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Adaptive Meta-Heuristic Optimization for Variable Problem Dimensionality in Artificial Intelligence

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Abstract:

In the realm of Artificial Intelligence, addressing complex optimization challenges with variable problem dimensionality remains an underexplored area. Existing meta-heuristic algorithms excel in solving optimization problems but often struggle when faced with problems of changing dimensionality. This doctoral research aims to bridge this gap by introducing adaptive strategies for meta-heuristic optimization tailored to variable problem dimensionality.

The primary objectives of this research are to develop novel algorithms capable of dynamically adjusting search operators, population sizes, and exploration-exploitation strategies in response to variations in problem dimensionality.

An extensive analysis of the proposed methods will be conducted, using both benchmark problems and real-world applications. The research will focus on evaluating the adaptability of these algorithms, comparing their performance, and assessing the trade-offs between algorithm complexity and adaptability.

By addressing this critical research gap, this work not only advances the field of AI-driven optimization but also offers practical solutions to enhance the performance and applicability of meta-heuristic algorithms in dynamic and uncertain environments. The findings of this research will have significant implications for a wide range of domains, such as network design, resource allocation, and machine learning, where variable problem dimensionality is prevalent and challenging.

Literature:

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