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# Radial Basis Surrogate Model Integrated to Evolutionary Algorithm for Solving Computation Intensive Black-Box Problems

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**Abstract :** For design optimization with high-dimensional expensive problems, an effective and efficient optimization methodology is desired. This work proposes a series of modification to the Differential Evolution (DE) algorithm for solving computation Intensive Black-Box Problems. The proposed methodology is called Radial Basis Meta-Model Algorithm Assisted Differential Evolutionary (RBF-DE), which is a global optimization algorithm based on the meta-modeling techniques. A meta-modeling assisted DE is proposed to solve computationally expensive optimization problems. The Radial Basis Function (RBF) model is used as a surrogate model to approximate the expensive objective function, while DE employs a mechanism to dynamically select the best performing combination of parameters such as differential rate, cross over probability, and population size. The proposed algorithm is tested on benchmark functions and real life practical applications and problems. The test results demonstrate that the proposed algorithm is promising and performs well compared to other optimization algorithms. The proposed algorithm is capable of converging to acceptable and good solutions in terms of accuracy, number of evaluations, and time needed to converge.

**Keywords :** differential evolution, engineering design, expensive computations, meta-modeling, radial basis function, optimization

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