Package: abwm (via r-universe)

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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>. 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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Imports stats

Repository https://yijin-zeng.r-universe.dev

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Contents

`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

`X`, `Y`	numeric vectors of data values with potential missing data. Inf and -Inf values will be omitted.
`alternative`	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 $X = \{x_1, \ldots, x_n\}$ and $Y = \{y_1, \ldots, y_m\}$, 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

`p.value`	the p-value for the test.
`bounds.statistic`	bounds of the value of the Ansari-Bradley test statistic.
`bounds.pvalue`	bounds of the p-value of the Ansari-Bradley test.
`alternative`	a character string describing the alternative hypothesis.
`data.name`	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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