International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 04 | Apr-2016 www.irjet.net p-ISSN: 2395-0072

A SURVEY: PATIENT MONITORING SYSTEM USING VARIOUS TECHNIQUE

SAMBODHI D. HASTE[1],ABHAY SATMOHANKAR[2]

[1]Dept. of Electronic Engineering, Waingangā collage Of Engineering Nagpur, India.

[2]Assistant Professor, Dept. Of Electronic, Engineering. Waingangā collage Of Engineering Nagpur, India.

Abstract– Today's Patient Monitoring systems provide appropriate and relevant solutions in response to exponentially growing patient information data complexity and their analysis. For this the volume of digitized biomedical signal data generated and preserved so that it can be used in future whenever needs. This preserved data who can be used in future exceeds the capacity of recent developments in digital storage and also communication media and hence there is a need for efficient compression and transmission system. Mainly biomedical signal have three types EEG,ECG,EMG; out of these three EEG signal having low amplitude than other biomedical signal. The compression of EEG biomedical signal is interesting task in the biomedical community. Large amount of very low amplitude data consist in EEG, for collecting this data required storage space and high bandwidth to transmit it to the patient monitoring system. Lossless compression of biomedical signal provides the assurance of exact recovery of data for analysis purposes. Efficient compression and transmission of biomedical signal is a difficult task due to their unpredictability and also they have very low amplitude. Thus with various relevant data compression and transmission for biomedical signal could be the great research.

Keyword- Biomedical Signal, patient monitoring system (PMS), Compression ratio (CR), Electroencephalographic (EEG) signal

1.INTRODUCTION

Like all other biomedical signal EEG is one of the biomedical signal. EEG signal records the electrical activity of brain, which is obtained by firing of neurons within the brain. EEG signal deals with brain and records activity of it in a short time, normally for 20-40 minutes.EEG signal is important for neurosurgeon who deal with brain disorder. compression and transmission techniques is used in telemedicine field to deliver biomedical signal such as EEG,ECG and to make long distance travel of medical services has become reality and challenge[1].Various e-health devices have been developed for the aged in society and the growing population of senior citizens who live alone. This stems from the growing interest in personal health care and the growth of cardiovascular diseases. E-health equipment are based on a ubiquitous sensor network (USN), to which various number of devices with different functions and different types are connected. In real-time 24-h biomedical signal monitor or multichannel biosignal attainment devices, a real-time biomedical signal data compression method and transmission method is required for the effective use of wired communication resources or wireless communications resources. For urgent treatment on patient or ordinary healthcare purposes or patient monitoring system, it is always necessary to compress the data and transmit it to get the efficient use of bandwidth. In telemedicine application, compressed large amount of data and transmitting these compressed form of data through limited bandwidth become a challenge. While transmitting this signal, if data is compressed by compression technique and then transmit then it will reduce the amount of data but significant features of these signals are preserved at the time of decompression. EEG biomedical signal acquired output from biological and physical systems. EEG signal having various properties and various characteristics that help in diagnosis [3]. Generally, data compression techniques can be divided into lossy and lossless methods.

1.1 Lossless Compression :

No information is lost in lossless compression. In lossless compression process original data can be exactly restore from their compressed form. Lossless compression is typically adopt to use in text compression. in lossless compression all information is saved in compressed form and compression is reversible [1].for biomedical signals lossless compression methods accomplish compression ratios is in the order of 2 to 1 [11].

1.2 Lossy Compression:

Lossy data compression is the converse of lossless data compression. lossy compression reduces bits by analyzing unnecessary information and removing it. Lossy compression techniques is a irreversible techniques and produces high CR results in the order of 10 to 1. in this method some form of input data is quantized which leads to CR. compression ratio is defined as ratio of the total no. of bits before and after compression which is used to represent digital signal. Because of high CR this compression INS irreversible but this is accepted till no clinically significant degradation is introduced to the encoded signal. Compression ratio in order of 2to1 is very low for most practical applications. So, lossy coding methods with small reconstruction errors are Preferred in practice [3].

For

1. Effective and economic data storage.
2. Real time transmission of the signals.

From all available data compression techniques lossless compression data technique is most efficient compression technique needs to be chosen.

2. OVERVIEW OF ALGORITHMS

To meet the research requirements, review is taken for properly functioning of the developed applications. Review contains comparison of various methods to achieve EEG data compression and transmission. Basic communication method could give best result for data compression. Methods for compression like sampling, transforming, filtering, amplifying and coding give the compression result and transmission methods using wireless network. Following study shows different result of compression and transmission.

1.Leontios J. Hadjileontiadis [1] has presented a novel information on bio signal and compression standard.

This paper concentrates focus on compression and transmission of biosignal and their speed in communication. This paper gives the information about compression types, transforms and other issues from a telemedicine prospective.

2. Sangjoon lee, Jungkuk Kim, and myoungho Lee [2] presented the different methodologies for compression of bio signal.

This paper proposes a real-time data compression and transmission algorithm between e-health terminals for a periodic ECG signal. In this paper author introduces real time data compression and transmission and algorithm. This paper proposed the algorithm of five construction procedure and four reconstruction procedure .algorithm of this paper shows better performance than the performance of other algorithm. This algorithm can compress and transmit data in real time; it can be supplied as almost favourable biosignal data transmission method for limited bandwidth communication between e-health devices.

Serial no.	Performance evaluation factor	Average value
1.	Compression Ratio(CR)	21.30
2.	Percentage RMS difference (PRD)	1.75
3.	percentage RMS difference normalize (PRDN)	24.93
4.	Signal to Noise Ratio (SNR)	13.10
5.	Quality of Service (QS)	12.18

3. N.Sriraam and Eswaran [3] paper presents near lossless compression of EEG signal by using compression performances of linear predictor and neural network. This paper used lossless compression scheme to produce real time transmission and offline EEG signals transmission over remote place. This paper done all things economically and utilize less bandwidth compared to other lossless compression and near lossless compression.

4. N.Sriraam and Eswaran [6] had mention the adaptive error modeling (AEM) schemes is used for better compression result. This paper focus on the method to get high compression ratio. Compression ratio obtained by AEM is 3.23.

5. Ayan Banerjee,Kanad Basu,Aruna Chakraborty [8] this paper studied the variation of filter order and also studied fast sample size, and proved that Kalman filter gives the solution for low RMS prediction error.

6. Jianbo Gao,Hussian Jing Hu [4] this paper contain EEG signal in sleep apnea and this paper shows adaptive filter algorithm that effectively reduces ECG and other form of noise and obtained result having contaminant component in ECG and EEG in reduced form by using adaptive filter method than wavelet algorithm.

7. N.Sriraaam [7] this paper have a problem to get better compression ratio by using neural network predictor. In this paper restore EEG signal is calculated and checked by taking help of parameters PRD, SNR, cross correlation and power spectral density and it is having low value PRD with single layer view point, restore signal store to use significant information. This paper produces better compression ratio than the other lossless scheme.

8. N.Sriraam [11] this paper work on error based modeling for lossless compression of EEG signal and four neural network models SLP, MLP, EN and GRNN are considered and this compression results compared with the adaptive linear predictors like fir filter and AR model.

9. Yu-Ting Pai , and Fan-Chieh Cheng, Shu-Ping Lu, and Shanq-Jang Ruan this paper having a low bit rate transmission scheme. In this paper bit rate clearly reduced by keeping high compression ratio.
10. Cetin, A.E., Köymen, H [10] this paper gives a survey on biomedical signal compression methods. Most of the compression methods have been developed for biosignal but these methods are applied with some modifications to other biomedical signals.
11. Omid Sayadi and Mohammad Bagher Shamsollahi [12] this paper present efficient denoising technique and lossy compression schemes that is used on ECG signals and it is based on a extended kalman filter (EKF) modified structure. This technique improves SNR and compression ratio.
12. Tao Ma, and Pradhumna Lal Shrestha ,and Michael Hempel, Dongming Peng, Hamid Sharif, and Hsiao-Hwa Chen [14] this paper presented the improvement in higher transmission quality, communication energy saving and security. This paper proposed method that could be applied to multimedia data transmission by reducing it bit rate under the same compression ratio.
13. Brain J. Roach &Daniel Mathalon this paper gives a detail study of EEG signal and examine the connection between frequencies in trials and in also recording sites [13].
14. Yu-Ting Pai,Fan-Chieh and Cheng, Shu-Ping Lu, and Shanq-Jang Ruan this paper gives the scheme by which stuffing bit reduced using compression ratio. Huffman coding used here support to data transmission [14].
15. Benoit, and Latre Bart Braem Ingrid Moerman Chris Blondia,Piet gives a survey on wireless body area network and it is very useful for medical applications. This network has a wide range of applications in digital IDs, medical rehabilitation, military and personal entertainment systems [15].
16. M. Somasundaram and R.Shivakumar. This paper introduces the survey on issues like security and solutions to overcome the problem in the research and the upcoming IEEE standard. This survey gives the current solutions in security but still having limitations needed further research so the survey also focus on further areas of research.

3.DISCUSSION

Most of the algorithms has been planned for biosignal compression and transmission.It is used on various types of EEG data . These signal having very low amplitude. So all details should reach on the patient of research in compression and transmission area. Form this study; it is clear that while transmitting these signals it should be free from error. Signal should like original have less communication bandwidth and it should be accurate. Algorithm based on sampling can provide good data rate that required by EEG data, different transforming technique to improve compression ratio, noise cancellation and to improve (SNR) signal to noise ratio by filtering and amplifying methods. Here coding can be used for encoding data in real time. Wireless transmission media like WBAN were used for PMS this WBAN channel is used for transmission of data.

4.CONCLUSION

Compression of biomedical signals like EEG data signals remains on important issue, even though vast increase in transmission speed and storage capacity in communication path. This is because of their diagnostic characteristics that set a common venture to all compression approaches. This paper discussed algorithms that are commonly used and recently developed. Year by years there is progress in the development of detection algorithms but their performance still not get accurate. To address the challenge in real time biomedical data developing new technique so that it can receive to the monitoring system in their original form.

5.REFERENCES

[1] *"Bio signal and compression standards" by leontios J.Hadjileontiadis*

[2] "A real time ECG data compression and transmission algorithm for an e-healthdevice"Sangjoo Lee, Jungkuk Kim, Myoungho Lee, IEEE transaction on biomedical Engineering,Vol 58, no.9, september2011.

[3] "Performance Evaluation of Neural network and linear predictor for near lossless Compression of EEG signal."N.Sriraam, C.Eswaran, IEEE transaction on Information Technology in biomedical, Vol.12 No.1, January 2011.

[4] Jianbo Gao, Hussian Sultan, Jing Hu, Wen Wen Tung,"Denoising nonlinear time series by adaptive filtering and wavelet shrinkage: A comparision"IEEE signal processing, Vol.17, No 3.March 2010.

[5] Huffman Coding

[6] "An Adaptive error modeling scheme for the lossless compression of EEG signals", N.Sriraam C.Eswaran, IEEE transaction on Information Technology in biomedical, Vol.12 No.5, September 2008.

[7] "Quality on demand compression of EEG signals for telemedicine application using neural network predictor", N. Sriraam. International journal for telemedicine and applications Volume 2011, Article ID 860549, 13pages.

[8] "Prediction of EEG signal by digital filtering" by Ayan Banerjee, Kanad Basu, &Aruna Chakraborty.

[9] "Assurance of energy efficiency and data security for ECG transmission in Ban's.",TaoMa,PradhumnaLalshrestha,Michael,Hempel,DongmingPeng,Hamind Sharif &Hsiao-Hwa Chen,IEEE

transaction on biomedical engineering ,Volume59,No.4,April 2012.

[10] Cetin, A.E., koymen,H."Compression of digital biomedical signals" The biomedical Engineering handbook: Second edition.

[11] "Context based near lossless compression of EEG signal using neural network predictor" NSriraamS, Science direct international journal of Electronic Communication (AEU), 63, (2009) pages 311-320.

[12] "ECG denoising and compression using a modified extended kalman filter structure", Omid Sayadi & Mohammad Bagher shamsollahi, IEEE transaction on Biomedical Engineering, Volume55, No9, September2008.

[13] "Event related EEG time –frequency analysis": An overview of measures and an analysis, Schizophrenia of early gamma band phase locking in", Brain J. Roach &Daniel Mathalon.

[14] "Sub-Trees Modification of Huffman Coding for Stuffing Bits reduction and Efficient NRZI Data Transmission",Yu-Ting Pai,Fan-Chieh Cheng,Shu-Ping Lu, and Shanq-Jang Ruan, IEEE Transaction on Broadcasting,2012.

[15] "A Survey on Wireless Body Area Networks" Benoit, Latre Bart Braem Ingrid Moerman Chris Blondia, Piet Demeester.

[16] "Security in Wireless Body Area Networks: A Survey", M. Somasundaram and R.Shivakumar, 2011 International Conference on Advancement in Information Technology with Workshop of ICBMG 2011, IPCSIT vol.20 (2011).