Experiment No. 1

Case Study on Early and Remote Detection of Possible Heartbeat Problems

Topic: Early and Remote Detection of Possible Heartbeat Problems With Convolutional Neural Networks and Multipart Interactive Training.

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Introduction

In the past decades, heart attack has been a significant health issue worldwide. Records from the World Health Organization (WHO) show that the number of deaths due to heart disease was higher in the twenty-first century. Any measures that can help contain the negative effects of cardiovascular disease should be seriously considered. Krzysztof created the Convolution Neural Network Model which produces accurate assessment of heart function by analysing heart beat sound.

Challenges

1. Heart beat sound data used for training the model contained lots of background noises.

2. The dataset A had more murmur class data than normal and extra sound.

3. In both dataset A and B Artificat audio file doesn't contained sound at all.

4. Some data were shorter than 3 second.

5. CSV file wasn't contained correct name as WAV file.

6. Data set size were small to train neural network.

Proposed Solution

1. Data were down sampled with very aggressive low pass band filtering (around 300Hz), all the background noise frequency were removed.

2. Data Augmentation applied on normal and extra sound data of data set A.

3. Artificats data totally removed from both set A and B.

4. Data shorter than 4 seconds were removed.

5. Data iteratively fetched from directory instead of using CSV File.

6. Pre-trained model such as ResNet and Mobile V Net were used.

Experiments

Most of the Image processing model can be used for Sound Classification, data were pre-processed and then Mel-Spectrogram image were created for each data and each image was reduced to 224*224 pixel(to fit in a 64-size batch). Models input layer changes to accept 224*224*3 (height*width*channels) and output layer were changed and contained only 4 neurons. Optimizer used for Resnet was Cyclic Stochastic Gradient Descent and data were trained using 2-3 Epochs.

Conclusion

Model were able to achieved overall accuracy of 99.96% and made only one mistake on the official testing set. With better quality of data set and more training iteration of model can achieve greater accuracy.