PhD research topic proposal

BME, Doctoral School of Mathematics and Computer Science

Name of supervisor :

MOLONTAY Roland

Degree:

PhD

Title of the topic:

Data-driven methods of complex networks

Short description:

Data-driven analysis of complex networks has attracted a lot of research interest since the millennium when the prompt evolution of information technology made the comprehensive exploration of real networks possible. The study of networks pervades all of science, such as Biology (e.g. neuroscience networks), Chemistry (e.g. protein interaction networks), Physics, Information Technology (e.g. WWW, Internet), Economics (e.g. interbank payments) and Social Sciences (e.g. collaboration and acquaintance networks). Despite the fact that networks can originate from different domains, most of them share a few common characteristics such as scale-free and small-world property, high clustering and fractality.

The main purpose of the project is to use data-driven techniques to analyze complex networks. The research can be extended to many different aspects depending on the expertise and interest of the applicant. The candidate will work on large datasets, analyze network models and state-of-the-art network algorithms from the literature and also propose novel ones to gain a better understanding of complex systems.

Requirements:

An MSc degree in (applied) mathematics, physics or computer science with a solid background in graph theory, algorithms, probability, statistics and machine learning. Strong programming skills (preferably in Python and/or R) are needed. Prior experience with complex networks is an advantage.

Contact:

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Place of work:

Department of Stochastics, Institute of mathematics, BME

Statement*: The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*