Social Networks & Recommendation Systems

III. Real networks properties and their visualization.

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MSc program in Data Science has been developed
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Project

Excercises

Excercise 1.

Draw a histogram with marked sigma intervals for random variables from the normal distribution

$$f(x) = \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-x^2}{2}\right).$$

compare the result with the continuous power distribution

$$f(x) = \frac{\alpha - 1}{x_{\min}} \left(\frac{x}{x_{\min}}\right)^{-\alpha}.$$

Excercise 2.

Check the Pareto rule for variables from the zeta distribution

$$p_k = \frac{1}{\zeta(s)} k^{-s}.$$

Projects

P3.0 Two above exercises [1.5P]

P3.1 Generate BA network and ER graphs using built-in functions. Observe presence of hubs, draw a vertex degree histograms. Compare these two models. What are the most important differences? [1.5P]

P3.2 Read documentation of the predefined graph layout functions in your chosen environment. For the selected real graph, test several visualization methods. [1.5P]

P3.3 Implement the graph visualization based on the spring method according to the specification below (static case) [3P]

P3.4 Add animation (take care of the visibility) to your spring-optimization method. [1P]

Graph visualization methods

Physical **approach**

- In every vertex we put the same electric charge,

Graph visualization methods

Physical **approach**

- In every vertex we put the same electric charge,
- every edge we replace with a spring,

Graph visualization methods

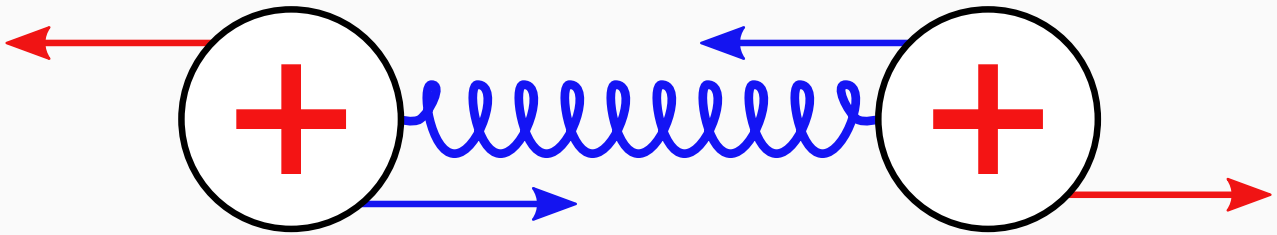
Physical **approach**

- In every vertex we put the same electric charge,
- every edge we replace with a spring,
- we start with the random configuration,

Graph visualization methods

Physical **approach**

- In every vertex we put the same electric charge,
- every edge we replace with a spring,
- we start with the random configuration,
- forces by minimizing electrostatic energy and potential elasticity do the work for us.



Project

Work plan

- Write the energy of the spring system.

Project

Work plan

- Write the energy of the spring system.
- Draw the graph in *some* configuration.

Project

Work plan

- Write the energy of the spring system.
- Draw the graph in *some* configuration.
- Apply simulated annealing (or other approach) for finding optimal configuration.

Project

Work plan

- Write the energy of the spring system.
- Draw the graph in *some* configuration.
- Apply simulated annealing (or other approach) for finding optimal configuration.
- Prepare animation.

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