University of Colorado Denver

National Center for Media Forensics
College of Arts & Media

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AI-Generated Audio and Python 101 (AG1)

Course Description: Artificial Intelligence (AI) is changing the world in nearly unimaginable ways. From deepfakes to ChatGPT, advances in synthetically generated media open new forms of entertainment, art, and communication while creating new threat vectors for crime and victimization. Forensic practitioners working with digital evidence need to understand the threat of AI generated media by understanding how various techniques work, what their limitations are, and what artifacts or forensic traces are left behind. This course will dig deeply into understanding AI and its application in audio by exploring speech analysis and synthetic voice generation. Attendees will learn the fundamentals of processing and generating audio with Python by using open-source libraries and applications to set the stage for tasks such as forensic audio analysis and authentication.

This course will take a hands-on approach to audio and is designed for all skill levels with no previous Python experience needed. The course will cover the basics of Python programming, audio processing, and synthesis. However, students should be familiar with the computer command line (e.g., Mac Terminal, Windows Powershell).

*Please note that some of the methods and software discussed and presented may only be available for demonstration purposes and/or to law enforcement agencies.

Course Outcomes:

KNOWLEDGE
Students will:
- Gain new perspectives to understand:
    - How open-source software can be leveraged.
    - Application techniques for Python.
    - How Deep Learning AI is applicable to audio.
- Acquire knowledge that either enhances or is not covered in scientific literature.

SKILLS
Students will:
- Demonstrate a familiarity with Python and open-source repositories.
- Create AI-generated data that can be used in the lab for testing and evaluation.

DISPOSITIONS
Students will:
- Gain an appreciation for specific issues in forensic audio.

- Appreciate the need to understand new techniques capable of carrying out crime, fraud, and victimization.
- Be able to critically evaluate different deep learning processes and algorithms.
- Enhance awareness of needs and opportunities in the field of forensic audio.

Course Schedule (*Subject to Change*):

Day 1: Python 101
- Environments and Notebooks
- Working with Data
- Processing Audio

Day 2: AI and Audio
- Speech Recognition
- Speaker Analysis

Day 3: AI-Generated Audio
- Synthetic Audio Generation
- Synthetic Voice Generation