

12.AUTOMATED MODEL SELECTION FOR ANOMALY DETECTION IN MULTIVARIATE DATA USING LEAGUE CHAMPIONSHIP ALGORITHM

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This project develops a comprehensive framework for anomaly detection in multivariate data using a League Championship Algorithm (LCA)-based comparison model. Anomaly detection in such data is challenging due to complex feature interactions, data imbalance, and noise. In order to tackle this issue, the framework assesses sophisticated deep learning and machine learning techniques, such as Long Short-Term Memory (LSTM) networks, Support Vector Machine (SVM), Isolation Forest, and Deep Autoencoders. To ensure a fair and competitive evaluation, the LCA systematically evaluates these models according to key performance parameters like accuracy, precision, recall, F1-score, and false positive rate. By applying feature selection, oversampling, and hyperparameter tuning, the framework enhances model performance while minimizing computational overhead. Designed for real-time applications in fields such as industrial monitoring, predictive maintenance, and cybersecurity, the system improves anomaly detection accuracy while ensuring adaptability and resilience in dynamic environments. The league-based evaluation provides a scalable and efficient solution for high-dimensional anomaly detection, optimizing reliability, system integrity, and data-driven decision-making across various sectors.