

COLLOQUIUM

Decoding Network Structure by Matrix Functions

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Abstract: The aim of this talk is to illustrate the necessity of introducing concepts and invariants beyond those of 'small-worldness' (SW) and 'scale-freeness' (SF) that pervade current network analysis. I will present three challenging examples from the real-world analysis of networks. The first is related to the identification of essential proteins in a protein-protein interaction map. The second deals with the identification of communities in rather homogeneous networks like an international trade network. The third one focuses on the discrimination of human brains after suffering strokes from healthy ones. The solution to these three problems are presented on the basis of matrix functions, such as the exponential adjacency matrix. Other extensions are also mentioned. They are presented by introducing the concepts of subgraph centrality and communicability in networks and are compared with the use of simple measures based of SW and SF concepts, such as the use of degree, average path length or betweenness centrality.

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