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Strategic formation of hierarchical networks

Hierarchical networks are different from similar small-world networks in the distribution of nodes' clustering coefficients. Typically, in a hierarchical network, nodes of higher degree (in particular hubs), are expected to have lower clustering coefficients. We present a grid-based game theoretic network formation model where the cost of establishing each link depends on the distance of the endpoints. In this game-theoretic model, players are located in a grid with the objective of minimizing their collective distances to others in the network. Our framework is inspired by Even-Dar and Kearns' model (NIPS 2007: 385-392) and consequently that of Atabati and Farzad (COCOA 2014: 581-592). However, in our model, the cost of establishing each link is dynamically determined depending not only on the distance but also the degrees of the endpoints. We show that the model generates hierarchical networks.