Is it really a small world - network connectivity revisited BARUCH BARZEL, OFER BIHAM, The Hebrew University — Networks are useful for describing systems of interacting objects, the applications include chemical and metabolic systems, food webs as well as social networks. Lately, it was found that many of these networks display some common topological features, such as high clustering, small average path length and a power-law degree distribution. These topological features are commonly related to the network's functionality. However, the topology alone does not account for the nature of the interactions in the network and their strength. In this talk we will introduce a method for evaluating the correlations between pairs of nodes in the network. These correlations depend both on the topology and on the functionality of the network. A network with high connectivity displays strong correlations between its interacting nodes and thus features small-world functionality. The method can be used to obtain the correlation matrix or to evaluate the correlation function of the network. Certain networks display a typical correlation length. The connectivity of a network is then defined as the ratio between this correlation length and the average path length of the network. Using this method one can distinguish between a topological small world and a functional small world, where the latter is characterized by long range correlations and high connectivity. Clearly, networks which share the same topology, may have different connectivities, based on the nature and strength of their interactions.

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