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学术探讨

网络拓扑进化算法

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摘要 借助拓扑进化网络描述生物进化的模型, 设计出网络拓扑进化算法。算法的拓扑进化结构使其具有可变的种群规模, 而进化中产生的新解提高了探测空间的能力。通过在算法中引入组合优化问题解的backbone概念, 可以用解的相同部分来直观表示进化网络中单元（解）之间的联系。将连续变量转换成二进制编码后, 以相同取值的二进制“位”表示解的相同部分, 也可以用该算法求解连续函数优化问题。网络拓扑进化算法不规定解的变异方式, 可以结合各种现有的技术, 具有广泛的应用性。仿真实验表明算法具有较强的空间搜索能力。

关键词 种群多样性 网络拓扑进化 解的backbone 极值优化

分类号

Network topology evolving optimization

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Abstract

Based on the model of topology evolving networks describing evolution,we designed Network Topology Evolving Optimization（NTEO）,which can automatically control the diversity of populations.The structure of topology evolving makes the population scale of NTEO variable,and the new solutions in the process of evolving enhance the exploration of problem space.The same parts of solutions may directly denote the relations of units（solutions） of evolving networks with the introduction of backbone of solutions of combinatorial optimizations.Coding continues variables into binary and denoting the same parts of solutions using binary bits with the same values,we may optimize continues problems by NTEO.Moreover,NTEO does not fix the mutation mechanism of solutions,so it may be combined with others various technologies and has broad applicability.The experiments show that NTEO has better searching performance.

Key words diversity of population network topology evolving backbone of solution extremal optimization

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