

R deltaScoring package description

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1 Instalation

```
install.package(devtools)
library(devtools)
install_github("amitko/DScoring")
```

2 Loading

```
library(boot)
library(DScoring)
```

3 Item responses

The dihotomous item response (0/1) should be in a numeric array. For example (

```
install.packages("random")
library("random")
```

```
itemData <- randomNumbers(n = 5000,min = 0,max = 1,col = 20)
```

The data are just a matrix with 0 and 1, so the results below are only for test purposes. If a real data stored in a file `data.csv` is used the loading is as follows

```
itemData <- read.csv('data.csv')
```

4 Estimating item delta

Estimating the main item parameter **delta**, referred as δ in the references is estimated by a bootstrap procedure

```
Itm<-DS.deltaBootstrap(itemData)
```

The result is a list with **delta** and **conf** fields, containig delta values and their 90% confidence interval respectively.

```
> Itm$delta
      delta
[1,] 0.492
[2,] 0.500
[3,] 0.508
[4,] 0.544
[5,] 0.464
[6,] 0.504
[7,] 0.496
[8,] 0.508
[9,] 0.516
.
.
```

```
.
> Itm$conf
      0.05    0.95
[1,] 0.4400 0.5480
[2,] 0.4480 0.5520
[3,] 0.4560 0.5600
[4,] 0.4920 0.5960
[5,] 0.4120 0.5200
.
.
.
```

5 Person D-score

Person D-score (see [1]) is calculated by the person response vector and the item deltas

```
Dscores<-DS.personDscore(itemData,Itm$delta)
```

```
> Dscores
      [,1]
[1,] 0.5521669
[2,] 0.7018459
[3,] 0.5565811
[4,] 0.3976726
[5,] 0.4069021
[6,] 0.4434189
[7,] 0.5425361
[8,] 0.5052167
.
.
.
```

6 Fit RFM Model

The RFM model defines the probability for correct item performance as 1,2 or 3 parametric function [1]. The corresponding parameters (b, s, c) are estimated for any item in the test. The fitted **parameters**, **p-Values** and standard errors **SE** are returned in the list **Fit**.

```
Fit<-DS.logitDeltaFit(itemData,Dscores)
```

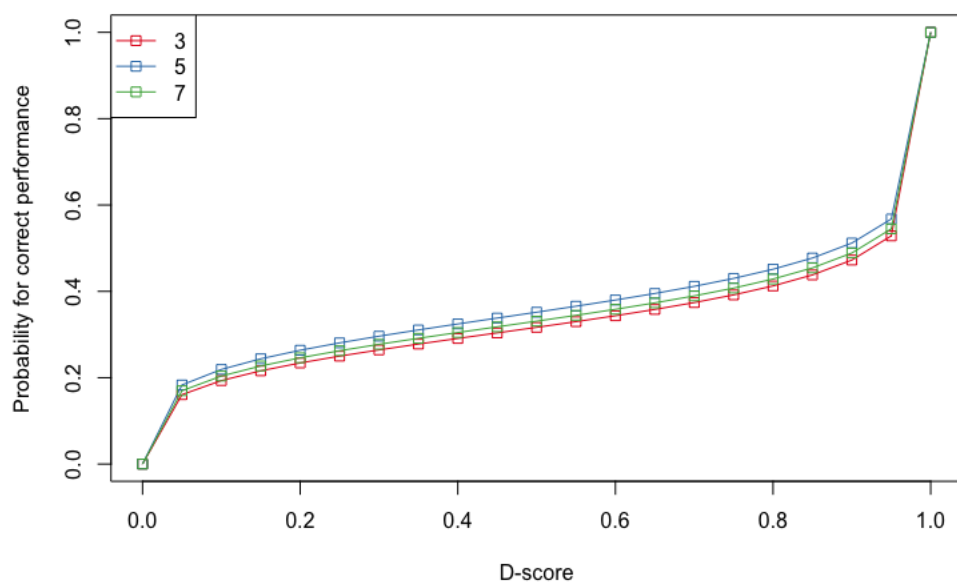
```
Fit$parameters
Fit$pValues
Fit$SE
```

The default model is RFM2 with parameters b and s for the difficulty and shape of the ICC. If a different model is required, it can be changed through the additional option parameter. For example, the following code fits the RFM3 model

```
o <- DS.options()
o$model <- 3
Fit<-DS.logitDeltaFit(itemData,Dscores,o)
```

The plot of the ICC can be generated by the code below, there the items 3,5,7 will be plotted in the same plot with a corresponding legend.

```
DS.logitDeltaPlot(Fit,items = c(3,5,7))
```



7 Equating

References

- [1] Dimitrov, Dimitar. (2019). Modeling of Item Response Functions Under the D -Scoring Method. Educational and Psychological Measurement. 80. 001316441985417. 10.1177/0013164419854176.