Random Networks

Mathematical Modeling and Analysis

Background

Networks are an ubiquitous concept pervading almost every aspect of live by providing a comprehensive framework for the understanding of the interaction of systems with multiple components. As such, they can be used for example to model and analyze communications in a population or between devices such as self-driving cars or in the internet of things. Network analysis has also been successfully applied in the study of epidemics or phase transitions in materials. A particularly relevant class of networks are random networks, where one or multiple parts of the system are subject to uncertainty. This stochasticity can stem for example from the intrinsic randomness of the vertices of the network that may represent for example cellphone users in an urban environment. But randomness can also stem for example from uncertainty in the observation of highly complex spin configurations in magnetic materials.
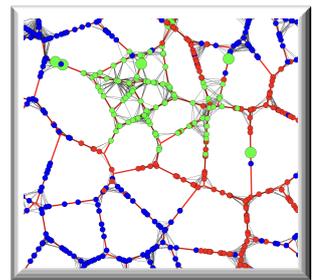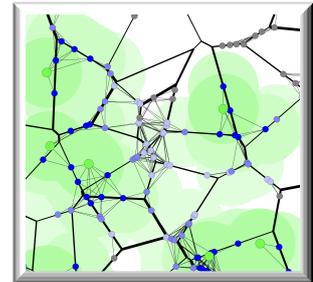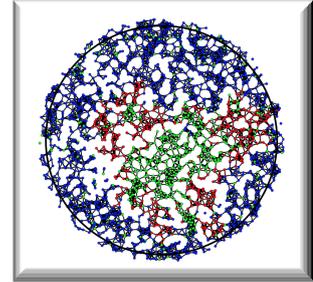
We Offer

Modeling and analysis of random networks is a central subject at our institute for many years. Here, we offer comprehensive expertise and experience in fundamental research as well as applications covering the full cycle from modeling of random networks, their rigorous analysis, simulations and data analysis. As an example, our researchers, over many years, have helped a major global communication provider to asses opportunities and challenges in device-to-device communication networks in urban as well as rural environments.

Fields of Application

- Communications providers
- Self-driving cars
- Materials sciences
- Life sciences

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