

Abstract

Most forms of tampering or malicious editing of an audio recording result in the edited version being a copy. Therefore, when conducting a forensic authenticity examination of an evidential audio recording, proving that the recording is the original or a copy is of paramount importance. The thesis reports on a method that detects if a digital recording has been copied using an analogue interface between recording systems. The technique is supported by extensive analysis, experiments, and blind trials. The method is primarily suitable for portable digital audio recording systems that store audio data that has not been perceptually encoded.

The magnitude response of anti-aliasing and anti-imaging filters allows the overall magnitude response of a recording system to be modeled as a low pass filter with a cut off frequency close to the Nyquist limit. It will be shown that in its simplest form, the recorded data may be considered to be an acoustic signal added to white noise produced from signal conditioning circuits and convolved with the low-pass response of the recording system. Making a number of initial assumptions about the recorded signals and recording systems, an estimate of the magnitude squared transfer function of part of the low-pass response of the recording system may be produced. This is achieved purely using the data from the recording under analysis.

The signal processing procedure incorporates a number of narrow band log-power spectral estimates formed over a limited part of the low-pass transition region. The application of averaging techniques and a simple novel transform to this limited frequency region allows a single parameter to be estimated using regression analysis. When the make and type of recorder are known, the parameter value can be a direct indication of the number of stages used in the production of the recording and hence provides a method for distinguishing between an original recording and a copy recording.

