

Dynamics of Smoking - Reproducibility

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Reproducibility check

This document was created with the intention to give the reader the possibility of reproducing the results presented in the project report Dynamics of Smoking. All the results mentioned in the project report can be reproduced by calling the functions in the main section of our code.

Light test

In order to perform a light test, the Python file `SmokingChanges.py` has to be stored together with the files `300nodes.mat`, `500nodes.mat` and `1000nodes.mat` in a folder. While `SmokingChanges.py` contains our simulation and the experiments, the other three files contain graphs which are used by the simulation for the creation of the network. At the end of `SmokingChanges.py` you may find a section "Main", which is used to run the simulation and perform the experiments.

To run the simulation and to get Figure 3, which shows the probability of an agent being a smoker in dependence of the share of smoker in his environment, you can uncomment the function `run_simulation()` with a `"#"` in front of the line.

In order to get Figure 4(a), which shows the parameter dependence of the simulation, you may use the function `run_experiment1()`. Figure 4(b), which displays the time propagation of the simulation in dependence of the parameter `impact_smoke`, can be obtained with the function `run_experiment2()`.

The resolution of the plots can be changed with the parameter `Gridlength`, we recommend values not larger than 14 for reasons of time.

Full test

For a full test of the results, the following parts can also be reproduced in about 40 minutes.

The histograms of the final percentage of smokers in Figure 2(a) and (b) can be produced with the function `Determinism_test()`. The number of samples used for the histogram can be controlled with the parameter `SampleSize`. We recommend using values between 20 and 60 for reasons of time.

You may additionally use the Block Two-Level Erdős-Rényi (BTER) model, which was first proposed by Seshadhri, Kolda, and Pinar in 2012, to create the files `300nodes.mat`, `500nodes.mat` and `1000nodes.mat`. This can be done with the library FEASTPACK distribution version 1.2 (Copyright (c) 2014, Sandia National Laboratories All rights reserved.) in MATLAB.

To get the visualization of our society as shown in Figure 1(a) and (b), you may use the program Gephi[©] to open the files `begin.gexf` and `end.gexf` which are created by the function `run_simulation`. For the visualization we used the layout "Force Atlas".