EXPERT SYSTEMS AND SOLUTIONS
48, North Street, Aranarai, Perambalur, Tamil Nadu, India.
Email ID: expertsyssol@yahoo.com,
Website: www.researchprojects.info
Phone: 9952749533,

INVESTIGATION OF ECG SIGNAL USING DSP PROCESSOR AND WAVELETS

The analysis of the ECG has been widely used for diagnosing many cardiac diseases. The ECG is a graphic record of the direction and magnitude of the electrical activity that is generated by depolarization and repolarization of the atria and ventricles. One cardiac cycle in an ECG signal consists of the P-QRS-T waves. Most of the clinically useful information in the ECG is found in the intervals and amplitudes defined by its features. The development of accurate and quick methods for automatic ECG feature extraction is of major importance, especially for the analysis of long recordings (Holters and ambulatory systems). In fact, beat detection is necessary to determine the heart rate, and several related arrhythmias such as Tachycardia, Bradycardia and Heart Rate Variation; it is also necessary for further processing of the signal in order to detect abnormal beats. The ECG feature extraction system provides fundamental features (amplitudes and intervals) to be used in subsequent automatic analysis.

The large number of known wavelet families and functions provides a rich space in which to search for a wavelet which will very efficiently represent a signal of interest in a large variety of applications. Wavelet families include Biorthogonal, Coiflet, Harr, Symmlet, Daubechies wavelets, etc. There is no absolute way to choose a certain wavelet. The choice of the wavelet function depends on the application. The Haar wavelet algorithm has the advantage of being simple to compute and easy to understand. The Daubechies algorithm is conceptually more complex and has a slightly higher computational overhead. But, the Daubechies algorithm picks up detail that is missed by the Haar wavelet algorithm. Even if a signal is not well represented by

one member of the Db family, it may still be efficiently represented by another. Selecting a wavelet function which closely matches the signal to be processed is of utmost importance in wavelet applications.

EXPERT SYSTEMS AND SOLUTIONS

48, North Street, Aranarai, Perambalur, Tamil Nadu, India.
Email ID: expertsyssol@yahoo.com,
Website: www.researchprojects.info
Phone: 9952749533,

INVESTIGATION OF ECG SIGNAL USING DSP PROCESSOR AND WAVELETS

The analysis of the ECG has been widely used for diagnosing many cardiac diseases. The ECG is a graphic record of the direction and magnitude of the electrical activity that is generated by depolarization and repolarization of the atria and ventricles. One cardiac cycle in an ECG signal consists of the P-QRS-T waves. Most of the clinically useful information in the ECG is found in the intervals and amplitudes defined by its features. The development of accurate and quick methods for automatic ECG feature extraction is of major importance, especially for the analysis of long recordings (Holters and ambulatory systems). In fact, beat detection is necessary to determine the heart rate, and several related arrhythmias such as Tachycardia, Bradycardia and Heart Rate Variation; it is also necessary for further processing of the signal in order to detect abnormal beats. The ECG feature extraction system provides fundamental features (amplitudes and intervals) to be used in subsequent automatic analysis.

The large number of known wavelet families and functions provides a rich space in which to search for a wavelet which will very efficiently represent a signal of interest in a large variety of applications. Wavelet families include Biorthogonal, Coiflet, Harr, Symmlet, Daubechies wavelets, etc. There is no absolute way to choose a certain wavelet. The choice of the wavelet function depends on the application. The Haar wavelet algorithm has the advantage of being simple to compute and easy to understand. The Daubechies algorithm is conceptually more complex and has a slightly higher computational overhead. But, the Daubechies algorithm picks up detail that is missed by the Haar wavelet algorithm. Even if a signal is not well represented by

one member of the Db family, it may still be efficiently represented by another. Selecting a wavelet function which closely matches the signal to be processed is of utmost importance in wavelet applications.

In particular, the influence of the selection of wavelet function and the choice of decomposition level on efficiency of denoising process were considered and whole procedures of noise reduction is done in TMS320CXX processor in MatLab environment. The Fast Wavelet Transform was use. The advantage of used denoising method is noise level decreasing in ECG signals, in which noise reduction by averaging has limited application, i.e. in case of arrhythmia, or in presence of extrasystols.

Noise reduction in ECG signals is one of the main problems, which appear during analysis of electrical activity of the heart. The most troublesome noise sources contain frequency components within ECG spectrum, i.e.: electrical activity of muscles (EMG), and instability of electrode-skin contact. Such noises are difficult to remove using typical filtering procedures. Efficient analytical tool which allows to increase signal to noise ratio is a technique of averaging of cardiac cycles. Effectiveness of this method strictly depends on stable sinus rhythm. That requirement is however not fulfilled in case of arrhythmia, or the presence of many extra systoles. In such signals noise reduction is only possible with using, more advanced signal processing method, as wavelet denoising technique.

The aim of this study is to investigate the application of DSP processor for real time denoising in high resolution ECG signals. In this work, we are developing and evaluated an electrocardiogram (ECG) feature extraction system based on the multi-resolution wavelet transform. In this work, we will develop and evaluated an electrocardiogram (ECG) feature extraction system based on the multi-resolution wavelet transform.

EXPERT SYSTEMS AND SOLUTIONS

48, North Street, Aranarai, Perambalur, Tamil Nadu, India.
Email ID: expertsyssol@yahoo.com,
Website: www.researchprojects.info
Phone: 9952749533,

In particular, the influence of the selection of wavelet function and the choice of decomposition level on efficiency of denoising process were considered and whole procedures of noise reduction is done in TMS320CXX processor in MatLab environment. The Fast Wavelet Transform was use. The advantage of used denoising method is noise level decreasing in ECG signals, in which noise reduction by averaging has limited application, i.e. in case of arrhythmia, or in presence of extrasystols.

Noise reduction in ECG signals is one of the main problems, which appear during analysis of electrical activity of the heart. The most troublesome noise sources contain frequency components within ECG spectrum, i.e.: electrical activity of muscles (EMG), and instability of electrode-skin contact. Such noises are difficult to remove using typical filtering procedures. Efficient analytical tool which allows to increase signal to noise ratio is a technique of averaging of cardiac cycles. Effectiveness of this method strictly depends on stable sinus rhythm. That requirement is however not fulfilled in case of arrhythmia, or the presence of many extra systoles. In such signals noise reduction is only possible with using, more advanced signal processing method, as wavelet denoising technique.

The aim of this study is to investigate the application of DSP processor for real time denoising in high resolution ECG signals. In this work, we are developing and evaluated an electrocardiogram (ECG) feature extraction system based on the multi-resolution wavelet transform. In this work, we will develop and evaluated an electrocardiogram (ECG) feature extraction system based on the multi-resolution wavelet transform.