local-degree-asymmetry

Source code for paper "Friendship Paradox in Growth Networks: Analytical and Empirical Analysis".

Can be used to acquire friendship index dynamic for nodes in networks, acquire and analyze friendship index distribution.

How to run

There are 3 python source files in the root of the repository with detailed descriptions on top.

1. Open `main.py` and edit `input_type_num` variable on line 29 to select which type of experiment you would like to run. The variable is an index for `input_types` array on line 27.
2. Edit model parameters or select input filename. For models you may record trajectories of nodes specified in `focus_indices` array:

- For real graph change filename in `experiment_file()` function on line 100;
- For BA model change parameters in `experiment_ba()` function on lines 159-162;
- For TC model change parameters in `experiment_triadic()` function on lines 280-282.

Output: raw node trajectories and histograms with friendship index distribution.

3. To average results for node trajectories after running `main.py` go to `process_output.py`, edit filename on line 3.
4. To evaluate friendship paradox use code in `analyze_hist.py` that accepts histograms produced by `main.py`

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={$\log(\#\beta_i\ \mathrm{in} \
\mathrm{interval})$, 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=lnt,y=lnb]{source_data/hist_out_ba_335000_3.txt};
\addlegendentry{$\log(\#\beta_i(t))$}
\addplot[red, smooth, thick] table[x=lnt,y=linreg]
{source_data/hist_out_ba_335000_3.txt};
\addlegendentry{$-2.48\log t+C$}
\end{axis}
\end{tikzpicture}
```

Produces following image: