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Simplifying Time-Series Recognition: Automated Feature Extraction and Modern Classification

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The contribution addresses the topic of time-series recognition, specifically comparing the conventional approach of manual feature extraction with contemporary classification methods that leverage features acquired through the training process. Employing automated feature extraction software, we attained a high-dimensional representation of a time-series, obviating the necessity of designating application-sensitive features. Subsequently, dimensionality reduction techniques, such as Linear Discriminant Analysis (LDA) or Generalized Discriminant Analysis (GDA), were applied to diminish the negative effects of features with low discriminative power among different classes of time-series. Finally, a variety of classification methods (including Bayes classifier, Random Forest or Artificial Neural Networks) were employed both on the complete and reduced feature sets. These results were compared with those of a simple Convolutional Neural Network (CNN) comprising two convolutional layers and trained on the original time-series data. The experimental data used in our work consist of acoustic emission signals originating from two distinct defectoscopy experiments.

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