

Package ‘abwm’

November 4, 2025

Title Ansari-Bradley Test with Arbitrarily Missing Data

Version 0.1.0

Description Performs the two-sample Ansari–Bradley test (Ansari & Bradley, 1960 <<https://www.jstor.org/stable/2237814>>) for univariate, distinct data in the presence of missing values, as described in Zeng et al. (2025) <[doi:10.48550/arXiv.2509.20332](https://doi.org/10.48550/arXiv.2509.20332)>. This method does not make any assumptions about the missingness mechanisms and controls the Type I error regardless of the missing values by taking all possible missing values into account.

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Encoding UTF-8

RoxygenNote 7.3.2

Suggests gtools, testthat (>= 3.0.0)

Config/testthat/edition 3

Imports stats

NeedsCompilation no

Author Yijin Zeng [aut, cre]

Maintainer Yijin Zeng <yijinzeng98@gmail.com>

Repository CRAN

Date/Publication 2025-11-04 19:20:02 UTC

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 abwm.test

Ansari-Bradley Test with Arbitrarily Missing Data

Description

Performs the two-sample Ansari-Bradley test for univariate, distinct data in the presence of missing values with controlled Type I error.

Usage

```
abwm.test(X, Y, alternative = c("two.sided", "less", "greater"))
```

Arguments

<code>X, Y</code>	numeric vectors of data values with potential missing data. Inf and -Inf values will be omitted.
<code>alternative</code>	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less". You can specify just the initial letter.

Details

`abwm.test()` performs the Ansari-Bradley scale testing method (Ansari & Bradley, 1960) in the presence of missing data, as described in Zeng et al. (2025). Suppose $X = \{x_1, \dots, x_n\}$ and $Y = \{y_1, \dots, y_m\}$, the Ansari-Bradley test statistic in Zeng et al. (2025) is defined as

$$\sum_{i=1}^n \left| R(x_i, X \cup Y) - \frac{n + m + 1}{2} \right|,$$

where $R(x_i, X \cup Y)$ denotes the rank of x_i in the set $X \cup Y$. The function `abwm.test()` returns the tight bounds of the Ansari-Bradley test statistic and its p-value obtained using the normal approximation. The p-value of the test method proposed in Zeng et al. (2025) is then returned as the maximum possible p-value of the Ansari-Bradley test. This method (Zeng et al., 2025) does not make any missing data assumptions, and controls the Type I error regardless of the values of missing data.

Value

<code>p.value</code>	the p-value for the test.
<code>bounds.statistic</code>	bounds of the value of the Ansari-Bradley test statistic.
<code>bounds.pvalue</code>	bounds of the p-value of the Ansari-Bradley test.
<code>alternative</code>	a character string describing the alternative hypothesis.
<code>data.name</code>	a character string giving the names of the data.

References

- Y. Zeng, N. M. Adams, D. A. Bodenham. Scale two-sample testing with arbitrarily missing data. arXiv preprint arXiv:2509.20332. 2025.
- A. R. Ansari, R. A. Bradley. Rank-Sum Tests for Dispersions. *The Annals of Mathematical Statistics*, pages 1174–1189, 1960.

See Also

[stats::ansari.test\(\)](#) when data are completely observed.

Examples

```
#### Assume all values are distinct.
X <- c(6.2, 3.5, NA, 7.6, 9.2)
Y <- c(0.2, 1.3, -0.5, -1.7)

## Perform the two-sided Ansari-Bradley testing with missing data.
abwm.test(X, Y, alternative = 'two.sided')

## Consider one-sided testing.
abwm.test(X, Y, alternative = 'less')
```

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