

## **Abstract**

**Lung sounds are sounds caused by breathing. Lung sounds can detect abnormalities in breathing. The detection in this study includes the classification of lung sounds against normal class, crackle class, wheeze class, and crackle and wheeze class.**

**Spectrogram is a visual representation of sounds or signals with various frequencies or other variables. The spectrogram is also referred to as a short-time Fourier transform. The short-time Fourier transform (STFT) algorithm is a development algorithm of the Fourier transform algorithm. The advantage of the STFT algorithm compared to the Fourier transform algorithm is that it can show the location of a frequency.**

**This study uses a spectrogram because the machine learning algorithm used is a convolutional neural network (CNN). CNN is an algorithm that has been validated in medical image processing. Therefore, the use of a spectrogram will make the CNN accuracy higher. In this study, three augmentation processes were used, namely shift up by a major third (four half-steps), compress to be one and a half as fast, compress to be half as fast. The augmentation process is carried out to avoid overfitting conditions in the machine learning model trained in this study.**

**After conducting training on the CNN machine learning model using generalizations in the form of augmentation and dropout layers, an accuracy of 84.80% for training data and 78.09% for test data is obtained.**

**Keywords: lung sound, spectrogram, CNN**