

# Social Networks & Recommendation Systems

## IX. Random walks.

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Grzegorz Siudem

Warsaw University of Technology



**European  
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MSc program in Data Science has been developed  
as a part of task 10 of the project  
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# Project

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# Projects

- P9.1 Find the analytical formula of the ergodic density for random walk on a graph given by adjacency matrix  $A$  with Markov operator  $p_{ji} = \frac{A_{ij}}{k_i}$ . [1.5P]
- P9.2 Determine numerically (looking for the eigenvector) values of ergodic density for the random walk on selected network. [1P]
- P9.3 Determine dynamically (by iterating the Markov operator) ergodic density for the random walk on selected network. [1P]
- P9.4 Read the original work introducing pagerank <http://infolab.stanford.edu/pub/papers/google.pdf> or one of many of its variations. Prepare few slides which explain the algorithm to the rest of the group. [2P]
- P9.5 Determine the value of classic or modified pagerank for the selected network. [1.5P]
- P9.6 Find a graph with a fixed number of edges and vertices where diffusion occurs fastest (hint: value a second eigenvalue can help). [3.5P]

Thank you for your attention!



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