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Fixed Length Temperature Gradient Controlled DNA Computing Algorithm for Elevator Dispatching

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Abstract

Elevator group control systems are required to operate in environments that involved with uncertainty, which many possible situations are comprised. The space of elevator dispatching problem is too large to be solved systematically, so many methods have been applied such as intelligent agents, fuzzy logic, neural networks, and evolutionary and genetic algorithms. On the other hand, as of conventional silicon-based computers have its upper limit in computational speed, the scientists have been searching for alternative media with which to solve complex computational problems. This search has led them among other places, to deoxyribonucleic acid (DNA).

The interest of finding the optimal solution to elevator dispatching systems began from Watada *et al.* (2005, 2004) and Jeng *et al.* (2005), who proposed bio-soft computing method with DNA in solving a multi-elevator routing problem. Later, Muhammad *et al.* (2005) adopted the concept to solve the elevator scheduling problem with length-based DNA computing; however, this method is inefficient in representing a wide range of weights.

To overcome the drawbacks of previous length-based DNA computing for elevator dispatching problem, followed by the model of Adleman (1994), this study propose a DNA computing algorithm with fixed length DNA strands, while the distances are varied by the melting temperature of DNA. This algorithm conquers the limitation of previous studies in numerical representation, and can be applied to other group control optimization problems.

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