

Continuous Authentication and Audio Processing

Michelle Bronstein, Shaya Wolf, Dr. Mike Borowczak

Background and Prior Research

Continuous authentication is an alternative to single passwords and other authentication methods providing more security for electronic devices. The field of cybersecurity as a whole is always looking for new ways to protect sensitive information, and continuous authentication is the next step in that process. The goal of continuous authentication is to have constant, or at the very least consistently periodical, input from the user. The goal of the research conducted here is to eventually create a continuous authentication system that relies on free speech (speech without any specific requirements for words or phrases) to identify a user. Prior research in this field has yielded programs such as PyBay, PyAudioProcessing, and PyAudioAnalysis, which have been able to identify differences in certain sounds and (fairly inaccurately) identify what made them.

Goals

- Find viable patterns in speech
- Be able to name said patterns and attribute them to specific qualities that can be compared between speech samples

-Create a program that takes data from the previous two objectives and compares a specific data type to a baseline to authenticate a user

Current and Future Work

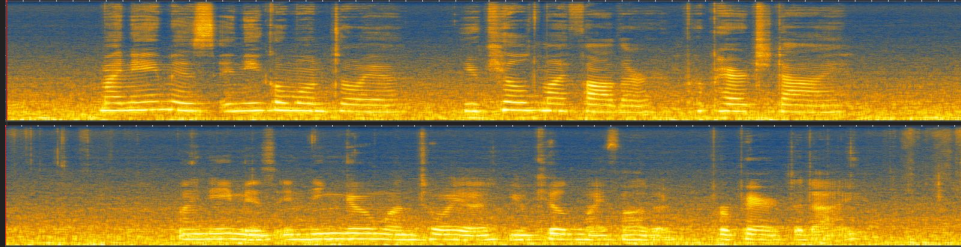


Fig. 1, Two audio spectrographs of individual voices saying, "My name is Inigo Montoya. You killed my father, prepare to die."

The speakers in both instances shown in fig. 1 are saying the same phrase, but their appearances are vastly different. The above spectrograph is a female voice, with overtones concentrated in the higher ranges of sound. The speaker also has greater pauses between words and took 4.527 seconds to get through the phrase. The bottom spectrograph, a male voice, was marginally faster at 4.123 seconds. There is a lower concentration of overtones as well as more sporadic instances of them. The fundamental notes are far clearer and more concentrated than in the above sample as well. These fundamental differences, while seemingly minute, are at the very least visually present. Future work will be centered around taking samples of data like this and working towards creating a program that analyzes these differences and compares them to see if a given voice is the correct one for authentication purposes.