scoreY | The vector of the first measured biomarker or score *Y*, one for each of the same observations |
| scoreZ | The vector of the second measured biomarker or score *Z*, one for each of the same observations |

## Value

| | |
|---|---|
| est.c | The estimated two *C* indices |
| est.diff_c | The estimated difference of the two *C* indices, i.e.,$C_{XY} - C_{XZ}$ |
| est.vardiff_c | The estimated variance of the difference of two *C* indices |
| est.varCxy | The estimated variance of the *C* index for *scoreY* |
| est.varCxz | The estimated variance of the *C* index for *scoreZ* |
| est.cov | The estimated covariance between the two *C* indices for *scoreY* and that for *scoreZ* |
| zscore | Z score (test statistic) for hypothesis testing |
| pval | P value for the comparison of two *C* indices |

## Note

Under non-random censoring, the returned *p*-value is statistically invalid as the assumption of random censoring is violated.

## Author(s)

Le Kang, Weijie Chen

## References

Harrell FE, Califf RM, Pryor DB, Lee KL, and Rosati RA. (1982) Evaluating the yield of medical tests. The Journal of the American Medical Association, 247(18), 2543–2546

Pencina MJ and D'Agostino RB. (2004) Overall *C* as a measure of discrimination in survival analysis: model specific population value and confidence interval estimation. Statistics in Medicine, 23(13), 2109–2123

Kang L, Chen W, Petrick NA, and Gallas BD. (2014) Comparing two correlated *C* indices with right-censored survival outcome: a one-shot nonparametric approach. Statistics in Medicine, 34(4), 685–703, doi: 10.1002/sim.6370

## See Also

`estC`,`vardiffC`

## Examples

```
demo(testC)
```

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`estC` *Estimation of a single overall* C *index*

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## Description

This is a function used to estimate a single overall *C* index

## Usage

```
estC(timeX, statusX, scoreY)
```

## Arguments

| | |
|---|---|
| `timeX` | The vector of actual survival time *X*, one survival time for each observation |
| `statusX` | The matching vector of event indicator for time *X*, 1 if occured and 0 otherwise |
| `scoreY` | The vector of the measured biomarker *Y*, one for each of the same observations, based on which the *C* index is to be estimated |

## Value

The estimated *C* index

## Author(s)

Le Kang, Weijie Chen

## References

Harrell FE, Califf RM, Pryor DB, Lee KL, and Rosati RA. (1982) Evaluating the yield of medical tests. The Journal of the American Medical Association, 247(18), 2543–2546

Pencina MJ and D'Agostino RB. (2004) Overall *C* as a measure of discrimination in survival analysis: model specific population value and confidence interval estimation. Statistics in Medicine, 23(13), 2109–2123

Kang L, Chen W, Petrick NA, and Gallas BD. (2014) Comparing two correlated *C* indices with right-censored survival outcome: a one-shot nonparametric approach. Statistics in Medicine, 34(4), 685–703, doi: 10.1002/sim.6370

## See Also

vardiffC,compareC

## Examples

```
demo(testC)
```

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`vardiffC` *Variance estimation of the difference between two correlated overall* C *indices*

---

## Description

This is a function used to estimate the variance of the difference between two correlated overall *C* indices

## Usage

```
vardiffC(timeX, statusX, scoreY, scoreZ)
```

## Arguments

| | |
|---|---|
| `timeX` | The vector of actual survival time *X*, one survival time for each observation |
| `statusX` | The matching vector of event indicator for time *X*, 1 if occured and 0 otherwise |
| `scoreY` | The vector of the first measured biomarker *Y*, one for each of the same observations, based on which the variance of the difference in overall *C* indices is to be estimated |
| `scoreZ` | The vector of the second measured biomarker *Z*, one for each of the same observations, based on which the variance of the difference in overall *C* indices is to be estimated |

## Value

| | |
|---|---|
| `est.vardiff_c` | The estimated variance of the difference of two *C* indices |
| `est.varCxy` | The estimated variance of the *C* index for *scoreY* |
| `est.varCxz` | The estimated variance of the *C* index for *scoreZ* |
| `est.cov` | The estimated covariance between the two *C* indices for *scoreY* and that for *scoreZ* |

## Author(s)

Le Kang, Weijie Chen

## References

Harrell FE, Califf RM, Pryor DB, Lee KL, and Rosati RA. (1982) Evaluating the yield of medical tests. The Journal of the American Medical Association, 247(18), 2543–2546

Pencina MJ and D'Agostino RB. (2004) Overall *C* as a measure of discrimination in survival analysis: model specific population value and confidence interval estimation. Statistics in Medicine, 23(13), 2109–2123

Kang L, Chen W, Petrick NA, and Gallas BD. (2014) Comparing two correlated *C* indices with right-censored survival outcome: a one-shot nonparametric approach. Statistics in Medicine, 34(4), 685–703, doi: 10.1002/sim.6370

## See Also

`estC`,`compareC`

## Examples

```
demo(testC)
```

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