CNN 경량화 모델을 이용한 효율적인 돼지 발성음 분류

Efficient Pig Sounds Classification Using a Lightweight CNN Model

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Pig sounds are vital indicators for evaluating the health and welfare of pigs. Implementing pig sound detection and classification systems inside pig farms can lead to more efficient farm management practices, enhancing productivity and animal care. This study introduces an efficient pig sounds classification method based on a lightweight convolutional neural network (CNN) model to classify pig sounds with a real pig farm. The mixed−MMCT audio feature extraction method is used to extract and transform the sound audio signal into the input representation for training the network model. Pig sounds were recorded and collected from a pig farm, sliced, and labeled into four classes: coughing, screaming, non−vocal, and others. For the experiment, a dataset consisting of 4,000 WAV files (1,000 coughing, 1,000 screaming, 1,000 non−vocal, and 1,000 others) was gathered. Each audio file has a duration of three seconds. In this study, the performance of the predictive model was assessed using the k−fold cross−validation (k=5) technique. By conducting rigorous experiments, the average accuracy of 5−fold cross−validation in terms of accuracy, precision, recall, and F1−score reached 96.93%, 96.95%, 96.90%, and 96.92%, respectively. All results demonstrate that the proposed model using lightweight CNN to classify pig sounds shows remarkable results. This finding is a significant and useful solution to the pig sounds classification problem.

***키워드(Keywords):** precision livestock farming, pig sound classification, audio feature extraction, convolutional neural network.

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