

# Behaviour Dynamics in Social Networks - Assignment 4

Maria Hotoiu, Federico Tavella

November 19, 2017

## Abstract

Learn to use parameter tuning tools to find the best values for a set of missing parameter values in a model.

## 1 Part 1

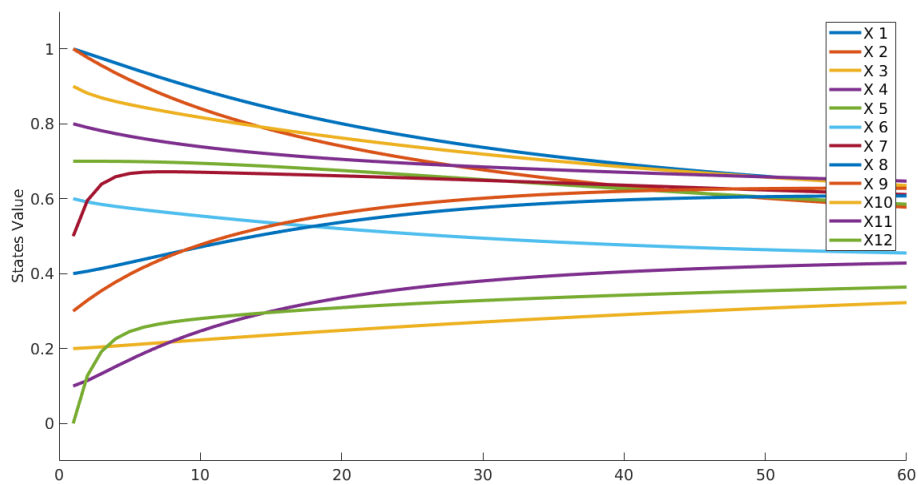


Figure 1: Results from the simulation

## 2 Part 2

$\eta_L$	$K(t = 2)$	$L(t = 2)$	$ K-L(t = 2) $	$K(t = 13)$	$L(t = 13)$	$ K-L(t = 13) $	Sum of differences
0	0.1146	0	0.1146	0.2221	0	0.2221	0.3367
0.05	0.1146	0.0127	0.1019	0.2395	0.1232	0.1162	0.2181
0.10	0.1146	0.0255	0.0892	0.2517	0.1949	0.0568	0.1460
0.15	0.1146	0.0382	0.0765	0.2603	0.2359	0.0243	0.1008
0.20	0.1146	0.0509	0.0637	0.2664	0.2592	0.0072	0.0709
0.25	0.1146	0.0636	0.0510	0.2708	0.2724	0.0016	0.0526
0.30	0.1146	0.0764	0.0383	0.2739	0.2799	0.0060	0.0443
0.35	0.1146	0.0891	0.0256	0.2763	0.2844	0.0081	0.0337
0.40	0.1146	0.1018	0.0128	0.2781	0.2873	0.0092	0.0220
0.45	0.1146	0.1145	0.0001	0.2795	0.2892	0.0097	0.0098
0.50	0.1146	0.1273	0.0126	0.2806	0.2906	0.0100	0.0226

Table 1: Exhaustive search for different values of  $\eta_L$

The best value for  $\eta_L$  (i.e. the one with the minimum sum of differences at  $t = 2$  and  $t = 13$ ) is  $\eta_L = 0.45$ .

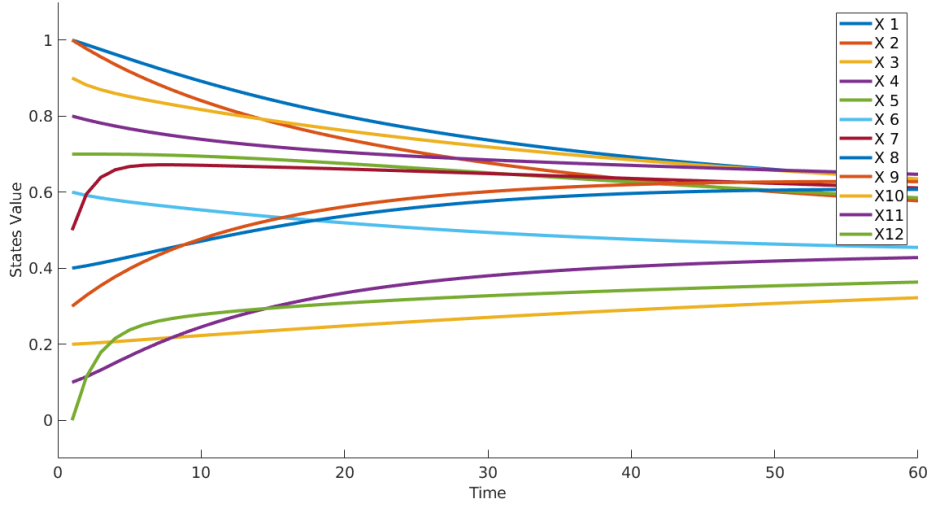


Figure 2: Results from the simulation for  $\eta_L = 0.45$

### 3 Part 3

$\eta_L$	SSR	Error
0	0.9593	0.2827
0.05	0.0222	0.0430
0.10	0.0463	0.0621
0.15	0.1618	0.1161
0.20	0.2621	0.1478
0.25	0.3402	0.1684
0.30	0.4010	0.1828
0.35	0.4491	0.1935
0.40	0.4881	0.2017
0.45	0.5202	0.2082
0.50	0.5472	0.2135

Table 2: Exhaustive search for different values of  $\eta_L$

The best value for  $\eta_L$  is  $\eta_L = 0.05$ .

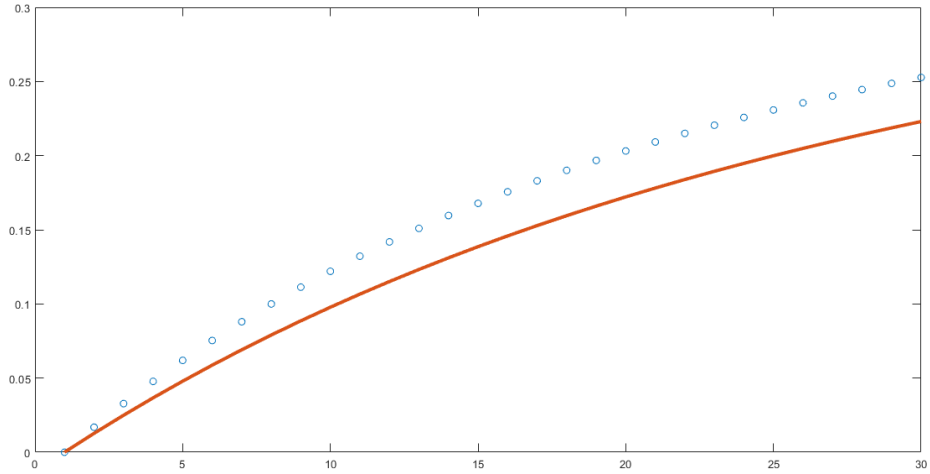


Figure 3: Simulated values for  $\eta_L = 0.05$  (line) vs empirical values (dots)

## 4 Part 4

If we want to use exhaustive search with grain size of 0.01, we should check  $101^{12}$  sets of values.

$\eta_i$	Value
$\eta_1$	0.257
$\eta_2$	0.105
$\eta_3$	0.062
$\eta_4$	0.078
$\eta_5$	0.323
$\eta_6$	0.089
$\eta_7$	0.370
$\eta_8$	0.229
$\eta_9$	0.113
$\eta_{10}$	0.032
$\eta_{11}$	0.139
$\eta_{12}$	0.312

Table 3: Best set of values for  $\eta$

The error corresponding to these speed factors is 0.1046.

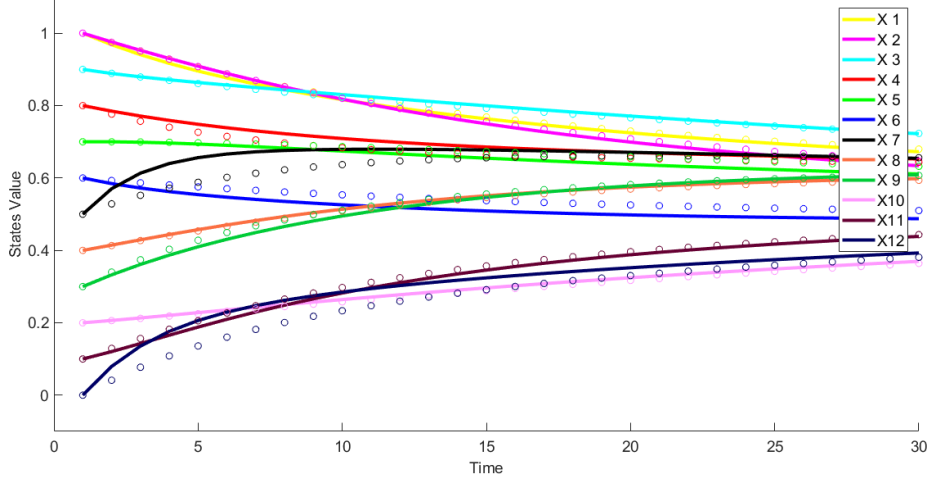


Figure 4: Simulated values vs empirical values