Package 'wavecov'

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Type Package

Title Overlap-Aware Workforce Wave Comparisons

Version 0.1.0

Description Tools for comparing workforce metric distributions between panel waves using linked stayers, reliability assumptions, or Cauchy bounds. Its purpose is to provide a low-latency alternative to traditional hierarchical or latent-growth modeling that is better-able to scale in cloud based architectures. The mathematics is an extension of rotating panel formulae from the official statistics literature.

License GPL-3

Encoding UTF-8

Depends R (>= 3.5.0)

Imports stats

Config/roxygen2/version 8.1.1

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

VignetteBuilder knitr

NeedsCompilation no

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`compare_waves` *Compare two workforce waves for a single metric*

Description

Compute overlap-aware inference for the change in a repeated organizational metric between two workforce waves, using linked stayers, a reliability assumption, or Cauchy-based bounds.

Usage

```
compare_waves(
  data,
  wave_0,
  wave_1,
  id_col,
  wave_col,
  metric_col,
  method = c("auto", "linked", "reliability", "bounds"),
  reliability = NULL,
  sigma2 = NULL,
  sigma2S = NULL,
  cov_sign = c("unrestricted", "nonnegative"),
  overlap_mode = c("generic", "overlap_aware"),
  level = 0.95,
  ...
)
```

Arguments

`data`	Data frame with at least id, wave, and metric columns.
`wave_0`	Value in `wave_col` for the first wave.
`wave_1`	Value in `wave_col` for the second wave.
`id_col`	Column name for the employee identifier.
`wave_col`	Column name for the wave identifier.
`metric_col`	Column name for the metric.
`method`	Method to use: "auto", "linked", "reliability", or "bounds". In "auto" mode, `wavecov` prefers linked, then reliability, then bounds.
`reliability`	Same-person cross-wave reliability for the relevant stayer population (used only for the reliability method).
`sigma2`	Optional common individual-level variance. When supplied with the reliability method, overrides the pooled variance from the two waves.

sigma2S	Optional pooled individual-level stayer variance. When supplied with the reliability method, is treated as a candidate sigma2. When supplied with the bounds method and overlap_mode = "overlap_aware", is used as a common stayer variance to tighten the Cauchy bounds.
cov_sign	Covariance sign restriction for bounds: "unrestricted" or "nonnegative".
overlap_mode	Whether to use generic Cauchy bounds ("generic") or overlap-aware tightening ("overlap_aware").
level	Confidence level for intervals (point-estimate methods) or sensitivity envelopes (bounded results).
...	Reserved for future extensions.

Value

A "wavecov_result" object (linked or reliability) or a "wavecov_bounds_result" object (bounds). Use print(), tidy(), and confint() for summaries.

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compare_waves_batch *Batch comparisons of multiple waves and metrics*

Description

Batch comparisons of multiple waves and metrics

Usage

```
compare_waves_batch(
  data,
  wave_pairs,
  id_col,
  wave_col,
  metric_col,
  metric_id_col = NULL,
  group_cols = NULL,
  method = c("linked", "reliability", "bounds", "auto", "ols"),
  reliability = NULL,
  sigma2 = NULL,
  sigma2S = NULL,
  level = 0.95,
  ...
)
```

Arguments

data	...
wave_pairs	...

id_col	...
wave_col	...
metric_col	...
metric_id_col	...
group_cols	...
method	...
reliability	...
sigma2	...
sigma2S	...
level	...
...	...

Value

...

`compare_waves_summary_stats` *Compare two waves using summary statistics only*

Description

When individual-level data are not available, this function computes overlap-aware variance for the change in means using either a reliability assumption or Cauchy-based bounds from supplied summary statistics.

Usage

```
compare_waves_summary_stats(
  N0,
  N1,
  nS,
  sigma2 = NULL,
  reliability = NULL,
  V0_bar = NULL,
  V1_bar = NULL,
  method = c("reliability", "bounds"),
  cov_sign = c("unrestricted", "nonnegative"),
  overlap_mode = c("generic", "overlap_aware"),
  sigma2S = NULL,
  level = 0.95
)
```

Arguments

N0	Workforce size at wave 0.
N1	Workforce size at wave 1.
nS	Number of stayers (present in both waves).
sigma2	Common individual-level variance for the relevant population (used with the reliability method).
reliability	Same-person cross-wave reliability (used with the reliability method).
V0_bar	Variance of the wave-0 mean (used with the bounds method).
V1_bar	Variance of the wave-1 mean (used with the bounds method).
method	"reliability" or "bounds".
cov_sign	Covariance sign restriction for bounds: "unrestricted" or "nonnegative".
overlap_mode	Whether to use generic Cauchy bounds or overlap-aware tightening. Overlap-aware bounds additionally use nS and sigma2S when supplied.
sigma2S	Optional pooled individual-level stayer variance for overlap-aware bounds.
level	Confidence level for point-estimate intervals or sensitivity envelopes.

Value

A "wavecov_result" (reliability) or "wavecov_bounds_result" (bounds) object. Use print(), tidy(), and confint() for summaries.

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tidy *Generic tidy method*

Description

A minimal generic for tidying objects returned by wavecov functions.

Usage

```
tidy(x, ...)
```

Arguments

x	An object to tidy.
...	Unused.

Value

A data frame with a structure determined by the class of x.

`tidy.wavecov_result` *Tidy output for wavecov point-estimate results*

Description

Tidy output for wavecov point-estimate results

Usage

```
## S3 method for class 'wavecov_result'
tidy(x, ...)
```

Arguments

`x`	A "wavecov_result" object.
`...`	Unused.

Value

A one-row data frame with change estimates and diagnostics.

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