CONVERSION OF VOICE SIGNAL INTO CHARACTERS USING ARITHMETIC CODING

D. Krishna¹  G. Raja²  T. Hemalatha³  M. Tejaswi⁴  T. Sriram⁵

¹ Assistant professor, Department of Electronics and Communication Engineering, Lingayas Institute of Management and Technology, madalavaram, Andhra Pradesh, India, krishnadharavath4u@gmail.com
² Student(M.Tech), Department of Electronics and Communication Engineering, Lingayas Institute of Management and Technology, madalavaram, Andhra Pradesh, India, gorumuchuraja@gmail.com
³ Student(M.Tech), Department of Electronics and Communication Engineering, Lingayas Institute of Management and Technology, madalavaram, Andhra Pradesh, India, tankala.hema455@gmail.com
⁴ Student(M.Tech), Department of Electronics and Communication Engineering, Lingayas Institute of Management and Technology, madalavaram, Andhra Pradesh, India, tejaswi.meduri@gmail.com
⁵ Student(B.Tech), Department of Electronics and Communication Engineering, Lingayas Institute of Management and Technology, madalavaram, Andhra Pradesh, India, tipirnenisriram@gmail.com

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

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 Pulse Code Modulation and the output of PCM is compressed by using Arithmetic coding. The procedure of converting voice signal to binary data is represented by the block diagram given below:
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.

4. RESULTS AND DISCUSSION

For real time results we developed an application using J2ME 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

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Length (letters)</th>
<th>Length (Words)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence 1</td>
<td>17</td>
<td>5</td>
</tr>
<tr>
<td>Sentence 2</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td>Sentence 3</td>
<td>41</td>
<td>10</td>
</tr>
</tbody>
</table>

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 2a 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.

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

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REFERENCES

1. Anatomy of Range Encoder The article explains both range and arithmetic coding. It has also code samples for 3 different arithmetic encoders along with performance comparison


BIOGRAPHIES
Krishna Dharavathu currently working as an Assistant Professor in department of ECE for the LIMAT, was born on 1 Aug 1984. He received graduated with a Bachelor Degree in Electronics Engineering from R.V.R.& J.C.Guntur in 2007 and his Master studies in Electronics Engineering with VLSI System Design specialization from S C E T, Narasapur in 2012. Since his keen interest in industries matters and strong support from the university, the author is involved in the development of the industrial based application such as monitoring systems, automation for industries and control base applications.

Raja Gorumuchu pursuing M.Tech in LIMAT in the stream of Embedded Systems, was born on 8th March, 1992. He received graduation with a Bachelor Degree in Electronics and Communication Engineering from Sri Sarathi Institute of Engineering and Technology, Nuzividu in 2013.

Hemalatha Tankala pursuing M.Tech in LIMAT in the stream of Embedded Systems, was born on 2nd December, 1991. She received graduation with a Bachelor Degree in Electronics and Communication Engineering from Vijaya Institute of Technology for Women, Enikepadu in 2013.

Tejaswi meduri pursuing M.Tech in LIMAT in the stream of Embedded Systems, was born on 4th December, 1992. She received graduation with a Bachelor Degree in Electronics and Communication Engineering from Lingayas Institute of Management and Technology, Madalavangudem, vijayawada in 2013.

Sri ram tipimeni pursuing B.Tech in Lingayas Institute of Management and Technology in the stream of Electronics and Communication Engineering, was born on 20th September 1991.