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(57) Abstract :
HIERARCHICAL BAYESIAN-BASED GLOBAL OPTIMIZATION ALGORITHM WITH ADAPTIVE CONVERGENCE ABSTRACT The present invention is designed to solve complex global optimization problems. The system utilizes a multi-layer Bayesian framework to model optimization variables and their interdependencies, providing probabilistic estimates at each layer. An adaptive convergence module dynamically adjusts convergence parameters based on real-time progress, enhancing both accuracy and speed of optimization. The method iteratively refines the search space by integrating feedback from an evaluation engine that assesses candidate solutions using an objective function. Additionally, a search space refinement module focuses the optimization process on promising regions, preventing premature convergence to local optima. The system can handle multi-objective optimization, outputting a set of Pareto-optimal solutions. The invention's adaptive approach ensures that it remains effective across varying complexities and problem sizes, making it suitable for real-world applications in diverse fields, such as machine learning, logistics, and engineering optimization.

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