Hybrid Genetic Bees Algorithm applied to Single Machine Scheduling with Earliness and Tardiness Penalties

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Hybrid Genetic Bees Algorithm applied to Single Machine Scheduling with Earliness and Tardiness Penalties

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ABSTRACT This paper presents a hybrid Genetic-Bees Algorithm based optimised solution for the single machine scheduling problem. The enhancement of the Bees Algorithm (BA) is conducted using the Genetic Algorithm’s (GA’s) operators during the global search stage. The proposed enhancement aims to increase the global search capability of the BA gradually with new additions. Although the BA has very successful implementations on various type of optimisation problems, it has found that the algorithm suffers from weak global search ability which increases the computational complexities on NP-hard type optimisation problems e.g. combinatorial/permutational type optimisation problems. This weakness occurs due to using a simple global random search operation during the search process. To reinforce the global search process in the BA, the proposed enhancement is utilised to increase exploration capability by expanding the number of fittest solutions through the genetical variations of promising solutions. The hybridisation process is realised by including two strategies into the basic BA, named as “reinforced global search” and “jumping function” strategies. The reinforced global search strategy is the first stage of the hybridisation process and contains the mutation operator of the GA. The second strategy, jumping function strategy, consists of four GA operators as single point crossover, multipoint crossover, mutation and randomisation. To demonstrate the strength of the
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