(Article: 39)

A NEW APPROACH BASED ON GENETIC ALGORITHM FOR DE-NOISING CORRUPTED SIGNAL

Poulami Das[1*], Dr. Subhas Chandra Panja[2], Dr. Sudip Naskar[1] , Dr. Sankar Narayan Patra[3]

Dept. of Computer Science and Engineering[1], (*Email: poulamidas1989@gmail.com)
Dept. of Mechanical Engineering[2], Dept. of Instrumentation Science[3]

ABSTRACT

This paper presents a survey on different strategies for filtering digital signals using Finite Impulse Response Digital Filters. For lesser overheads in designing and lower hardware cost, Finite Impulse Response (FIR) filters have been popular since past few eras than the Infinite Impulse Response Filters (IIR). Till the date a considerable number of scientists have been proposed several methods namely Window method, Optimal Sampling Method, Frequency Sampling Method for designing FIR digital filters. A wide number of algorithms for designing FIR filters using each methodology also proposed in numerous papers earlier. In this paper a brief review of most of those algorithms is presented. Moreover, a new stratagem using Genetic Algorithm based on Kaiser Window with varying ripple factors has been proposed to de-noise a corrupted bio-medical signal.

Keywords- *Finite Impulse Response Filter, Kaiser Window, Genetic Algorithm, Noise Reduction Factor.*

INTRODUCTION

Exchanging information amongst various hospitals and diagnostic centres for mutual availability of diagnostic and therapeutic case studies is quite common in this modern century. But transmission of signals may include undesirable components to the signals often. Removal of unwanted components (noise) from the corrupted signals is the most stimulating mission for the researchers in the pitch of digital signal processing. In this favour a considerable number of techniques have been proposed by the scientists from the earlier days of signal processing.

INTRODUCTION

Use of digital filters to de-noise a corrupted signal is the most successful techniques among all those. An extensive number of algorithms have been proposed by the researchers for implementation of filters over the years. Lesser overheads in designing and lowerhardware cost made the Finite Impulse Response (FIR) filters more popular than Infinite Impulse Response (IIR) filters since past few eras. Design of FIR filters makes it necessary to calculate impulse response coefficients. A number of methods like window method, optimal sampling and frequency sampling have been introduced in this purpose. A wide number of windowing methods [1,2,3] were proposed earlier, based on different parameters like sampling frequency, cut off frequency, passband ripple, stopband attenuation, order of the filter, filter length, width of the lobes, etc.

In this paper a new strategy has been used for de-noising a corrupted heart sound signal. In this new technique Kaiser Window (Section- II) with varying passband and stopband ripples (passband ripple varies from 0.21 to 0.40 and stopband ripple varies from 0.30 to 0.49) has been used to de-noise a corrupted signal and thus obtaining a Matrix of filtered signals. This matrix has been used as the initial population in Genetic Algorithm that has been used to obtain the least noisy signal. Considering initial population is the starting point of the Genetic Algorithm where the initial population comprises set of possible solutions to the specified problem.

Heart sound is basically a noise caused by the heart beats and the flow of blood through the heart. Usually heart produces the sound Lub & Dub, where Lub is the first sound S1 and S2 is the second sound Dub. The time between S1 and S2 is systole (Lub-------Dub) , caused by the flow of blood from the heart to the lungs and body, flow of blood across the Pulmonic and Aortic valves. This sound primarily occurs due to closing of the bicuspid and tricupsid valves. They close because of the contraction of the ventricle. The time between S2 and S1 is diastole (Dub--------Lub) , caused by closing by the flow of blood from the atria to the ventricles, flow of blood across the bicuspid and tricuspid valves.