

Multidimensional Network Analysis: Models, Analytics, Applications

Michele Berlingerio

IBM Research and Development,
Dublin, Ireland

Abstract. Multidimensional networks (also known as multilayer, multiplex, or multislice) are receiving increased attention from computer scientists, physicists, mathematicians, and other scientists, thanks also to many application scenarios and increased availability of data for analytics. Social sciences are interested in the multidimensional aspects of the connections between individuals, not only by looking at different types of connections (i.e., different relationships that may co-exist at the same time), but also taking into account different dimensions like space, time, and text, all at the same time. Economists are also looking at modelling and analysing hidden or explicit relationships between companies, products, CEOs, and all the other entities within the financial environment. Due to the higher complexity of the relationships that this type of networks is able to capture, and the higher expressiveness of the models to represent them, Multidimensional Network Analysis is both a technically challenging field, and a powerful means to extract knowledge from real world phenomena. During this talk, we will review the basic aspects of Multidimensional Network Analysis, like history, models, structural analysis, some focused (open) problems like community detection or link prediction, and some application scenarios like public safety and financial analytics.