CONVERSION OF VOICE SIGNAL INTO CHARACTERS USING ARITHMETIC CODING

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ABSTRACT

This paper enables a method of conversion of voice signal through mobile communication using Arithmetic coding. In olden days mobile communication supports only voice communication and only text transmission. But this method is enable combine of this two technologies for better communication. For this purpose we are using pulse code modulation and arithmetic coding technique. By using this method we get a better communication results.

Index Terms: SMS (Short Message Service), GSM (Global System for Mobile Communications), PCM (Pulse-Code Modulation) Audio messages, Arithmetic coding compression technique

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1. INTRODUCTION

Now days the SMS service is very popular to the communication because it has more advantages compared to the voice signal transmission. And this SMS technology is support national and international roaming. SMS size is limited to 160 characters and it can only send alphanumeric text only. But now days this service support animations, images, and long texts called EMS (Extended Messaging Service).

Presented method has three major steps; first step is about converting user input into characters and second step performs compression method on those characters and third step converts the compressed characters into strings and set that strings into payloads. For compression, Arithmetic Coding method is used. Main reasons for selecting Arithmetic Coding is very efficient for more frequently occurring sequences of pixels with fewer bits and reduces the file size dramatically.

This paper enables the method of sending PCM based audio messages through SMS. As SMS is text based service, so a method is developed which converts audio messages into characters. After converting lossless compression technique Arithmetic coding is applied. Lastly those characters will set as a payload text of SMS. Paper is divided into following sections. Section 2 discusses the related work, section 3 and 4 is about proposed methodology and results and lastly we conclude the paper.

2. RELATED WORK

A method which allows wireless user to obtain information from World Wide Web, internet or other information source via SMS or micro browser in phone. Method uses a dialed telephone number, feature code, other dialed digits or SMS origination message to cause SMS and micro browser messages to be sent to a wireless telephone or other device.

For converting the voice signal to text format, the input voice signal which is a continuous signal is applied to the PCM (Pulse Code Modulation) and the output of PCM which is in binary format is compressed by using Arithmetic coding. The procedure of converting voice signal to binary data is represented by the block diagram given below:

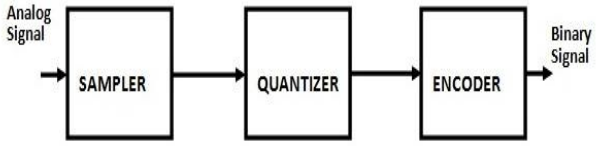

Fig: Block diagram of PCM

3. PROPOSED METHODOLOGY

For transferring and retrieving of PCM based audio messages through SMS, install our application on a mobile phone. It takes voice messages as input from user and converts that input into a SMS; hides variant steps from the user. The variant steps are;

1. First, it stored user input in ByteArrayOutputStream.
2. First, it stored user input in ByteArrayOutputStream.
3. Second, it converted the signed ByteArrayOutput Stream into unsigned integer array.
4. In third step we convert the unsigned integer array into ASCII characters. But before that conversion, 256 was added in all unsigned integer array values which was ranged between 0-31 in ordered to move them up to the range of 256- 287. The main reason behind this was that, values of 0-31 of ASCII characters cannot send through SMS. Because such characters were universally reserved for specific functions ; „0" represents null in ASCII etc.,
5. Fourth, apply lossless compression algorithm Arithmetic coding on Extended ASCII characters. Arithmetic coding algorithm focuses on the frequency of the characters; and generally frequency represents in a tree format.
6. Fifth, now convert ASCII characters into strings and again convert into payloads.

Characters generated by the application could not be adjusted in one SMS; it may consume multiple numbers of SMS. Here, we used the extended SMS called Concatenated SMS. Indexing used for link the each SMS. At the receiver side we implement the same application. When the receiver receives the message our application convert that message into voice signal.

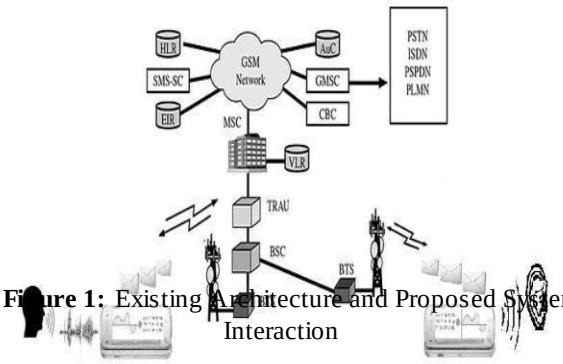

Figure 1: Existing Architecture and Proposed System Interaction

Figure 1 describes the proposed system interaction within the existing GSM architecture. Our system does not require any hardware or intermediate source while transferring the voice. It is just an application which installed in a mobile phone.

4. RESULTS AND DISSCUSSION

For real time results we developed an application usingJ2ME platform and installed it on "Nokia N95" for testing. During experiments our major focus on two factors; number of characters and number of concatenated SMS. In graphs; x axis represents test numbers. Here, we considered two cases; with Arithmetic Compression and without With Arithmetic Compression."PCMW" Represents "With Arithmetic Compression" and "PCM" Represents "Without Compression".

Table 1: Basic characteristics of voice messages

Sentence 1	This is an Audio Clip		
Sentence 2	The five boxing wizards jump quickly		
Sentence 3	By Jove, my quick study of lexicography won a prize		
Sentence	**Sentence 1**	**Sentence 2**	**Sentence 3**
Test Numbers.	1 to 10	11 to 20	21 to 30
Length (letters)	17	31	41
Length (Words)	5	6	10

For experiments we used different voice sentences with different time durations; three sentences are shown in table 1. The results of experiments are shown in figure 1 a, b. we consider two cases; with and without compression. Case one is without compression and its result is shown in blue line. Where case two describes the compression technique within the application and its

result is in red line.

Figure 2 a shows the compression of two cases; with or without compression. And graph is evident that Huffman Coding perform very well with the method. Similarly figure 2b represents the compression of both cases in form of connected SMS.

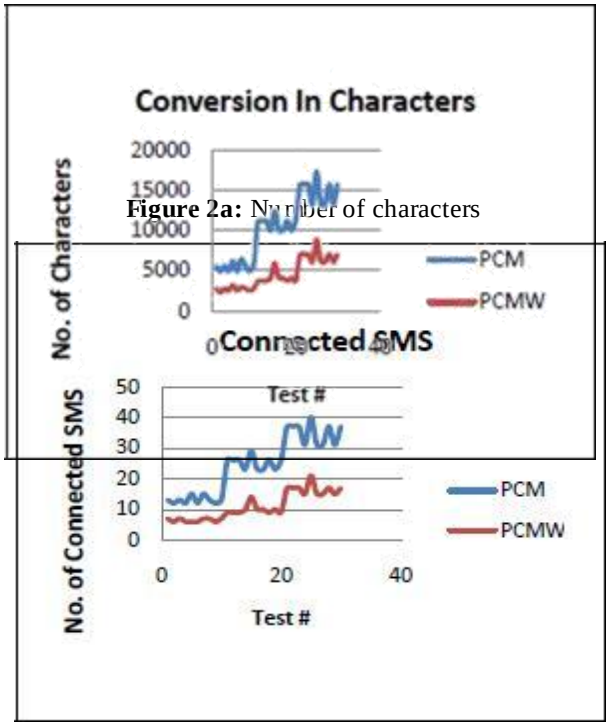

Figure 2a: Number of characters

Figure 2b: Number of connected SMS

5. CONCLUSION

SMS supports only alphanumeric service but it not support voice transmission service. In this paper we enable that combine of these two technologies and improve communication service. Using this application all GSM devices can send or receive PCM based voice messages. This method is very simple and did not need any changes in existing infrastructure of GSM-SMS. In this paper we also verify the efficiency of Arithmetic coding

ACKNOWLEDGEMENT

We are greatly indebted to our college LINGAYAS INSTITUTE OF MANAGEMENT AND TECHNOLOGY that provided a healthy environment to drive us to achieve our ambitions and goals. We would like to express our sincere thanks to our beloved guide Mr.D. Krishna for the guidance, support and assistance he has provided in completing the paper.

We are perspicuous to divulge our sincere gratefulness to our Honourable Dignitary Smt.G.Chenchamma.,Ph.D Head of the Department of Electronics and Communication for her encouragement and assistance to us, which contribute to the successful completion of this paper.

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BIOGRAPHIES

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