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A Scalable Method for Managing Resources in a Fog Computing Environment

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Abstract: The dynamic and distributed characteristics of fog environments have brought fresh resource management challenges amid the rapid expansion of fog computing. This paper presents an AI-based resource management framework for fog computing that aims to optimize resource allocation and workload distribution. The proposed approach leverages machine learning, optimization techniques, and data analytics to develop innovative algorithms, frameworks, and protocols. Theoretical contributions include new concepts and methodologies for managing resources in fog computing, considering dynamic workloads, energy efficiency, and system scalability. Empirical contributions involve validating the effectiveness of the approach through experiments, demonstrating improved resource utilization, reduced response time, optimized energy consumption, and enhanced fault tolerance.

Furthermore, a practical contribution is made by developing a prototype, tool, or library that embodies the proposed approach, enabling practitioners and researchers to implement and evaluate the approach in real-world scenarios. Acknowledging limitations such as generalizability, data availability, complexity, dynamic nature, external factors, and evaluation metrics, the study aims to advance the field of AI-based resource management in fog computing, leading to improved system performance, energy efficiency, and scalability.

Keywords: Fog Computing; Resource Management; AI-based Approach; Workload Distribution; Optimization Techniques.