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Generalization of Clustering Coefficient on Lattice Networks Applied to Criminal Networks

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Abstract : A lattice network is a special type of network in which all nodes have the same number of links, and its boundary conditions are periodic. The most basic lattice network is the ring, a one-dimensional network with periodic border conditions. In contrast, the Cartesian product of d rings forms a d-dimensional lattice network. An analytical expression currently exists for the clustering coefficient in this type of network, but the theoretical value is valid only up to certain connectivity value; in other words, the analytical expression is incomplete. Here we obtain analytically the clustering coefficient expression in d-dimensional lattice networks for any link density. Our analytical results show that the clustering coefficient for a lattice network with density of links that tend to 1, leads to the value of the clustering coefficient of a fully connected network. We developed a model on criminology in which the generalized clustering coefficient expression is applied. The model states that delinquents learn the know-how of crime business by sharing knowledge, directly or indirectly, with their friends of the gang. This generalization shed light on the network properties, which is important to develop new models in different fields where network structure plays an important role in the system dynamic, such as criminology, evolutionary game theory, econophysics, among others.

Keywords : clustering coefficient, criminology, generalized, regular network d-dimensional
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