

Complexity Indices for Random Graphs

Daria Kalytiuk¹

In the study a definition of the complexity index of a growing random acyclic graph is proposed. This value can be considered as a modification of the Wiener index, which was introduced as a measure of compactness of a molecular graph, and which is defined as the sum of the distances between all pairs of vertices of the graph. Like the Wiener index, the proposed complexity index characterizes the shape or spread of a graph, but can be calculated not only for a connected graph, but also for a random forest. Its multiplicative property allowed us to estimate from below the mathematical expectation of the complexity index of a random tree, obtained as a result of random forest coalescence. For the recursive uniform random tree the asymptotic behaviour of both the mathematical expectation of the complexity index and the complexity index itself are established. The proposed measure of complexity can be applied to a wide class of random graphs with Markovian growth dynamics.

¹National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”. Email: darkal-ipt22@lil.kpi.ua