

# Heart Murmurs Detection Using Traditional And Deep Learning Methods

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## Abstract

**Aims:** The goal of this work is to identify heart murmurs in heart sound recordings collected from five different auscultation locations of 943 patients, into three cases: presence, absence, or unknown.

**Methods:** Our team, *Buckeye AI*, have used two traditional classification algorithms (i.e.,  $k$ -nearest neighbors algorithm (KNN) and gradient boosting machine (GBM)) and a deep learning approach identify the heart murmurs. For the two traditional algorithms, we predict the heart murmurs based on the routine demographic information of patients. For the deep learning method, we adopt ResNet-18 which is a convolutional neural network to extract the abnormal features from heart sound recordings. The concatenation vectors of abnormal features and patients' demographics are sent to a fully connected layer to generate the heart murmur risks. Note that we utilize contrastive learning to force the model to focus on the abnormalities of heart sound recordings (i.e., the difference of heart sound recordings among patients with similar meta data).

**Results:** In the current challenge stage, we got 0.833 accuracy with AUROC of 0.951 on KNN algorithm and 0.860 accuracy with AUROC of 0.950 on GBM algorithm. For the official scores of KNN and GBM showing on the unofficial phase leader board are 1546 and 2028 respectively.

**Conclusion:** Based on the result of our classification work, we found that without the sound recording data, the two traditional algorithms still achieved superior performance with demographic information of patients. We will further apply contrastive learning framework with metadata and audio files for heart murmurs detection.