

Models of Complex and Spatial Networks

Jordi Levy
IIIA-CSIC
levy@iiia.csic.es

AIHUB JAE Intro 2021

Graph structures are omnipresent in many problems, from the field of mathematics, computer science, AI, physics, . . . not only as networks or data structures, but also as the intrinsic structure of problems with constraints, the interaction of agents, . . . In recent years, complex networks or, more formally, scalefree graphs have attracted great attention. Preferential attachment has been proposed as a generic mechanism that gives rise to these types of graphs. However, it is a very partial model.

In this project, we propose to study other mechanisms that give rise to these graphs, especially those that generate spatial graphs, where the nodes occupy positions in a certain space. These graphs, in addition to the variability in the arity of the nodes of scalefree graphs, present variability in the length of the arcs, fractal structures, . . . As possible applications, we will study the influence of these structures in some classical algorithms on graphs, and their possible adaptation.

The candidates are expected to integrate into an international team that has been working on the subject for the last year. Skills in mathematics, statistical mechanics, complexity analysis, programming, AI, are necessary/appreciated. The candidates can hold a degree in Computer Science, Mathematics, or Physics.