Audio Authentication based on Distributed Source Coding

David Varodayan, Yao-Chung Lin and Bernd Girod
Information Systems Laboratory, Stanford University
{varodayan, yao-chung.lin, bgirod}@stanford.edu

Abstract

The idea is to provide audio authentication data in the form of a perceptually-significant pseudorandom projection, quantized and Slepian-Wolf encoded. This version can be correctly decoded only with the help of authentic audio as side information. Distributed source coding provides robustness against legitimate encoding variations, while detecting illegitimate modification. We demonstrate reliable authentication at a Slepian-Wolf bitrate of less than 100 bit/s. At this rate, a single IP packet suffices to verify the integrity of 2 minutes of audio.

Slepian-Wolf Theorem

Admissible rate: \( R > H(X|Y) \)
Probability of decoding error arbitrarily small

Inadmissible rate: \( R < H(X|Y) \)
Probability of decoding error bounded away from zero

Audio Authentication System

Two-state Lossy Channel

Perceptual Pseudorandom Projection

Authentication Results