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Manifold Multi-Surrogate Assisted Firefly Global Optimization

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Abstract

Curse of dimensionality seems to be a formidable difficult issue in global optimization. To overcome this problem, some efforts have been devote to this issue. In this study, an alternative algorithm is suggested. This method is composed of two levels. In the first stage, an efficient evolutionary algorithm, firefly method is used to find the local extremes in the design space. Then, an adaptive K-mean clustering method is suggested to partition the present sample points. Compared with the popular K-mean method, the value of K should be modified according to the errors of surrogates. In the second stage, the samples in the original design space should be projected to the lower space by the locally linear embedding algorithm. Then, the projected sample points are used to construct the surrogate and the new sample points generated by this surrogate should be re-mapped to the original design space. To enforce the reliability of surrogate, a multi-surrogate is used. To evaluate the suggested method, we have conducted a series of experiments on both synthetic and real data and compared with other reported methods. The results demonstrate that the proposed method can achieve superior performance, outperforming related method.

References

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