Hierarchical classification of directed graph with cyclically equivalent nodes

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In this paper an algorithm of a hierarchical classification of a directed graph with cyclically equivalent nodes is constructed. An example of this algorithm application to an analysis of secondary metabolism subnetwork in protein network of Arabidopsis is represented.

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An algorithm of hierarchical classification of directed graph nodes is based on a concept of minimal length of cycles passing through a pair of nodes. Using well known Floyd–Warshall algorithm [4] it is possible to calculate matrix of cycles minimal length and then to apply to this matrix previous algorithm. This algorithm is applied to secondary metabolism protein network of Arabidopsis defined in Suggested algorithm is based on a relation of cyclic equivalence of nodes pair in directed graph (an existence of a cycle containing a pair of nodes in directed graph) and a relation of partial order between classes of cyclic equivalence (an existence of a way between nodes from different classes of cyclic equivalence).

An algorithm of hierarchical classification of undirected graph nodes by similarity matrix is constructed [2]. This approach gives single solution of classification problem. Each hierarchical level is defined by some critical value of a similarity. Using critical value the similarity matrix is transformed into contiguity matrix of some undirected graph in which connectivity components are constructed. Increasing successfully critical values, it is possible to define hierarchical classification of initial objects. This algorithm is applied for hierarchical classification of species of a plant by presence of some matters in them [3], [5].