

## Assignments $\mathcal{N}^o$ 9

**released:** 07.01.2015      **due:** 13.01.2015 at 12:00h

### **Task 1: Creating and terminating ties** **10 points**

Let  $x(t_0)$  and  $x(t_1)$  be two observations of a network at two time points  $t_0$  and  $t_1$  and  $v$  a binary attribute (e.g. gender). We consider a stochastic actor-oriented model for undirected ties assuming that the initiative is two-sided and the choice is dictatorial.

Consider an evaluation function based on edges, reciprocity, and homophily with respect to  $v$ . Is there an ERGM which is the limiting distribution of this SAOM?

### **Task 2: Creating and terminating ties – R task** **10 points**

Let us consider the data collected by Andrea Knecht.

- (a) Estimate a SAOM specified by the following effects: outdegree and reciprocity. The reciprocity effect should appear in both the evaluation function and the endowment function.
  - (a.1) Compute the gain/loss in the utility function when
    - a tie not reciprocating an existing tie is maintained
    - a tie reciprocating an existing tie is dissolved
  - (a.2) Comment the results in (a.1)
- (b) Add the transitive triplets and the 3-cycles to the model. Estimate the model.
- (c) Add one or more effects in order to test the hypothesis that terminating a tie closing a transitive triad is not attractive for an actor. Is the hypothesis supported by the data?

- (d) Add one or more effects to test if homophily with respect to gender and similarity with respect to delinquency favour either the creation or the maintenance of friendship ties.
- (e) Compare your results with those deriving from the estimation of the STERGMs (last slide on Temporal Exponential Random Graph Models)