

# AI/ML-Enabled Optimization of Edge Infrastructure: Enhancing Performance and Security

Sahil Arora<sup>1</sup> and Pranav Khare<sup>2</sup>

Independent Researcher/Staff Product Manager<sup>1</sup>

Independent Researcher/Sr. Product Manager<sup>2</sup>

AI/ML, Edge Infra & Identity, Mountain View, CA, USA

**Abstract:** *This study explores the efficacy of AI/ML-enabled optimization techniques in enhancing the performance and security of edge infrastructure within the context of edge computing environments. The research objectives encompass investigating dynamic resource allocation, security threat detection and mitigation, workload distribution optimization, and evaluating the impact of AI/ML-driven optimizations on latency reduction, bandwidth efficiency, and system reliability. A survey was conducted to gather insights from users and stakeholders regarding their perceptions and experiences related to AI/ML-enabled optimizations in edge computing environments. The survey findings provide valuable insights into the effectiveness of AI/ML techniques in addressing key challenges and improving various aspects of edge infrastructure. Interpretation of survey results alongside the research objectives reveals promising outcomes, indicating that AI/ML-driven optimizations significantly enhance resource utilization, mitigate security threats, optimize workload distribution, and improve overall system performance and reliability in edge environments. This study contributes to the growing body of research on AI/ML applications in edge computing, offering practical insights for implementing AI/ML-enabled optimizations to achieve superior performance and security in edge infrastructure.*

**Keywords:** Edge Computing, Artificial Intelligence (AI), Machine Learning (ML), Optimization Techniques, Dynamic Resource Allocation