

Chebyshev and Hermite) is presented. Two undesired effects that must be avoided in order to use orthogonal polynomial kernels are identified and resolved: the Annihilation and the Explosion effects. The proposed formulation is studied by means of introducing a new family of orthogonal polynomial kernels based on Gegenbauer polynomials and comparing it against other kernels. Experimental results reveal that the Gegenbauer family competes with the RBF kernel in accuracy while requiring fewer support vectors and overcomes other classical and orthogonal kernels.

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OPTIMAL HYPER-PARAMETER TUNING OF SVM CLASSIFIERS WITH APPLICATION TO MEDICAL DIAGNOSIS

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Proper tuning of hyper-parameters is essential to the successful application of SVM-classifiers. Several methods have been used for this problem: grid search, random search, estimation of distribution Algorithms (EDAs), bio-inspired metaheuristics, among others. The objective of this paper is to determine the optimal method among those that recently reported good results: Bat algorithm, Firefly algorithm, Fruit-fly optimization algorithm, particle Swarm optimization, Univariate Marginal Distribution Algorithm (UMDA), and Boltzmann-UMDA. The criteria for optimality include measures of effectiveness, generalization, efficiency, and complexity. Experimental results on 15 medical diagnosis problems reveal that EDAs are the optimal strategy under such criteria. Finally, a novel performance index to guide the optimization process, that improves the generalization of the solutions while maintaining their effectiveness, is presented.

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A NEIGHBORHOOD OPERATOR FOR CONTINUOUS MULTI-OBJECTIVE OPTIMIZATION PROBLEMS

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Path-metaheuristics have been used successfully in combinatorial optimization. However, in continuous optimization problems, the lack of neighborhood definitions makes them difficult to design and implement. This paper proposes a neighborhood operator based on first order linear approximation of the gradient. In order to adapt the linear approximation to multi-objective optimization, we use the multi-objective decomposition approach so the operator can be used for single and multi-objective continuous optimization problems. The proposed approach is validated using a Threshold Accepting algorithm based on decomposition and a set of benchmark problems for multi-objective optimization. Results show a significant improvement over Pareto lineal sets.

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2016-06-06

EXACT AND HEURISTIC APPROACHES TO SOLVE THE INTERNET SHOPPING OPTIMIZATION PROBLEM WITH DELIVERY COSTS

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Internet shopping has been one of the most common online activities, carried out by millions of users every day. As the number of available offers increases, the difficulty in getting the best offer among all the shops increases as well. In this paper we propose an Integer Linear Programming (ILP) model and two heuristic solutions, the MinMin algorithm and the Cellular Processing algorithm, to tackle the Internet Shopping Optimization Problem with delivery costs. The results obtained improve on those obtained by the state of the art heuristics, and for small real case scenarios, the ILP delivers exact solutions in a reasonable amount of time.

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