

A COMPREHENSIVE REVIEW OF AI TECHNIQUES IN INTRUSION DETECTION SYSTEMS: TRENDS AND FUTURE DIRECTIONS

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ABSTRACT

Intrusion Detection Systems (IDS) play a vital role in protecting information networks from unauthorized access and cyber threats. Incorporating Artificial Intelligence (AI) into IDS has significantly enhanced their capability to detect intrusions accurately and efficiently. This paper exhaustively reviews recent AI methodologies used in IDS, analyzing key trends, innovative techniques, performance metrics, and future research paths. The review addresses various AI methods including traditional machine learning, deep learning, reinforcement learning, and hybrid models, supported by practical implementations, detailed examples, case studies, critical evaluations, and graphical illustrations. This study aims to provide a comprehensive understanding of current advancements and existing challenges to guide future research and application in cybersecurity.

KEYWORDS: *Intrusion Detection Systems (IDS), Artificial Intelligence (AI), Machine Learning, Deep Learning, Reinforcement Learning, Cybersecurity, Anomaly Detection, Network Security.*

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