

## The Classification of Heartbeat PCG Signals via Transfer Learning

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### ABSTRACT

Cardiovascular auscultation is a process of listening to the sound of a heartbeat to pick up on any abnormalities. One of these abnormalities is heart murmurs, which are the result of blood turbulence, in or near the heart. Heart murmurs can be innocent, or they can indicate the existence of very serious diseases. Normally the process is performed with a stethoscope, by a medical professional, where murmurs are identified by the subtle difference in timing and pitch from a normal heartbeat. These professionals, however, are not always available; hence, the need for the automation of this process rises. This paper aims at testing the performance of pre-trained CNN models at the classification of heartbeats. A database of phonocardiogram (PCG) heartbeat recordings, under the name of the PASCAL CHSC database was used to train four pre-trained models: VGG16, VGG19, MobileNet, and inceptionV3. The data was processed, and the features were extracted using Spectrogram signal representation. They were then split into training and testing data, and the results were compared using the metrics of accuracy and loss. The classification accuracies of the VGG16, VGG19, MobileNet, and inceptionV3 models are 80.25%, 85.19%, 72.84% and 54.32%, respectively. The findings of the paper indicate that the use of different transfer learning models can, to a certain extent, enhance the overall accuracy at detecting the murmurs of the heart.

### KEYWORDS

Classification; Feature selection; Heart murmur; Machine learning; PCG; Transfer learning

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