Communicability and geometry of complex networks

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Abstract

I will introduce some basic concepts of network theory, in particular the small-worldness and how the communication is though to flow in networks. Then, I will motivate and introduce the concept of communicability. I will show the way to formulate this concept mathematically. I will show a few applications of this concept in different areas, such as material sciences, human brain diseases and bioinformatics. Then, I will introduce the concept of communicability distance and angles, and will show how them induces the embedding of a network in a high-dimensional Euclidean space. Using these concepts I will show how to investigate the spatial efficiency of networks and will illustrate the analysis of urban street networks, brain networks, protein residue networks and others.