Deepfake Audio Detection

Mentor: Brandon Wu, Jerry Liao

Members: Ching-yuan Pai, Yipin Peng, Andy Chen, Evian Chen

Introduction

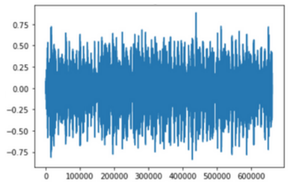
- As the application of the Internet continues to expand, the impact of synthetic audio cannot be underestimated.
- Through artificial intelligence, has been able to successfully synthesize voices. Synthetic audio could be like our relatives, friends or trusted experts, which are difficult for human ears to recognize.
- This project aims to build a system through CNN to detect the authenticity of any audio file.

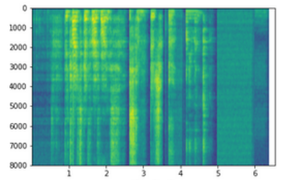
Dataset

- ASVspoof is a challenge hold in bi-annual which aim to promote the design of countermeasures to protect automatic speaker verification systems from manipulation. There are two types dataset and all is saved in FLAC.
- PA is made in a real physical space
- LA is generated using TTS and VC algorithms.

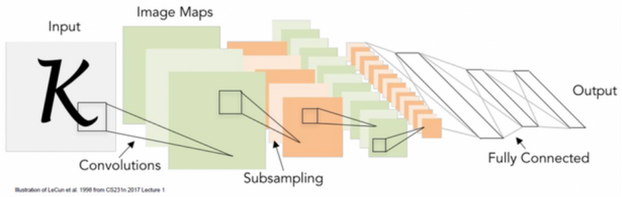
Methodology & Results

- We convert FLAC to WAV, and use PyTorch module to generate waveform and spectrogram which characterizes in three features: frequency, time and intensity which shown by varying the color or brightness.





- Since our dataset contains 200,000 audio files, we found it extreamly time-consuming to load to G-drive, so we unzip the folder on colab to avoid run-time error.
- We construct two models for LA and PA dataset respectively.
- For LA dataset, we built a VGG-like model, which is 27 layers, to train and successfully achieve the accuracy of 91%.



- For PA dataset, we use ResNet50, which can be pre-trained by 1000 classifications dataset, and it achieves the accuracy of 95%.

Disscussion & Conclusion

- Although spectrograms and waveform are two-dimensional information, the total number of datasets can not be increased by image flipping and other methods due to the time-ordered characteristics of spectrograms and waveform.
- According to the training results of the VGG-like model and the ResNet model, the validation accuracy is over 90%, and the individual accuracy of real and synthetic audio files is also similar.

Future Work

- Establish an user interface where people can upload random audio files and obtain predections from our model.
- Test the effect of different compressed audio formats like MP3.

Reference

[1] M. Todisco et al., "ASVspoof 2019: Future horizons in spoofed and fake audio detection", Proc. Interspeech, pp. 1008-1012, 2019.

[2] Y. Jia et al., "Transfer learning from speaker verification to multispeaker text-to-speech synthesis", arXiv:1806.04558, 2019.