Neural Computing and Applications, vol.33, no.11, pp.5989-6008, June, 2021.

A novel binary gaining–sharing knowledge-based optimization algorithm for feature selection

P. Agrawal; T. Ganesh; A.W. Mohamed

Abstract-

To obtain the optimal set of features in feature selection problems is the most challenging and prominent problem in machine learning. Very few human-related metaheuristic algorithms were developed and solved this type of problem. It motivated us to check the performance of recently developed gaining–sharing knowledge-based optimization algorithm (GSK), which is based on the concept of gaining and sharing knowledge of humans throughout their lifespan. It depends on two stages: beginners–intermediate gaining and sharing stage and intermediate–experts gaining and sharing stage. In this study, two approaches are proposed to solve feature selection problems: FS-BGSK: a novel binary version of GSK algorithm that relies on these two stages with knowledge factor 1 and FS-pBGSK: a population reduction technique that is employed on BGSK algorithm to enhance the exploration and exploitation quality of FS-BGSK. The proposed approaches are checked on twenty two feature selection benchmark datasets from UCI repository that contains small, medium and large dimensions datasets. The obtained results are compared with seven state-of-the-art metaheuristic algorithms; binary differential evolution, binary particle swarm optimization algorithm, binary bat algorithm, binary grey wolf optimizer, binary ant lion optimizer, binary dragonfly algorithm and binary salp swarm algorithm. It concludes that FS-pBGSK and FS-BGSK outperform other algorithms in terms of accuracy, convergence and robustness in most of the datasets.

Index Terms- Gaining-sharing knowledge-based optimization algorithm; Feature selection; Classification; K-NN classifier

Citation:
Agrawal, P.; Ganesh, T.; Mohamed, A.W. "A novel binary gaining–sharing

knowledge-based optimization algorithm for feature selection", Neural Computing and Applications, vol.33, no.11, pp.5989-6008, June, 2021.