

I. INTRODUCTION

THE term anti-forensics has become a staple for digital researchers. The term is not new, but there is no clear definition [1]. Forensics is the specialized scientific analysis of anti-forensic behavior as evidence in court. Since 2008, audio recordings have been admissible as valid evidence in Indonesian courts [2]. Using multimedia voice recording technology, evidence is often found at crime scenes in the form of voice recorders with voice recordings of people's conversations. Different dictaphones found at crime scenes can be compared to determine if the recording device belongs to the same person [3]. These digital voice recordings are part of the evidence that needs to be verified for authenticity, as their use in the courtroom is so large and growing [4]. Forensic speech comparison (FVC) usually refers to comparing recordings of a perpetrator with those of a suspect for the purpose of assisting investigative agencies or courts in identifying the identity of the speaker [5]. Records can be used as evidence in both criminal and civil cases.

Along with the times in this modern era, technology has become important in supporting human activities. Technology as a human creation has a positive side and a negative side [6]. But basically, technology is neutral, meaning that positive or negative impacts arise depending on the intended use. One of the significant technological developments is the change from physical data storage to digital data. Storage data that has changed include data in the form of images, video and sound. Changes in data storage also affect tools for recording data. The audio recorder also underwent a change from an analog phonograph recorder to a digital recorder that was not shaped like a recorder [7]. From several previous studies, voice manipulation has been carried out to change the identity of the original voice with various anti-forensic methods such as the use of a voice changer with a telephone effect conducted by A.B Baskoro [8] in 2020, the use of a voice changer with the effects of aliens, robots and zombies conducted by Rusydi Umar [9] in 2019, increasing 20% audio speed conducted by Yasep Azzery [10] in 2020 and the use of MDCT audio conducted by Tao B [11] in 2020.

In a study conducted by A.B Baskoro [8], the voice changer method with telephone effects was able to manipulate the authenticity of the voice with an average value of 63.4% and 61.4%, respectively. In a study conducted by Rusydi Umar [9] using a voice changer method with robotic, alien and zombie effects as well as a study conducted by Tao B [11] using the MDCT audio method to manipulate the authenticity of the voice. However, both studies did not use the ANOVA method as an analysis in identifying authenticity in sound recordings. Yasep Azzery [10] conducted a study of manipulating sound recordings by increasing the audio speed by 20%. By analyzing the pitch, formant, and spectrogram using the ANOVA approach, it can be concluded that the sound of the manipulated evidence recording and the recorded voice of the subject as a comparison are not identical.

Based on previous research, this study manipulates sound recordings using different types of distortion effects, namely hard clipping, hard overdrive and odd harmonics. Giving a distortion effect to manipulate sound recordings has not been much researched. So that the results of the effectiveness of the distortion in this sound recording will be compared with the anti-forensic methods that have been studied previously. To complete this research, ANOVA analysis was used to determine the similarities between the original sound recording and the distorted sound recording.

The problem raised in this study is the extent to which the effects of distortion can complicate the process of identifying the authenticity of sound. Another problem is that of some types of distortions, there are distortions that make the sound recording still recognizable and some that are already unrecognizable. The solution given by the researchers was to make an experiment by distorting a sample of sound recordings and analyzed the results using anova to see the effectiveness of each type of distortion in changing the authenticity of a sound recording.

Digital voice forensics uses voice recognition technology that compares two voices: evidence voice (unknown pattern) and comparison voice (known pattern). Its implementation uses several measurable metrics to determine the similarity between evidentiary sounds and a suspect's voice [12]. These metrics include pitch, one of the sound components that describe the intonation of pronunciation. Formants, in turn, are indicators of the articulation and accent of sound pronunciation and are spectrogram indicators of the energy of sound pronunciation. The three indicators have their own function without weakening each other [13]. In this study, digital audio forensic analysis based on formant metrics was performed. In carrying out the analysis process, several supporting applications were used to process the sound shape data numerically using the PRAAT application and then using Excel using a one-factor ANOVA approach. Statistically calculate and determine similarity between samples with evidence of sound was stocked [14].