Optimizing Cloud Costs: A Machine Learning-Driven Approach for Efficiency

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Abstract: *With the increasing reliance on cloud computing, organizations must effectively manage costs while optimizing resource utilization. This paper presents a machine learning-driven approach to cloud cost optimization, utilizing predictive analytics to forecast workload demands and allocate resources efficiently. By examining historical usage trends, the proposed model detects inefficiencies and suggests real-time adjustments, leading to reduced expenses without compromising system performance or reliability.*

The framework incorporates automated scaling and intelligent resource scheduling, ensuring cost-effective operations by dynamically adapting to fluctuating workloads. Unlike conventional cost management methods that depend on static provisioning or manual intervention, this AI-driven strategy offers a proactive and adaptive approach to cloud cost control.

Experimental assessments conducted across diverse cloud environments indicate a substantial reduction in resource wastage and operational expenses. The model demonstrates high accuracy in predicting future resource needs, improving both scalability and resilience. This study highlights the transformative potential of machine learning in cloud cost management and advocates for AI-driven solutions to enhance efficiency, flexibility, and cost-effectiveness in modern cloud infrastructures.

Keywords: Cloud Cost Optimization, Machine Learning, Predictive Analytics, Resource Allocation, AI-Driven Efficiency, Operational Cost Reduction