

# Package ‘RankResponse’

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**Type** Package

**Title** Ranking Responses in a Single Response Question or a Multiple Response Question

**Version** 4.0.0

**Imports** stats

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**Description** Methods for ranking responses of a single response question or a multiple response question are described in the two papers:

1. Wang, H. (2008). Ranking Responses in Multiple-Choice Questions. *Journal of Applied Statistics*, 35, 465-474. <[DOI:10.1080/02664760801924533](https://doi.org/10.1080/02664760801924533)>
2. Wang, H. and Huang, W. H. (2014). Bayesian Ranking Responses in Multiple Response Questions. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 177, 191-208. <[DOI:10.1111/rssa.12009](https://doi.org/10.1111/rssa.12009)>.

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rank.gs

*Rank Responses based on the Generalized Score Test***Description**

Rank responses of a single response question or a multiple response question by the generalized score test procedure.

**Usage**

```
rank.gs(data, alpha = 0.05, ranktype = 1)
```

**Arguments**

data	A m by n matrix $d_{ij}$ , where $d_{ij} = 0$ or 1. If the $i$ th respondent selects the $j$ th response, then $d_{ij} = 1$ , otherwise $d_{ij} = 0$ .
alpha	The significance level is used to control the type I error rate. The default is 0.05.
ranktype	A numerical value specifies which type of ranking method is used. The default is 1 (see 'Details').

**Details**

Suppose that the question has  $k$  responses. Let  $\pi_j$  denote the probability that the  $j$ th response is selected. Using the survey data,  $\pi_j$  can be estimated.

If ranktype is 1, the ranking rule is the following steps. Let  $\pi_{(j)}$  denote the order statistic. If the hypothesis  $\pi_{(k)} = \pi_{(k-1)}$  is rejected, we rank the response corresponding to  $\pi_{(k)}$  first. If it is not rejected, we compare  $\pi_{(k)}$  with  $\pi_{(j)}$ ,  $j \leq k - 2$  sequentially.

If ranktype is 2, the rank of the  $i$ th response can be defined as

$$R_i = k - \sum_{j=1, j \neq i}^k I(\pi_i > \pi_j)$$

**Value**

rank.gs returns a table contains the estimated probabilities of the responses being selected in the first line and the ranks of the responses in the second line.

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**References**

Wang, H. (2008). Ranking Responses in Multiple-Choice Questions. *Journal of Applied Statistics*, 35, 465-474.

Wang, H. and Huang, W. H. (2014). Bayesian Ranking Responses in Multiple Response Questions. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 177, 191-208.

**See Also**

[rankL2R](#), [rankLN](#), [rank.wald](#)

**Examples**

```
set.seed(12345)
# This is an example to rank k responses in a multiple response question
# when the number of respondents is 1000.
# In this example, we do not use a real data, but generate data in the first six lines.
k <- 5
data <- matrix(NA, nrow = 1000, ncol = k)
for(i in 1:k){
  p <- runif(1)
  data[, i] <- sample(c(0, 1), 1000, p = c(p, 1-p), replace = TRUE)
}
## or upload the true data
rank.gs(data)
```

rank.wald

*Rank Responses based on the Wald Test***Description**

Rank responses of a single response question or a multiple response question by the wald test procedure.

**Usage**

```
rank.wald(data, alpha = 0.05, ranktype = 1)
```

**Arguments**

data	A m by n matrix $d_{ij}$ , where $d_{ij} = 0$ or 1. If the $i$ th respondent selects the $j$ th response, then $d_{ij} = 1$ , otherwise $d_{ij} = 0$ .
alpha	The significance level is used to control the type I error rate. The default is 0.05.
ranktype	A numerical value specifies which type of ranking method is used. The default is 1 (see 'Details').

**Details**

Suppose that the question has  $k$  responses. Let  $\pi_j$  denote the probability that the  $j$ th response is selected. Using the survey data,  $\pi_j$  can be estimated.

If ranktype is 1, the ranking rule is the following steps. Let  $\pi_{(j)}$  denote the order statistic. If the hypothesis  $\pi_{(k)} = \pi_{(k-1)}$  is rejected, we rank the response corresponding to  $\pi_{(k)}$  first. If it is not rejected, we compare  $\pi_{(k)}$  with  $\pi_{(j)}$ ,  $j \leq k - 2$  sequentially.

If ranktype is 2, the rank of the  $i$ th response can be defined as

$$R_i = k - \sum_{j=1, j \neq i}^k I(\pi_i > \pi_j)$$

### Value

rank.wald returns a table contains the estimated probabilities of the responses being selected in the first line and the ranks of the responses in the second line.

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### References

Wang, H. (2008). Ranking Responses in Multiple-Choice Questions. *Journal of Applied Statistics*, 35, 465-474.

Wang, H. and Huang, W. H. (2014). Bayesian Ranking Responses in Multiple Response Questions. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 177, 191-208.

### See Also

[rankL2R](#), [rankLN](#), [rank.gs](#)

### Examples

```
set.seed(12345)
# This is an example to rank k responses in a multiple response question
# when the number of respondents is 1000.
# In this example, we do not use a real data, but generate data in the first six lines.
k <- 5
data <- matrix(NA, nrow = 1000, ncol = k)
for(i in 1:k){
  p <- runif(1)
  data[, i] <- sample(c(0, 1), 1000, p = c(p, 1-p), replace = TRUE)
}
## or upload the true data
rank.wald(data)
```

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rankL2R	<i>Rank responses under the Bayesian framework according to the loss function in Method 3 of Wang and Huang (2004).</i>
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### Description

Rank responses of a single response question or a multiple response question under the Bayesian framework according to the loss function in Method 3 of Wang and Huang (2004).

### Usage

```
rankL2R(data, response.number, prior.parameter, e)
```

### Arguments

data	A m by n matrix $d_{ij}$ , where $d_{ij} = 0$ or 1. If the $i$ th respondent selects the $j$ th response, then $d_{ij} = 1$ , otherwise $d_{ij} = 0$ .
response.number	The number of the responses.
prior.parameter	The parameter vector of the Dirichlet prior distribution, where the vector dimension is $2^{\text{response.number}}$ .
e	A cut point used in the loss function which depends on the economic costs.

### Value

The rankL2R returns the estimated probabilities of the responses being selected in the first line and the ranks of the responses in the second line.

### Author(s)

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### References

Wang, H. and Huang, W. H. (2014). Bayesian Ranking Responses in Multiple Response Questions. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 177, 191-208.

### See Also

[rankLN](#), [rank.wald](#), [rank.gs](#)

**Examples**

```

set.seed(12345)
# This is an example to rank k responses in a multiple response question
# when the number of respondents is 1000 and the value e is 0.15.
# In this example, we do not use a real data, but generate data in the first six lines.
k <- 3
data <- matrix(NA, nrow = 1000, ncol = k)
for(i in 1:k){
  p <- runif(1)
  data[, i] <- sample(c(0, 1), 1000, p = c(p, 1-p), replace = TRUE)
}
## or upload the true data
response.number <- 3
prior.parameter <- c(5, 98, 63, 7, 42, 7, 7, 7)
e <- 0.15
rankL2R(data, response.number, prior.parameter, e)

```

rankLN

*Rank responses under the Bayesian framework according to the loss function in Method 1 of Wang and Huang (2004).*

**Description**

Rank responses of a single response question or a multiple response question under the Bayesian framework according to the loss function in Method 1 of Wang and Huang (2004).

**Usage**

```
rankLN(data, response.number, prior.parameter, c)
```

**Arguments**

data	A m by n matrix $d_{ij}$ , where $d_{ij} = 0$ or 1. If the $i$ th respondent selects the $j$ th response, then $d_{ij} = 1$ , otherwise $d_{ij} = 0$ .
response.number	The number of the responses.
prior.parameter	The parameter vector of the Dirichlet prior distribution, where the vector dimension is $2^{\text{response.number}}$ .
c	The value of c in the loss function

**Value**

The rankLN returns the estimated probabilities of the responses being selected in the first line and the ranks of the responses in the second line.

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**References**

Wang, H. and Huang, W. H. (2014). Bayesian Ranking Responses in Multiple Response Questions. Journal of the Royal Statistical Society: Series A (Statistics in Society), 177, 191-208.

**See Also**

[rankL2R](#), [rank.wald](#), [rank.gs](#)

**Examples**

```
set.seed(12345)
# This is an example to rank k responses in a multiple response question
# when the number of respondents is 1000 and the value e2R is 0.15.
# In this example, we do not use a real data, but generate data in the first six lines.
k <- 3
data <- matrix(NA, nrow = 1000, ncol = k)
for(i in 1:k){
  p <- runif(1)
  data[, i] <- sample(c(0, 1), 1000, p = c(p, 1-p), replace = TRUE)
}
## or upload the true data
response.number <- 3
prior.parameter <- c(5, 98, 63, 7, 42, 7, 7, 7)
c <- 0.05
rankLN(data, response.number, prior.parameter, c)
```

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