

# local-degree-asymmetry

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Source code for papers: "Friendship Paradox in Growth Networks: Analytical and Empirical Analysis" and "Average Nearest Neighbor Degree and Its Distribution in Social Networks".

The program can be used to simulate Barabasi-Albert and triadic closure (by Holme and Kim) networks, acquire friendship index, average degree dynamics for nodes in networks, acquire friendship index distributions, degree-degree correlations in real and synthetic networks.

## How to run

There are 2 main python source files in the root of the repository.

1. `main-ui.py` handles a simple self-explanatory UI for running experiments.
2. To manually run the program open `main.py` and follow detailed instructions on top of the file. In short, edit `experiment_type_num` variable on line 53 to select which type of experiment you would like to run. The variable is an index for `input_types` array on line 51. Edit model parameters or select input filename. For models you may record trajectories of nodes specified in `focus_indices` array.

Output: histograms with value distributions, node trajectories: both raw and processed.

Tested on Windows 10, Python 3.7.6. Please, see next section on how to visualize output.

## How to visualize

Output histograms and averaged degree dynamics are created in the format, that is accepted by LaTeX Tikzpicture environment.

Example of code:

```
\begin{tikzpicture}\footnotesize
\begin{axis}[height = 1.3in, width=\linewidth,
xmin=1.2,
```

```

xmax=4.8,
tick align = {outside},
ymin=0,
ymax=12,
xlabel={ $\log(\#\beta_i(t))$ , BA model},
legend style = {cells = {anchor=west}, nodes = {scale=0.75}},
legend pos=south west
]
\addplot[blue, only marks, mark=*, mark options={scale=0.25}]
table[x=ln t,y=ln b]{source_data/hist_out_ba_335000_3.txt};
\addlegendentry{ $\log(\#\beta_i(t))$ }
\addplot[red, smooth, thick] table[x=ln t,y=linreg]
{source_data/hist_out_ba_335000_3.txt};
\addlegendentry{ $-2.48 \log t + C$ }
\end{axis}
\end{tikzpicture}

```

Produces following image:

