

## Similarity Analysis of Audio Steganography Combined With Rijndael Cryptography Algorithm

Hudson Leroy Simanjuntak, Anggoro Suryo Pramudyo,  
Rian Fahrizal

Universitas Sultan Ageng Tirtayasa  
e-mail: hudsonleroy@gmail.com, pramudyo@untirta.ac.id, rianf@yahoo.com

### *Abstract*

*The rapid development of digital media and its use are covered various fields give rise to greater demands for creating an information delivery system that is secured. There are two techniques used to secure the message, cryptography and steganography. Cryptography is used to scramble the message (encryption), so that others, who have an interest in it, cannot read messages without a password. While steganography is used to hide messages in different media (carrier file). The method used is the Rijndael algorithm in cryptography and Least Significant Bit (LSB) on steganography. File carrier is audio mp3 and message is text files (txt). Audio mp3 has some kind of musical genres, so that course of a study conducted to determine the effect on the quality of the music genre of audio steganography produced. Some samples genre of music used is country, jazz, pop, reggae and rock. Application of audio steganography technique consists of testing the success of the process of embedding, extracting, playing and testing of similarity. After comparison of all test results, then we obtain the best genre in security system audio steganography technique is a genre of rock with a similarity value of 81.39%.*

**Keywords :** mp3 genre, steganography

## 1 INTRODUCTION

Steganography is a technique of hiding information in digital media in such a way that no one apart from the intended recipient knows the existence of the information (Ashok et al. 2010). Information security becomes an inseparable part in digital world today. As the technology advances, the risk of threats to information will be even greater, especially in the information confidential. Various threats from cyberspace as hackers and crackers can increase the risk of leaking the information to the parties that are not desired. Concerns that causes delays in the delivery of information, while the information is needed by certain parties. In an effort to improve safety and comfort in the process of sending digital files both locally and connected to the internet, it takes a method and appropriate mechanisms to secure communication in a digital file, that is by disguising digital content in other media,

but the file is not damaged and still can be used by the user. This technique is known as steganography, the data hiding technique using a carrier medium (carrier).

Mp3 audio is a promising carrier format for covert communication because of its popularization (Yan et al. 2012). Since the last 6-7 years, the audio file format that is becoming popular until now. Although other types of compression that some have better quality, but cannot be rivaled mp3 today. The widespread use enables mp3 audio files to become excellent covers to carry hidden information in audio steganography on the Internet (Qiao, Sung, & Liu, 2013). Traffic exchanges mp3 on the internet is common so steganography using mp3 is a good technique for securing confidential messages via the Internet.

## 2 EXPERIMENTS

### 2.1 Software

Mp3stegz v.1.1.0.0 is software that is used for embedding and extracting the text file into mp3 file. This software uses LSB method for steganography. The text file will be encrypted and decrypted using Rijndael algorithm. Another software is Similarity Version 1.9.1 (x86) Build 1844. Its used for analyze the similarity of mp3 files. The similarity is analyze from the content, tags, and precise of the mp3 file. Similarity of content is analyzed by compare the contents of sound similar uses voice analysis techniques. Similarity of tag is analyzed from comparative information residing on mp3 audio files, such as information artist, title, album, bit rate, sample rate, size, duration, channels and so on. Similarity of precise is analyzed the mp3 audio file content comparisons from byte to byte overall.

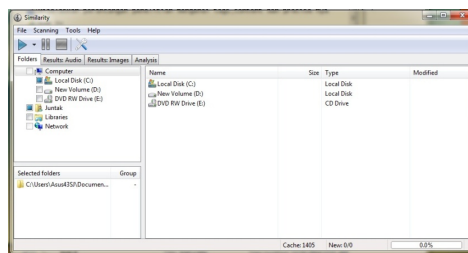


Figure 1: Similarity Version 1.9.1 (x86) Build 1844

### 2.2 Experiment Design

The process of research conducted to obtain data and get the results as expected refers to the purpose of research is to determine whether a particular genre of music can affect the quality of the resulting audio steganography using the Least Significant Bit (LSB). In the study used five (5) has been a popular genre of music to be heard, it aims to simplify the process of analyzing the quality assessment of audio mp3. Sample-determination process for the genre of music is done freely and randomly to provide 20 samples in every genre of music to the parameters that are used not only refer to the sample at any given genre.

## 2.3 MP3 Files Testing

The test file was exacting and thorough in mp3 audio file that has undergone insertion of text, some of the parameters that must be considered in conducting the testing is successful embedding, extracting and can be played (playing) the mp3 file. The return message information intact become a benchmark in determining the success of the process steganography applied, because the essence of the use of steganography is to secure the confidentiality of a message in the process of digital data communication. Tests were also performed using the software similarity to know how resemblance an mp3 audio files to other audio mp3. While the study was used to measure the degree of similarity of the original audio file to mp3 audio files that have been inserted message information (file embedding) using analytical calculation of content, tags and precise.

## 3 RESULTS

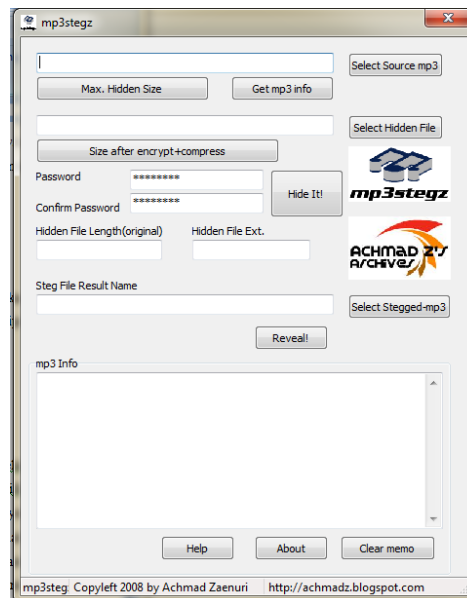


Figure 2: Mp3stegz v.1.0.0

### 3.1 Embedding Process Testing

After the insertion process the message information into the file sample carrier against all genres of music is used, the obtained result of the embedding process as a whole is as follows:

$$\begin{aligned} \text{Percentage of Successful Testing} &= \frac{n \text{ test} - n \text{ failed test}}{n \text{ test}} \times 100\% \\ &= \frac{100 - 0}{100} \times 100\% = 100\% \end{aligned}$$

### 3.2 Extracting Process Testing

After the process of extracting the information revealing the message that has been inserted (text file) on each sample genre of music used, the obtained results of the overall success of the extracting process is as follows:

$$\begin{aligned} \text{Percentage of Successful Testing} &= \frac{n \text{ test} - n \text{ failed test}}{n \text{ test}} \times 100\% \\ &= \frac{100 - 0}{100} \times 100\% = 100\% \end{aligned}$$

### 3.3 Testing Process Playing

Basically damage to the mp3 audio file must have happened after undergoing a process of insertion of information, but the damages sought are not significant, so the file is still similar to the original mp3 file so as not to arouse suspicion from the other party to the information embedded in the mp3 audio. Test results playing process is as follows:

$$\begin{aligned} \text{Percentage of Successful Testing} &= \frac{n \text{ test} - n \text{ failed test}}{n \text{ test}} \times 100\% \\ &= \frac{100 - 0}{100} \times 100\% = 100\% \end{aligned}$$

### 3.4 Similarity Test Results

Similarity test is done between the original audio and audio files that have been inserted message information. Similarity is analyzed from their content, tags and precise. The results obtained from testing the similarity of the analytical calculation of the content in all genres of music samples, namely the genre of country, jazz, pop, reggae and rock has similarities to the original file with an average value of 100%. The results obtained from testing the similarity of the analysis on the sample tag calculations genre of country, jazz, pop and reggae was 41.7%. While in the rock genre has the highest average value, ie 44.18%. The results obtained from testing the similarity of the precise calculation analysis on all samples genres of music, which is a genre of country, jazz, pop, reggae, and rock has similarities to the original file with the average value of 100%.

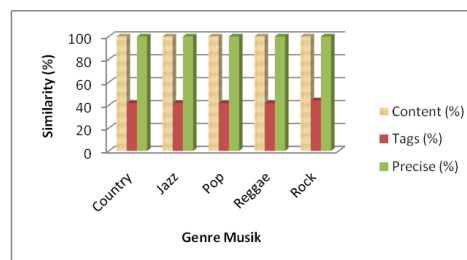


Figure 3: Similarity of content, tags, and precise of each music genre

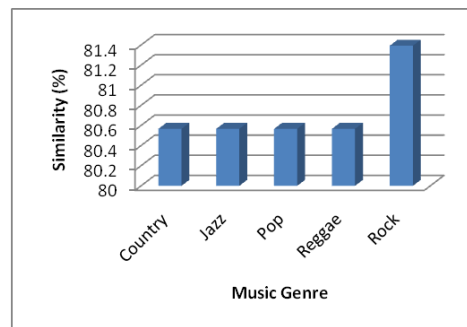


Figure 4: The average of similarity for each music genre

#### 4 CONCLUSION

The results of this experiment are:

1. The similarity of content and precise of all genres is 100
2. The similarity of tags of country, jazz, pop, and reggae is 41.7%, while rock is 44.18%.
3. Rock genre has 81.39% of similarity, and the others (country, jazz, pop and reggae) have 80.56%.

#### References

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