

Application of water cycle algorithm to stochastic fractional programming problem

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Abstract-

This paper presents an application of Water Cycle algorithm (WCA) in solving stochastic programming problems. In particular, Linear stochastic fractional programming problems are considered which are solved by WCA and solutions are compared with Particle Swarm Optimization, Differential Evolution, and Whale Optimization Algorithm and the results from literature. The constraints are handled by converting constrained optimization problem into an unconstrained optimization problem using Augmented Lagrangian Method. Further, a fractional stochastic transportation problem is examined as an application of the stochastic fractional programming problem. In terms of efficiency of algorithms and the ability to find optimal solutions, WCA gives highly significant results in comparison with the other metaheuristic algorithms and the quoted results in the literature which demonstrates that WCA algorithm has 100% convergence in all the problems. Moreover, non-parametric hypothesis tests are performed and which indicates that WCA presents better results as compare to the other algorithms.

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