

LISTEN TO YOUR HEART

Boikanyo Radiokana (1386807) & Elias Sepuru (1427726)
Supervisor - Ellen De Mello Koch

INTRODUCTION

- ▶ According to WHO, Cardiovascular Diseases (CVD's) continue to be one of the leading causes of deaths globally.
- ▶ To check for any CVD's (abnormalities) in patients' heartbeat sounds, medical practitioners currently use a method known as cardiac auscultation.
- ▶ This is a process whereby a medical practitioner listens to the heart sound, analyses it and classifies it as normal or abnormal.
- ▶ Generally it is a difficult skill to acquire considering the complexity of abnormal heart sounds.
- ▶ An easily accessible and reliable heart-beat sound classification system would be vital in reducing high mortality rates due to CVD's and also assist medical practitioners with more accurate cardiac auscultation.

BACKGROUND CONT.

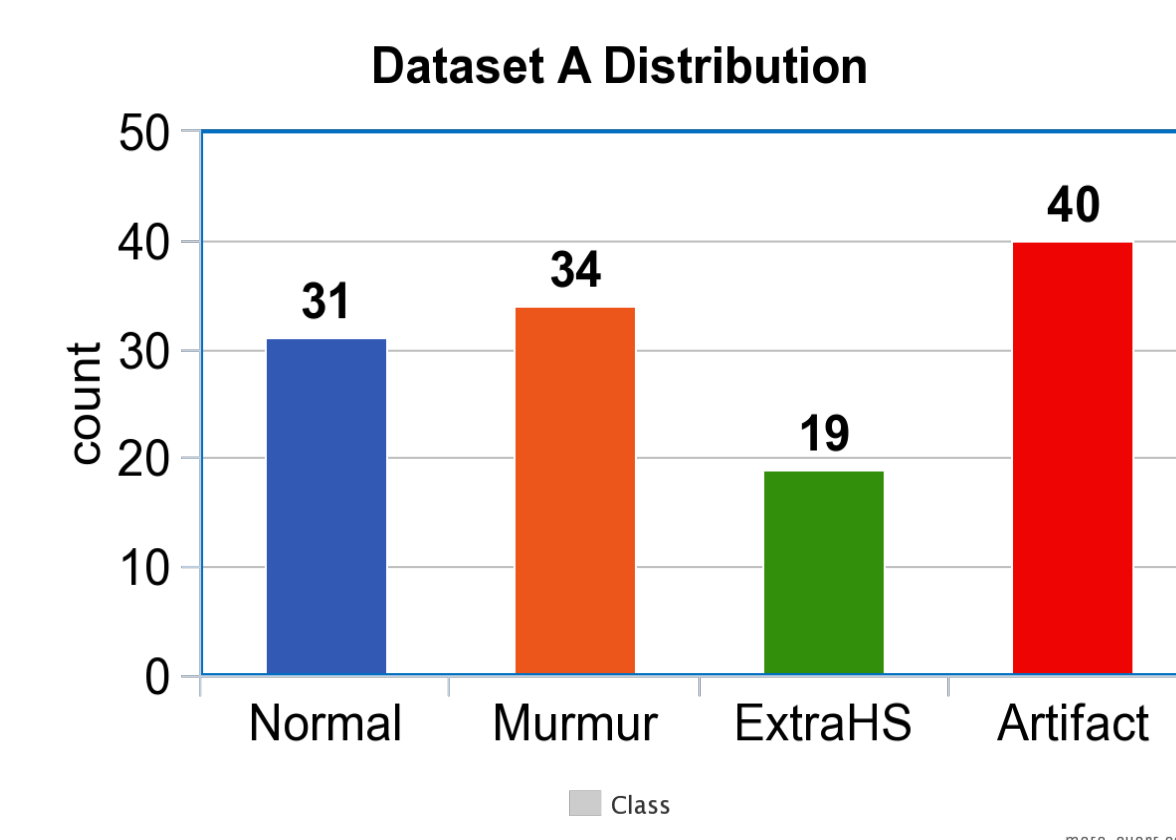


Figure 1: Dataset A: iphone (iStethoscope)

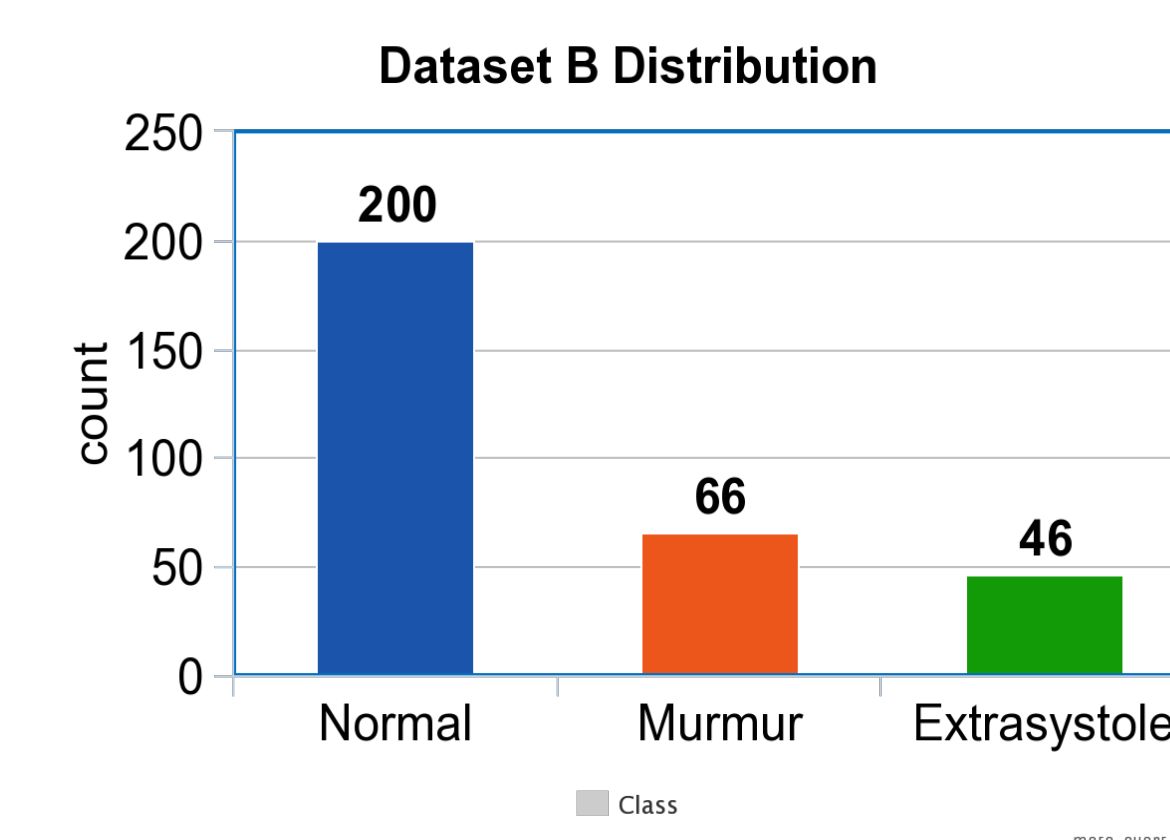


Figure 2: Dataset B: Digital stethoscope

METHODOLOGY

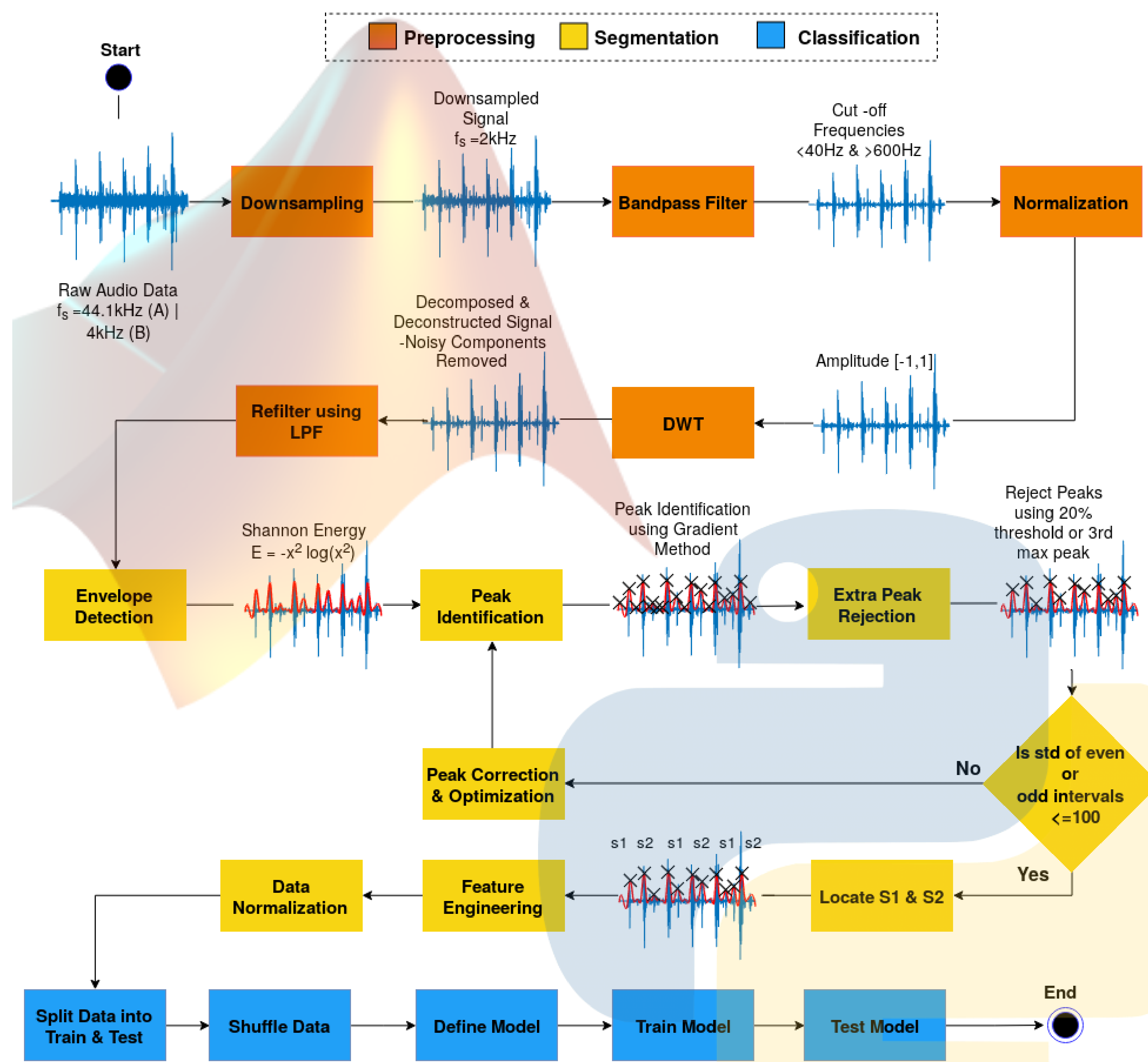


Figure 3: System Overview

RESULTS & DISCUSSION

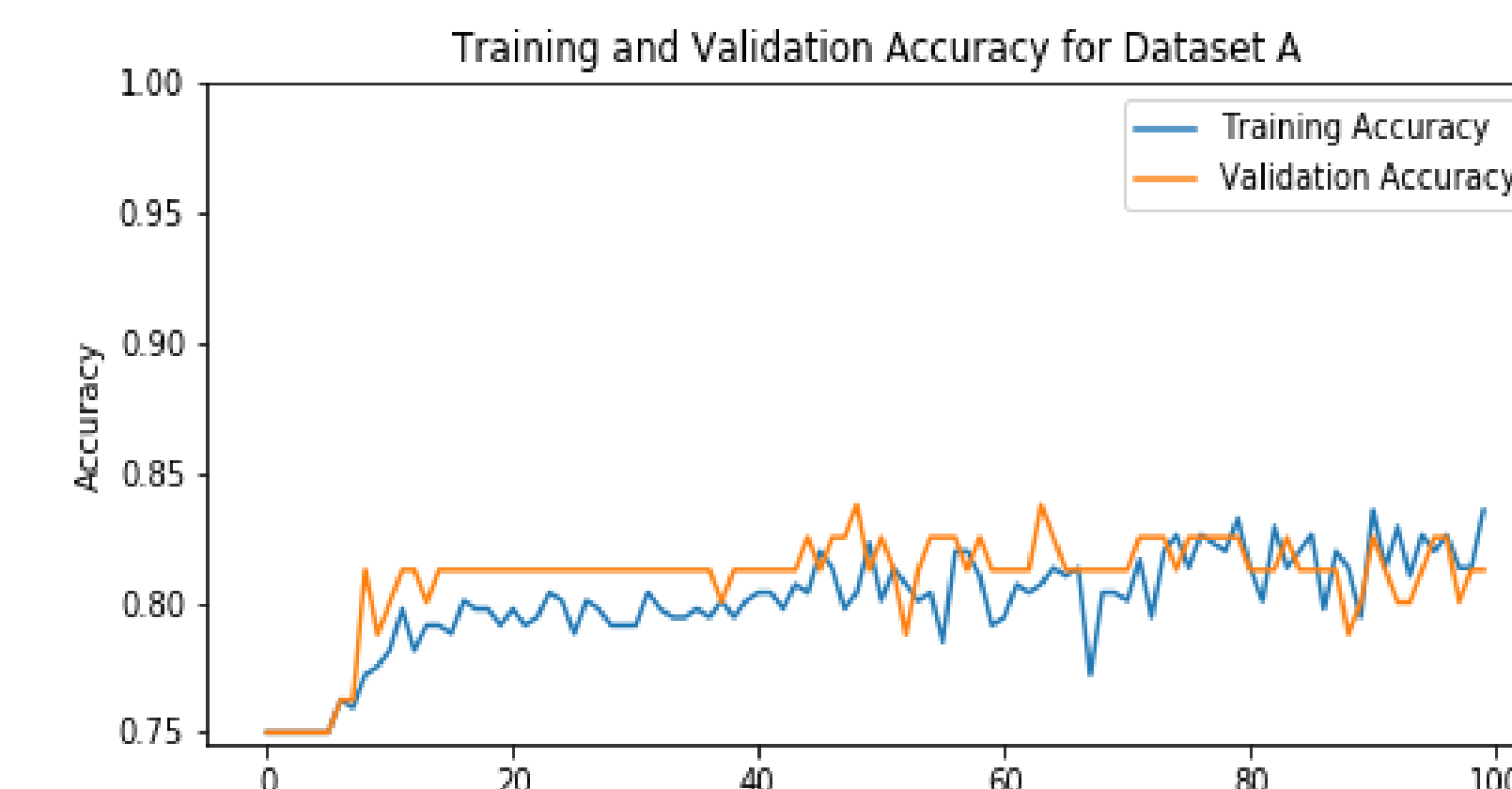


Figure 4: ANN performance (Dataset A)

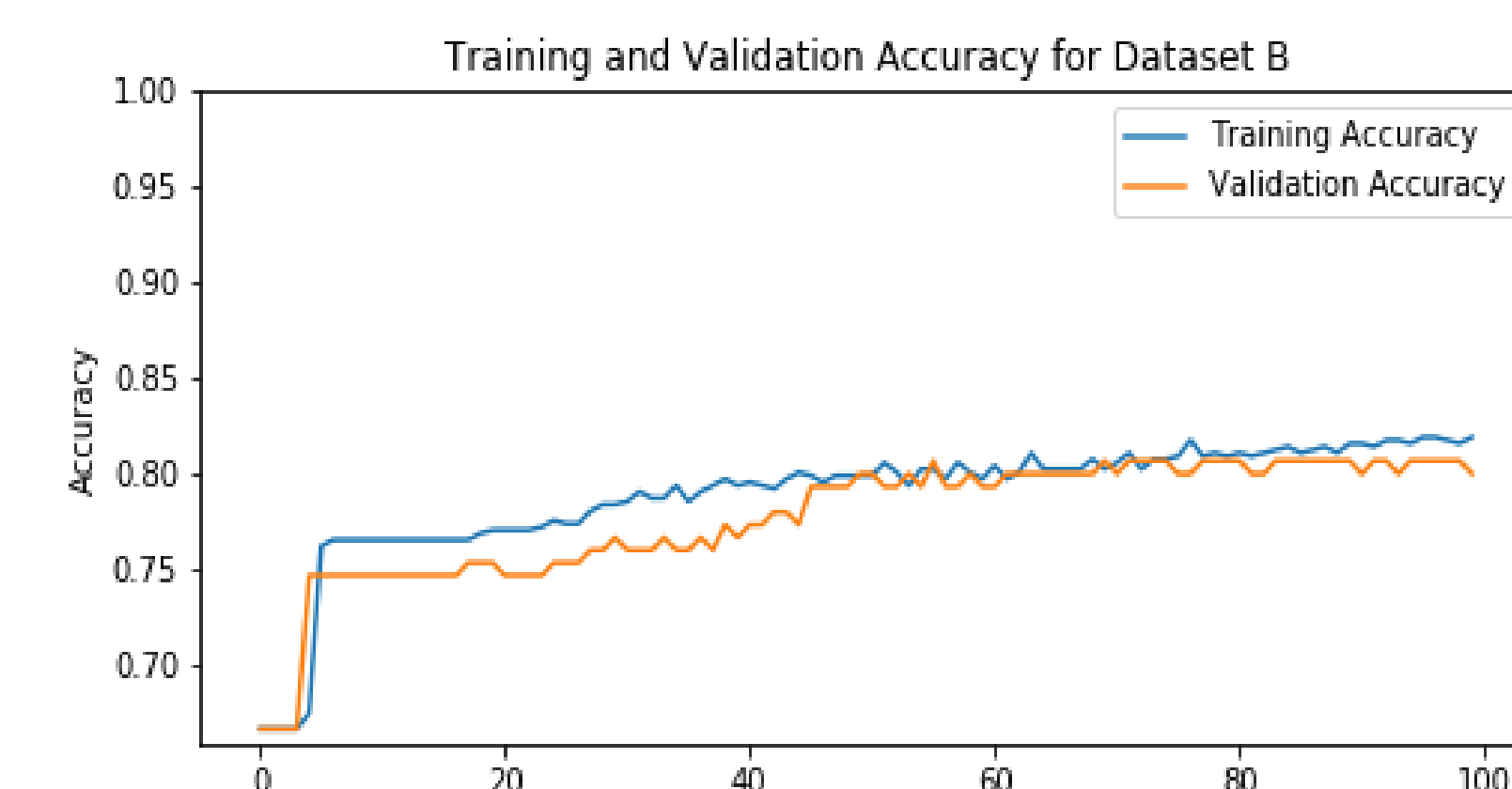


Figure 5: ANN performance (Dataset B)

Dataset B	ANN (%)	SVM (%)	XGB (%)	Literature (%)
Normal	80	77	89	78
Murmur	90	87	75	37
Extrasys	15	0	17	17

Figure 6: Performances for Dataset B

- ▶ ANN performed best with high class precisions, however it was unable to classify Extrasystole heart sounds.
- ▶ This is due to a small training set used and Extrasystoles having similar characteristics to normal heart sounds.

PROJECT OBJECTIVES

- ▶ To implement a method which can locate *lub* and *dub* sounds (S1 and S2) within audio data, segment the files and classify heartbeats into normal or diseased categories.
- ▶ To create a model that will enable a first level screening of detecting abnormalities in an individuals heart sound.
 - For home use by individuals using a smartphone.
 - For hospital use by medical professionals.

BACKGROUND

The dataset used is from a secondary source, collected from recordings using an iphone (iStethoscope app - Dataset A) and digital stethoscope (Dataset B).

CONCLUSION

ANN classifier was found to be the most promising audio heart sounds classifier. For future work, an equally distributed training set distinct Extra-systole features are recommended.

ACKNOWLEDGEMENTS

A special thanks to Ms Ellen De Mello Koch for her constant support and advice.