Volume 3, Issue 7, July 2013 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Speech Signal Analysis through Wavelets and Finding Similar Patterns in Signals of Regional Dialects of Large Demographic Region

Akhilesh Tiwari [1,] **Dr. A. S. Zadgaoankar** [2,]

Abstract—The importance of speech signal lies in Communications, feature extracting and classification of speech based on important attributes of signal. In this paper, a set of extracted speech features is discussed. This paper aims to design and implement speech recognition system using Discrete Wavelets transformation using Daubechies wavelets. This work is based on Analysis of Signals of Regional Dialects and finding similar pattern in the Regional Dialects of Demographic Region, which provides a highly reliable way for recognizing speech. The system is able to recognize the speech waveform by translating the speech into a set of Dialects through wavelet transformation and analyses matching patterns. This paper contributes to find new and effective technique for analysing Signals Of Regional Dialects and how it will help in the current scenario of high performance computing.

Keywords—Speech Recognition, High-performance Computing,

I. INTRODUCTION

Daubechies wavelet transforms the scaling Signals and wavelets have slightly longer supports, i.e., they produce averages and differences using just a few more values from the signal. This Slight change, however, provides a tremendous improvement in the capabilities of these new transforms. They provide us with a set of powerful tools for performing basic signal processing tasks. These tasks include compression and noise removal for audio signals and for images, and include image Enhancement and signal recognition.Thus, sets of complementary wavelets are useful in wavelet based compression/decompression algorithms where it is desirable to recover the original information with minimal loss. Wavelets are a set of functions that can be used effectively in a number of situations, to represent natural, highly transient phenomena that result from a dilation and shift of the original waveform. For example, when a pulse propagates through a layered medium, due to dispersion and for different electrical properties of the layers, the pulse is dilated and delayed, due to the finite velocity of propagation. The application of wavelets (which literally **translates** from *ondellets* in French into English as *small waves)* was first made in the area of geophysics [4], in 1980, by the French geophysicist J. Morlet, of Elf-Aquitaine. Speech is the primary means of communication between people. For reasons ranging from technological curiosity about the mechanisms for mechanical realization of human speech capabilities, to the desire to automate simple tasks inherently requiring human-machine interactions, research in automatic speech recognition (and speech synthesis) by machine has attracted a great deal of attention over the past five decades. The speech signal conveys many levels of information to the listener. At the primary level, speech conveys a message via words. But at other levels speech conveys information about the language being spoken and the emotion, gender and, generally, the identity of the speaker. While speech recognition aims at recognizing the word spoken in speech, the goal of automatic speaker recognition systems is to extract, characterize and recognize the information in the speech signal conveying speaker identity [2]. The main objective of this paper is to design and implement speech recognition system based on speech samples were then decomposed into approximation and detail coefficients using Daubechies wavelets. Different sets of decomposition were carried out on each speech samples, of these different decomposition sets, analysis of wavelet for finding similar pattern were carried out using the Daubechies wavelets as they have been reported to be highly successful in speech compression Schemes using wavelets [12].

II. Basics of Speech Signal and Analysis of Wavelets

Speech Recognition can be defined as the process of converting speech signal to a sequence of words by means Algorithm implemented as a computer program. Speech processing is one of the exciting areas of signal processing. The goal of speech recognition area is to developed technique and system for speech input to machine. Based on major advanced in statically modelling of speech ,automatic speech recognition today find widespread application in task that require human machine interface such as automatic call processing.[3]. In a speech recognition system, many parameters affect the accuracy of the Recognition System. These parameters are: dependence or independence from speaker, discrete or continues word

recognition, size of vocabulary book, language constrains, colloquial speeches and recognition environment conditions. Problems such as noisy environment, incompatibility between train and test conditions, dissimilar expressing of one word by two different speakers and different pronouncing of one word by one person in several times, is led to made system without complete recognition; So resolving each of these problems is a good step toward this aim. A speech recognition algorithm is consisted of several stages that the most significant of them are feature extraction and pattern recognition [4]. Wavelet analysis has attracted much attention in recently in signal processing. it has been successfully applied in many applications such a as signal analysis ,communication system and other signal processing applications. Wavelet analysis consists of transforming the speech signal to a set of features of Speech parameterization. The aim of this transformation is to obtain a new representation which is more suitable for statistical modeling and for Speech Signal Analysis and Finding Similar Patterns in Signals of Regional Dialects Most of the speech parameterization used in speaker verification systems matching pattern of speech. The speech signal sample of Regional Dialects of Chhattisgarh state regions are taken into consideration and based on the mathematical model and coefficients collected through DWT similar pattern amongst all these sample of Regional Dialects have been examined.

III. Analysis And Architecture Of Speech Recognition

The evaluation of Speech Recognition categorized into following steps:

1. Samples of speech signal is taken from different Regional Dialects which are similar sets of routine talk.
2. Since natural environment speech signals are almost always immersed in ambient noise and it is essential for speech processing systems to apply some noise reduction techniques to extract the desired speech signal.
3. Wavelet transformation is done which involves filtering of speech samples and allow complex information such as speech, images and patterns to be decomposed into elementary forms at different
Positions and scales and subsequently reconstructed with high precision.
4. features of speech signal is extracted and based on the different features, analysis of finding different pattern is examined.
5. A mathematical model is created and results are compared with standard parameter and based on these parameter accuracy of the model is evaluated.
6. Analysis of results derived from different pattern of Patterns in Signals of Regional Dialects is done.

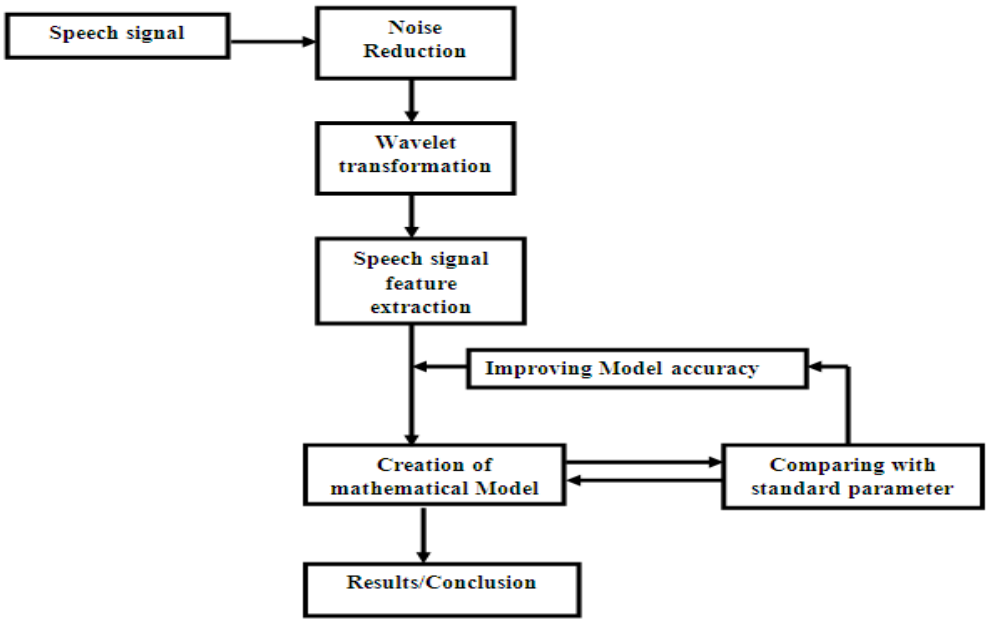

Fig. 1 System Architecture

Speech data contain different type of information that shows a speaker identity. This includes speaker specific information due to vocal tract, excitation source and behaviour feature. The information about the behaviour feature also embedded in signal and that can be used for speaker recognition. The speech analysis stage deals with stage with suitable frame size for segmenting speech signal for further analysis and extracting [2]. The speech analysis technique done with following three techniques:

4.1 loading signal in wavelet filters

Different Samples of speech signal is taken from different Regional Dialects and loaded into the filter which will decompose a signal into multiple signal bands and then get the sample analyzed waveform

4.2 Analysing in Debauchees and feature extraction.

Speech signals are analyzed using Debauchee wavelets and features of speech signal is extracted and based on the different features; analysis of finding different pattern is examined. Based on different filters, histogram, standard deviation, mean and mode the system will be able to analysis difference among different dialects and also able to conclude the similarities [6].

One of the sample analyzed waveform for kankeri dialect is depicted in figure 2.

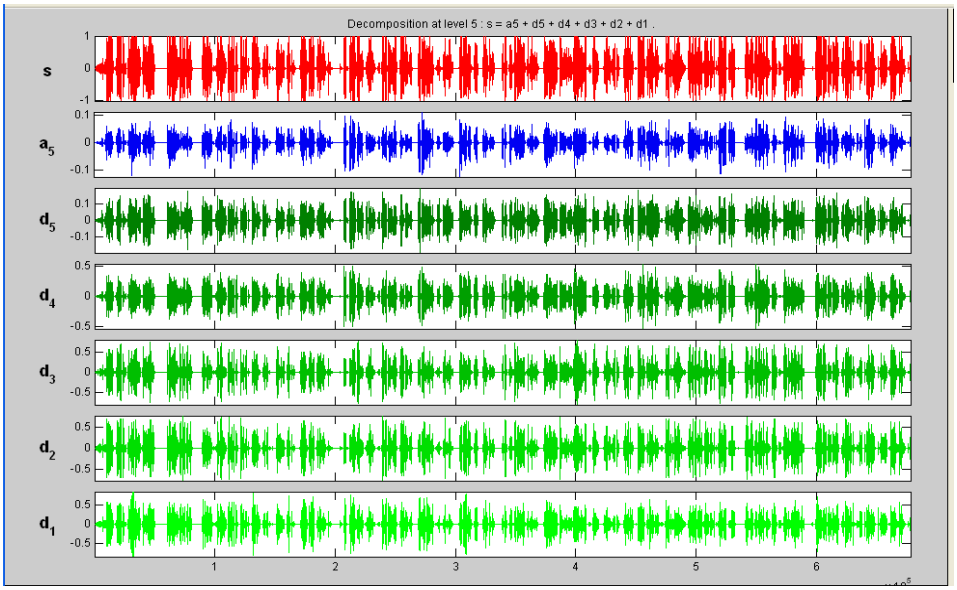

Fig:2 Analyzed acoustic wave signal (kankeri)

4.3 Creation of Mathematical Model

After extraction of the features and based on these feature mathematical model is created and results are compared with standard parameter and accuracy of the model is evaluated. On the basis of Mean, Median, Mode and SD the system will be able to differentiate among different dialects as given in table 1.

Table1: Result for the different dialects.

S.No.	Dialect Name	Signal No.	Mean	Median	Mode	Standard Deviation
1	Baheliya	1	-0.0001138	-0.0002441	0.03321	0.1978
		Record(28)	-0.0001097	-0.0007324	-0.03345	0.2139
		Record(29)	-0.0001108	-0.0004883	0.03321	0.1781
		Record(30)	-0.0001143	-0.001465	0.03321	0.02558
		Record(31)	-0.0001129	0	0.03321	0.2271
2	Bhinjhwari	bin Lata	-0.0001093	0.0002441	0.0188	0.05367
		Bin Rajesh 45	-0.0001095	0	-0.01742	0.09709
		binshivas 67	-0.0001094	0	-0.02202	0.07623
		binsweta 35	-0.0001094	0.0002441	-0.001245	0.0676
		Ramesh 20 M	-0.0001095	0	-0.001742	0.09707
3	Bilaspuri	bill	-0.0002385	-0.0004883	-0.03345	0.2001
		bill 1	-0.0002446	-0.0004883	-0.03345	0.1965
		bill 2	-0.0002693	-0.0002441	-0.03345	0.1893
		bill 3	-0.0003271	-0.0002441	-0.03345	0.1927
		bill 4	-0.0002812	-0.0004883	-0.03345	0.1764
4	Chhattisgarhi	Record(1)	-0.0001109	-0.0002441	-0.03321	0.2037
		Record(2)	-0.0001103	0	-0.03345	0.2283
		Record(3)	-0.0001184	-0.0002441	0.03321	0.2556
		Record(4)	-0.0001113	-0.0002441	0.03321	0.2357
		Record(5)	-0.0001103	0.0004883	-0.02046	0.2224
5	kankeri	kan	-0.0002186	-0.0002441	-0.03345	0.1767
		kan1	-0.0001812	-0.0002441	-0.03345	0.1631
		kan2	-0.0002296	-0.0002441	-0.03345	0.183
		kan3	-0.0001885	-0.0002441	-0.03345	0.1745
		kan4	-0.0001884	-0.0002441	-0.03345	0.2002

IV.Conclusion

On the basis of different criteria the system will able to conclude the similar patterns of different dialects Through the model created we can deduce that some of the parameter values and their relation from the set of all inputs taken for all speakers from the large demographic region. All though their words and pronunciation are different but there are large similar patterns which are reflected through values in the model.

References

[1] Book on Speech Signals and Introduction to Speech Coding.

[2] Leh Luoh,Yu-Zhe Su and Chih-Fan Hsu,Speech signal processing based emotion recognition‖.2010 International Conferences on System Science and Engineering. 978-1-4244-6474-61101$26.00 © 2010 IEEE.

[3] Santosh K.Gaikwad, Bharti W.Gawali, "A Review on Speech Recognition Technique", International Journal of Computer Applications (0975 – 8887) Volume 10– No.3, November 2010

[4] Meysam Mohamad pour, Fardad Farokhi " An Advanced Method for Speech Recognition", World Academy of Science, Engineering and Technology 49 2009.

[5] Thankam Thyvalikakath, Speech Recognition and its clinical applications" MDS Center for Biomedical Informatics University of Pittsburgh.

[6] Madhuri Gupta, Akhilesh Tiwari, "Mathematical Model for Detection of Dissimilar Patterns of Speech Signal of Chhattisgarhi Dialects using Wavelet Transformation", 2011 International Conference on Signal, Image Processing and Applications With workshop of ICEEA 2011 ,IPCSIT vol.21 (2011) © (2011) IACSIT Press, Singapore.

[7] Mansour Sheikhan1, Mohammad Khadem Safdarkhani2, Davood Gharavian3. Presenting and Classification Based on Three Basic Speech Properties, Using Haar Wavelet Analyzing‖. 22nd International Conference on Signal Processing Systems (ICSPS 2010).

[8] Douglas A. Reynolds "Automatic Speaker Recognition: Current Approaches and Future Trends" ICASSP 2001.

[9] Ilyas Potamitis and George Kokkinakis, _Speech Separation of Multiple Moving Speakers Using Multisensory

[10] Multistage Techniques , IEEE TRANSACTION ON SYSTEM, MAN, AND CYBERNETICS—PART A: SYSTEMS AND HUMANS, VOL. 37, NO. 1, JANUARY 2007

[11] J. Morlet, G. Arens, I. Fourgeau and D. Giard, "Wave Propagation and Sampling Theory," Geophysics, 47, 1982, pp. 203- 236.

[12] Nikhil Rao, Speech Compression Using Wavelets, ELEC 4801 THESIS PROJECT.School of Information Technology and Electrical Engineering, The University of Queensland,October 2001

