

Optimizing diffusion in Multiplexes by Maximizing Layer Dissimilarity

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Diffusion in a multiplex depends on the specific link distribution between the nodes in each layer, but also on the set of the intra-layer and inter-layer diffusion coefficients. In this work we investigate, in a quantitative way, the efficiency of multiplex diffusion as a function of the topological similarity among multiplex layers. This similarity is measured by the distance between layers, taken among the pairs of layers. Results are presented for a simple two-layer multiplex, where one of the layers is held fixed, while the other one can be rewired in a controlled way in order to increase or decrease the inter-layer distance. The results indicate that, for fixed values of all intra- and inter-layer diffusion coefficients, large inter-layer distance generally enhances the global multiplex diffusion, providing a topological mechanism to control the global diffusive process. For some sets of networks we develop an algorithm to identify the most sensitive nodes in the rewirable layer, so that changes in a small set of connections produce a drastic enhancement of the global diffusion of the whole multiplex system.