. ive Refining Harmony Search: A New Optimization Algorithm

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Abstract While music improvisation is an NP-hard problem, it has always been handled by musicians successfully. Harmony search is a class of meta-heuristics inspired by the improvisation process of musicians. Inexperienced musicians usually make several harmonies until they find the desired one. However, experienced musicians more rely on their knowledge and experience instead of brute-force searching for a desired harmony. When making a harmony, they are able to distinguish the undesired notes of the harmony and just modify them instead of throwing away the total harmony and making a new one. TIHS approach of experienced musicians was adopted in tIHS paper to allow the harmony search algorithm to exploit the knowledge and experience accumulated in the harmony memory to refine current harmonies. The underlying algorithm is called ive Refining Harmony Search in which a new harmony memory update has been utilized. The main differences between the proposed method and the original harmony search are the integration of ion in the improvisation step and introduction of refinement concept. During refinement procedure, two new parameters were employed to make a trade-off between effectiveness and efficiency of the algorithm. Several algorithms including original harmony search and its state-of-the-art variants were implemented to conduct comprehensive comparisons. All of the algorithms were evaluated over IEEE CEC 2010 suite, one of the well-known and challenging benchmark test sets. The experimental results along with corresponding statistical testings proved that ive Refining Harmony Search outperforms almost all other algorithms for most of the test problems. During the experiments, the proposed method exhibited robust performance against its two new parameters.

Keywords : Optimization, evolutionary algorithm, ultra exploration, refining population, ive search of harmony, exploitation, exploration