

Pavement Maintenance Decision Optimization Using a Novel Discrete Bare-Bones Particle Swarm Algorithm

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A B S T R A C T

Timely pavement maintenance and rehabilitation is essential for a healthy road network. As the resources are always limited, some form of action prioritization is necessary. There are a number of objectives to satisfy and the influencing variables are too many, leading to complicated decision making scenarios. In this work, a novel bare-bones particle swarm algorithm is presented for a general multi-objective problem that is discrete in nature. In contrast to the original particle swarm method, the proposed technique has the advantage in that it is a parameter-free technique. The developed algorithm is applied to find optimal rehabilitation scheduling considering the two objectives, the minimization of the total pavement rehabilitation cost and the minimization of the sum of all residual pavement condition index (PCI) values. The method is benchmarked against a discrete-domain particle swarm algorithm, by comparing a number of performance criteria, demonstrating its effectiveness.