Thesis Project Portfolio

Localizing Deepfake Audio Detection: Enhancing Community Resilience against Synthetic Fraud

(Technical Report)

The Ethical Dangers and Detection Challenges of Deepfake and Synthetic Audio

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The rapid advancement in machine learning technology, specifically in the field of synthetic audio, has brought about significant changes in how many perceive and interact with digital content as well as avoid bad actors within society. This evolution served as the foundation for my research and project work; the technical side explored developing an accurate algorithm to detect fabricated audio speech samples and the sociotechnical side analyzed the ethical implications of deepfake audio's existence. The connection between my technical project and STS research paper is rooted in the broader concern of how these technologies affect trust, safety, and the authenticity of information in our digital age.

Technical Report Summary

The technical portion of my thesis produced a detailed proposal on creating an accessible way to test and detect synthetic audio deepfakes. By developing a system capable of distinguishing between genuine and artificially generated audio clips, my project contributes to the broader efforts in safeguarding digital communications and media against manipulation. A lot of detection systems are currently unavailable to those who need them most, so by creating a localized and simple web interface for testing potential instances of synthetic audio, the project proposes a practical solution to the problems that this technology creates for the average person, as well as raise awareness.

Sociotechnical Report Summary

In my STS research, I examined the ethical implications and potential dangers posed by the use of synthetic audio deepfakes. My exploration into the topic sheds light on the complex ways in which these technologies can be used to target vulnerable groups to extort, manipulate, and defraud. The ability to create highly realistic and convincing fake audio recordings has the potential to create numerous ethical dilemmas, including identity theft, misinformation, and even

erode public trust. My research aimed to explain just how accessible this technology has become for the average person and emphasize the gravity of these ethical problems. I also include research into the proposed regulation of synthetic audio technologies to mitigate their potential harm.

Conclusion

The combination of my technical project and STS research has enriched my understanding of both the capabilities and the potential dangers of synthetic audio technologies. By examining the ethical implications alongside developing a technical solution for detection, my work highlights the critical role of interdisciplinary approaches in addressing complex issues at the intersection of technology and society. This experience has underscored the importance of ethical considerations in engineering practices and has motivated a commitment to developing technologies that are not only innovative but also responsible and socially beneficial. Through this dual approach, the projects underscore the significance of human and non-human actors in shaping the digital landscape, advocating for a future where technological advancements are guided by ethical principles and societal well-being.