

Pseudo-Labeling and Time-Series Data Analysis Model for Device Status Diagnostics in Smart Agriculture

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Abstract: This study proposes an automated data-labeling model that combines a pseudo-labeling algorithm with waveform segmentation based on Long Short-Term Memory (LSTM) to effectively label time-series data in smart agriculture. This model aims to address the inefficiency of manual labeling for large-scale data generated by agricultural systems, enhancing the performance and scalability of predictive models. Our proposed method leverages key features of time-series data to automatically generate labels for new data, thereby improving model accuracy and streamlining data processing. By automating the labeling process, we reduce dependence on manual labeling, which is often labor-intensive and prone to errors in large datasets. This approach enables the efficient preparation of labeled data for applications such as anomaly detection, pattern recognition, and predictive modeling in smart agriculture. Experimental results demonstrate that the automated labeling model achieves 89% accuracy in agricultural environments and reduces data processing time by 30%. Future research will focus on extending the model's applicability to diverse agricultural settings, enhancing generalization performance, and improving real-time processing capabilities, thereby advancing intelligent and sustainable smart agriculture systems.

Keywords: smart agriculture; pseudo-labeling; time-series data; machine learning automation; IoT device status monitoring

Biography:

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