

These are our first tries to fit ERGM-models. First approach: Try to fit a model suggested for starting by Robins and Lusher (2011). Model does degenerate quickly. Thus we try to find statistics which are responsible for degeneration by extracting each term in a separate model and check the performance via `mcmc.diagnostics`. This is repeated for every year in our data set (1992 - 2011).

Tabelle 1: ERGM-Terms suggested by Robins and Lusher and the result of their `mcmc.diagnostics`

ergm-term	mcmc.diagnostics
edges	converges
mutual	converges
gwidegree(decay, fixed = TRUE)	works only with decay near one
gwodegree(decay, fixed = TRUE)	degenerates
gwdsp(fixed = TRUE)	works, long computation time
gwesp(fixed = TRUE)	works, long computation time
ctriple	degenerates

Now we try to find some terms which can replace the terms which are degenerating or have a long computational time. The idea is to combine all terms which are working fine in new model.

Tabelle 2: Replacement for ERGM-Terms

ergm-term	mcmc.diagnostics
ostar(2)	degenerates
dsp(1)	converges in most years
esp(1)	converges in most years

- Combining statistics leads to long computing time
- That's why we try to estimate parameters for single statistics
- Estimation of four different models:
 - edge + mutual,
 - edge + `gwindegree(decay = 0.9, fixed = T)`,
 - edge + `esp(1)`,
 - edge + `dsp(1)`
- Time Series of Parameters:

Interpretation of Time Series:

- mutual : Positive value suggests that reciprocated ties are likely. Strength of effect weakens between 1991-1997, then stays quite constant. In our context this means that the weapon trade tends to be symmetric.
- gwindegree: Negative popularity spread parameter indicates that most actors have similar levels of popularity (the network is not centralized on in-degree). Strength of effect increases over time. In our context this means that the weapon trade network does not tend to have central importeurs.
- esp(1): A negative effect indicates a low degree of clustering. Strength of effect increases until 1996, then stays quite constant. In our context this means that the weapon trade network does not tend to form small groups.
- dsp(1): This parameter relates to the 2-paths in the networks. A negative estimate indicates that 2-paths tend to be closed (triangles are formed). In our context this means that the weapon trade network tends to form triangles (small groups). This contradicts the findings of the interpretation of esp(1). A joint modeling of both parameters could possibly solve this problem?

Time Series of Parameter Values (1992-2011)

