

Lab task

Understand the model. Explore baseline

1. Open the model and read the code. Create monitor with total demand of all users for previous day. The idea of power generation is to generate the same amount users are demanding. Create adjustment procedure, so power plant will produce the mean amount of demanded power for previous 5 days (each tick max-power should be equal to $\text{mean-day-demand} / 24$). Create plot: total demand per day of all users with days as x-axis steps
2. Consider network with 1 plant, 5 distribution stations and 100 users. For three implemented network types explore how productivity (number of satisfied users) will change with grow of demands. Set stations to maximum levels (generation-capacity should change with user demands grow). Find threshold when more then 10% users will face power shutdown.
3. Analyze results. What you can say about network and how its connectivity influence the results.

Generate own network

Note! You need to create own network, based on general principle, using following rules:

1. Each distribution station linked to power plant. Power plant cant be linked to users
2. Distribution stations cant be linked together
3. Users can be linked together (this will be difference of your network from baseline). If one user get power through other - you need to change algorithm or distribution. Think about logic of power distribution and propose solution (this is one of tasks of this lab).
4. Each user must be linked at least to one source of power.

Variants

0: preferential attachments

1:small world

2:random with p around 0.4

3:random with p around 0.7

For your network implement metric calculations: APL, CC, mean betweenness of nodes, mean Closeness, EigenCentrality.

Fix network with parameters just below threshold of shutdow and now randomly destroy 1, 2, 3.. of distribution stations, measure productivity of network and show the results.

Compare this for baseline model. What model is the weakest? And what is the most resilient?

Fix network with parameters just below threshold of shutdown and randomly destroy 5,10,15.. % percent of links. What is the difference?

Present your results with conclusions about