University of Zurich[UZH]

Local Item Dependence

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Local Item Dependence

Local item dependencies (LID) indicate that items are associated or correlated above a threshold.

LID introduces bias in the estimation of the reliability of the metric.

Residual Correlation (Q_3)

Strength of item association is computed using the correlation matrix of the standardized residuals.

Items are said locally dependent when correlating positively about a certain cut-off.

The cut-off is typically set at 0.2 or 0.3

$$corr(X,Y) = \frac{cov(XY)}{\sigma_x \sigma_y}$$

	I1	**I2**	**3**
I1	1	0.03	0.4
I2	0.03	1	-0.3
I3	0.4	-0.3	1

Example of a correlation matrix

Residual Correlation (Q_3) Cut-off

The cut-off for an acceptable item residual correlation is typically set at 0.2 or 0.3.

Recent simulation studies have suggested another, more reliable but more conservative, approach to detect LID:

$$Q_3^{\star} = Q_{3,max} - \bar{Q}_3 > 0.2$$

The cut-off corresponds to the mean residual correlation + 0.2. No residual correlation should be above this cut-off.

Residual Correlation (Q_3) Visual inspection

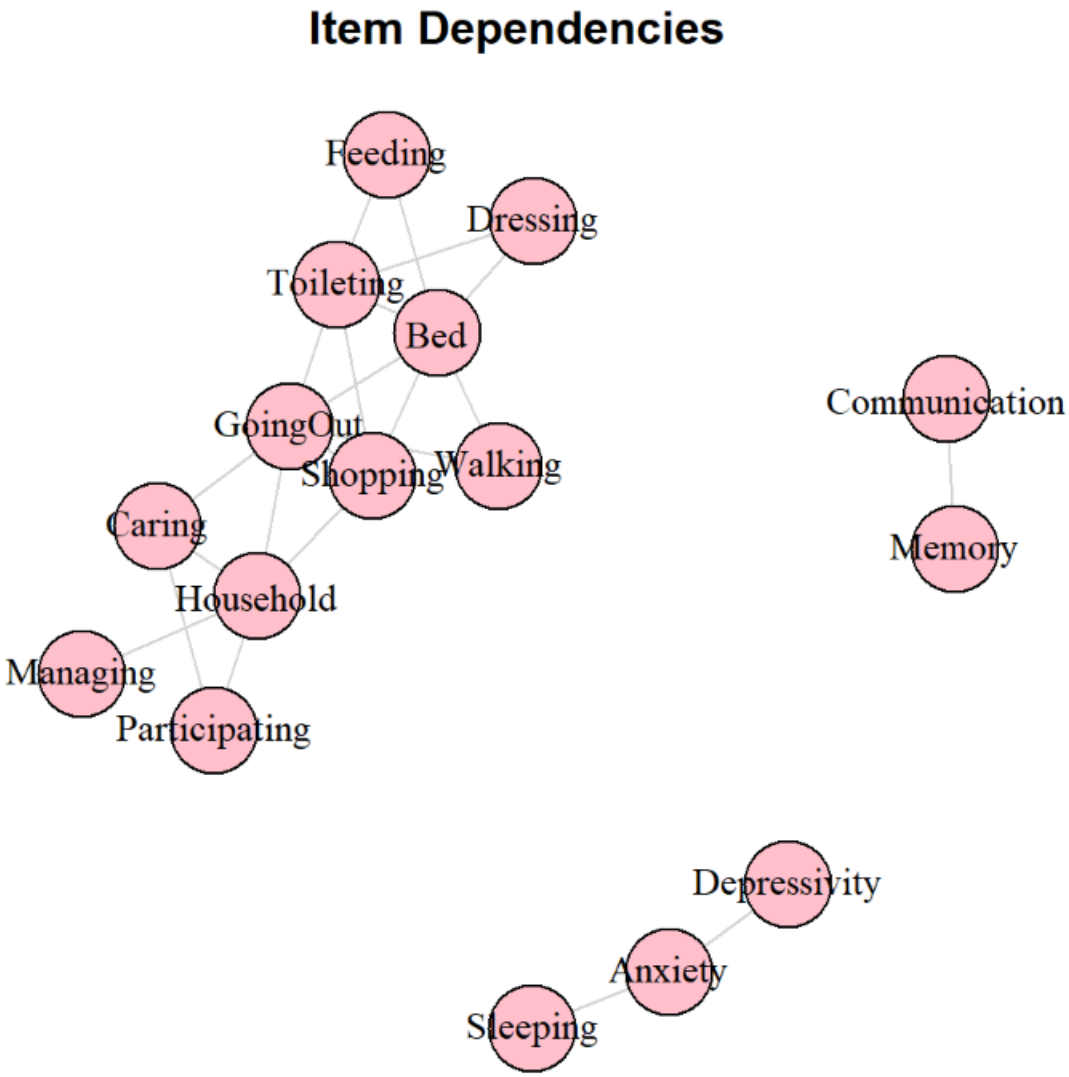
With large scales, the inspection of the residual matrix can become tedious.

Approach to detect the dependency, is either to search through the correlation matrix.

Another approach is to visualize the dependencies with a graphical model.

The graphical model has the advantage to show association patterns, beyond the pairwise correlations.

Residual Correlation (Q_3) Visual inspection



Let’s go to R-Studio

Open the R-Script MS6_Rscript.r that you can find, in the OLAT or the MS-Teams Course Materials.

Exercise

Use the MDS capacity data to investigate if LID items are found in the capacity metric:
a) cut-off of 0.2
b) cut-off mean Q3 + 0.2

Which are the two pair of items with the strongest dependency?
Which pair of items are only flagged when using 'Q3star'?
Do you see themes in the correlation pattern? Potential nested latent constructs?