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SecureGrid: Ensemble Learning Approach For Intrusion Detection

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Abstract: *Smart grids, as the next generation of electrical networks, are highly dependent on advanced communication and control systems, making them vulnerable to a wide range of cyber threats. Ensuring the security and reliability of these networks is crucial for stable power delivery and infrastructure protection. This study proposes an artificial intelligence-based ensemble modeling approach for intrusion detection in smart grids. By integrating multiple machine learning algorithms, the ensemble model leverages the strengths of individual classifiers to enhance detection accuracy and reduce false alarms. Experimental evaluations on benchmark smart grid datasets demonstrate that the proposed method effectively identifies both known and emerging cyber attacks, outperforming traditional single-classifier systems. The results highlight the potential of AI-driven ensemble techniques to strengthen smart grid cybersecurity and support the development of resilient energy infrastructures.*

Keywords: Smart Grids, Intrusion Detection System (IDS), Cybersecurity, Artificial Intelligence (AI), Machine Learning, Ensemble Modeling, Anomaly Detection, Network Security, Power Systems Security, Cyber Attack Detection

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