HYBRID GENETIC ALGORITHM FOR THE OPTIMAL SYNTHESIS OF COMMUNICATION NETWORK[1]

R.V. Plotnikov

Novosibirsk State University, Novosibirsk
e-mail: nomad87@ngs.ru

Consider the following problem. A simple undirected weighted graph $G = (V, E)$ with the set of nodes V, $|V| = n$, and the set of edges E is given. Let $c_{ij} \geq 0$ be *weight* of the edge $(i, j) \in E$. It is necessary to find a spanning tree $T^* \in G$ – solution of the problem:

$$\sum_{i \in V} \max_{j \in N_i(T)} c_{ij} \to \min_{T},$$

where $N_i(T)$ is the set of adjacent to the vertex i nodes in the tree T.

The considered problem may be applied to the modern wireless communication networks with adjustable transmission ranges when it is necessary to minimize the total energy consumprion per time unit. In such networks the energy consumption of each element is proportional to d^s, where $s \geq 2$, and d is transmission range [1]. In this case the vertices of the graph G correspond to the network elements and the weight of an edge corresponds to the energy consumed in one time unit for data transmission between two network elements. An optimal solution of the considered problem allows to define such transmission range for each network element that the connectivity of the graph is preserved and the total energy consumption for communications is minimum. This meaningful statement of the problem is called Min-Power Symmetric Connectivity [1].

It is known that the considered problem is strong NP-hard [2,3]. We propose the genetic algorithm where the new heuristic based on variable neighborhood search is applied as mutation. The conducted numerical experiment shows the high efficiency of the proposed method.

REFERENCES

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