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INTRODUCTION

Respiratory sounds are a simple, objective, and noninvasive marker to assess patients' respiratory condition. Adventitious sounds are abnormal sounds that are superimposed on the normal respiratory sounds and are used for diagnostic purposes in several respiratory conditions. They can be discontinuous (crackles) or continuous (wheezes), shown in Fig.1.



LIMITATIONS OF RELATED WORK

Traditionally, the field has relied on small or private data collections that do not contain environmental noise. Additionally, neglected experimental design has led to overestimated and non-generalizable results.

Therefore, we decided to study the impact of event duration on the largest publicly available respiratory sound database, containing sounds from 126 patients.

Robust experimental design is crucial for realistic evaluation of wheeze classification algorithms.

Classifiers are implicitly learning an irrelevant characteristic of the dataset, event duration.

False negatives are concentrated around 150 ms on FD and encompass all durations on VD.

Fig.3: Distributions of false negatives



-100 ۽

-140

Influence of Event Duration on Automatic Wheeze Classification



MATERIALS AND METHODS

To study the impact of event duration on the classification performance, we experimented with the design of the negative class (Other), which consisted of random events containing speech, cough, crackles, and background noise: 1. Fixed Durations (FD): events with 150 ms 2. Variable Durations (VD): events with durations belonging to the same distribution of wheeze events We followed both the traditional approach of feeding extracted features to classifiers and a deep learning approach, in which a convolutional neural network (CNN) was fed spectrogram images.



EVALUATION As displayed in Fig.2, the performance decreased significantly between the FD and the VD experiments.



Fig.2: Matthews Correlation Coefficient