

Second International Symposium on Computer Vision and the Internet (VisionNet'15)

Classification of Heart Sound Signals Using Multi-modal Features Simarjot Kaur Randhawa¹ and Mandeep Singh² *

1. Research Scholar EIED, Thapar University Patiala, INDIA

2. Asst. Professor, EIED, Thapar University Patiala, INDIA

Abstract

Cardiac auscultation is a technique of listening to heart sounds. Any abnormality in the heart sound may indicate some problem in the heart. In this paper, the phonocardiogram (PCG) signal i.e. the digital recording of the heart sounds has been studied and classified into three classes namely normal signal, systolic murmur signal and diastolic murmur signal. Total number of samples used for this study are 144 out of which 60 are normal signals, 45 are diastolic murmur signals and 39 are systolic murmur signals. Various features have been extracted for the classification. A total of 28 features have been extracted and then reduced to 7 most significant features using feature reduction technique. The selected features have been used to classify the signal into various classes using classifiers. The classifiers which have been used in this study are *k*-NN (*k* Nearest Neighbour), fuzzy *k*-NN and Artificial Neural Network (ANN). Both *k*-NN and fuzzy *k*-NN as classifiers have the highest accuracy of 99.6%.

© 2015 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of organizing committee of the Second International Symposium on Computer Vision and the Internet (VisionNet'15)

Keywords: Heart Sounds; Classification; Feature Extraction

1. Introduction

Cardiac auscultation is the foremost basic analysis tool used to evaluate the function of the heart [1]. It is a technique of listening to heart sounds with a stethoscope. The main cause of the generation of heart sounds in blood turbulence. The blood turbulence is mainly caused due to opening and closing of heart valves and also due to fast accelerations and retardations of blood flow in the heart chambers [2]. The digital recording of heart sound is called phonocardiogram (PCG). It is mainly recorded using the electronic stethoscope and the signal is displayed on the computer.

The heart sound comprises of four components: S1, S2, S3 and S4. S1 (lub) and S2 (dub) are called fundamental

* Corresponding author. Mandeep Singh
E-mail address: mdsingh@thapar.edu