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Intelligent Intrusion Detection System for Cybersecurity of Water Utilities

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Real-time cybersecurity of critical infrastructures that include multiple networked automation systems represents a important challenge for the assurance of modern societal functions. In particular water supply and treatment facilities have to operate at high availability and efficiency parameters, with direct impact on public health in the case of performance degradation or unscheduled down time due to network attacks. We present a machine learning (ML)-based approach to detect malicious activities in operational control networks of water utilities. The system accounts for the particularities of the industrial communication protocols used for process control of this critical sector and presents a comparison between enhanced random forest models (XGBoost), hybrid neural network architectures (CNN-MLP) and logistic regression, as reference baseline model. Binary classification results, evaluated on the popular SWaT dataset, show that ML methods can extend intrusion detection system capabilities for accurate attack detection.

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