Saving Big Bucks: Finetuning Deep TTS Model for Custom Voice Cloning

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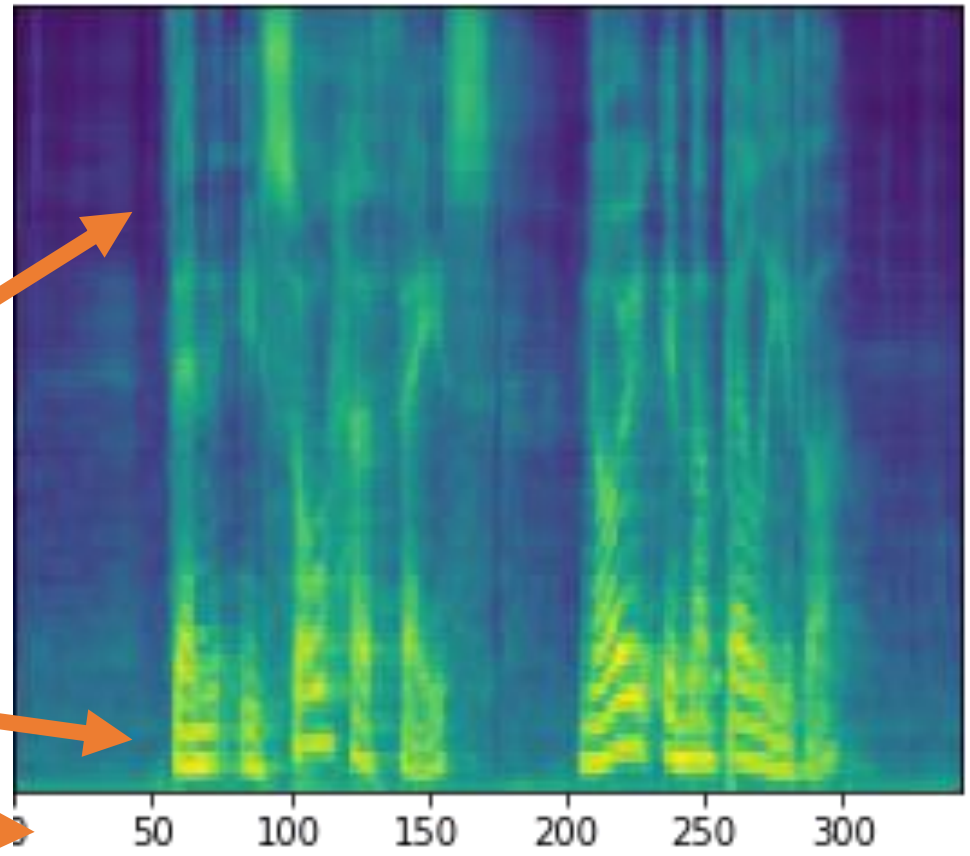
Introduction

CC: Welcome to our presentation, documenting our attempts to clone a speaker’s voice with deep neural networks.

CC: Together, we’ve spent the past several weeks on exploring the field of dimensionality reduction, as well as working with state of the art models.

What is a spectrogram?

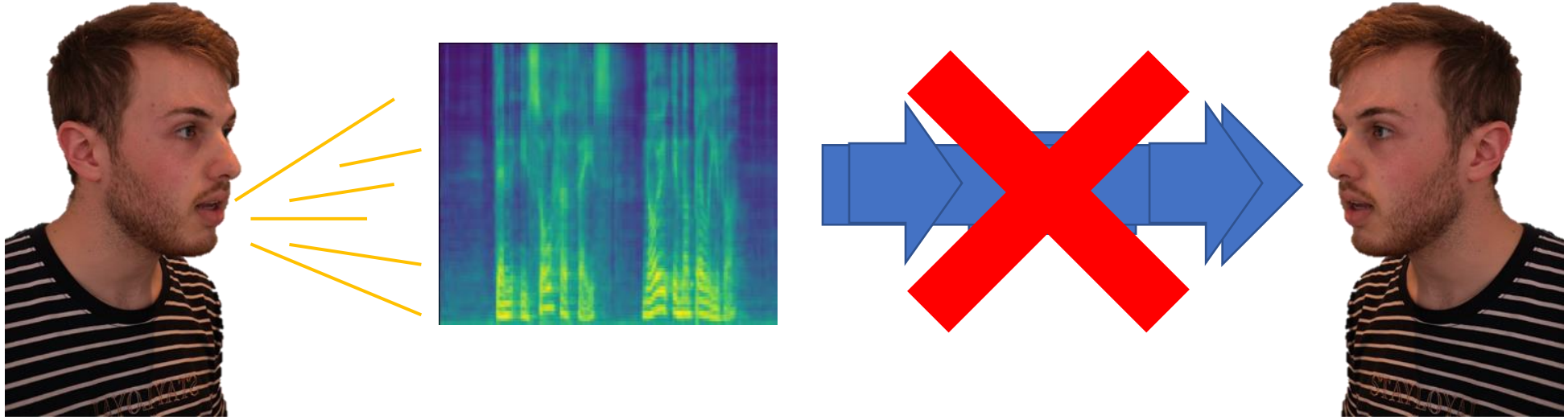
- Visual representation of audio.
- Breaks down the frequencies
- Higher frequencies at top, lower ones at bottom
- X axis is time

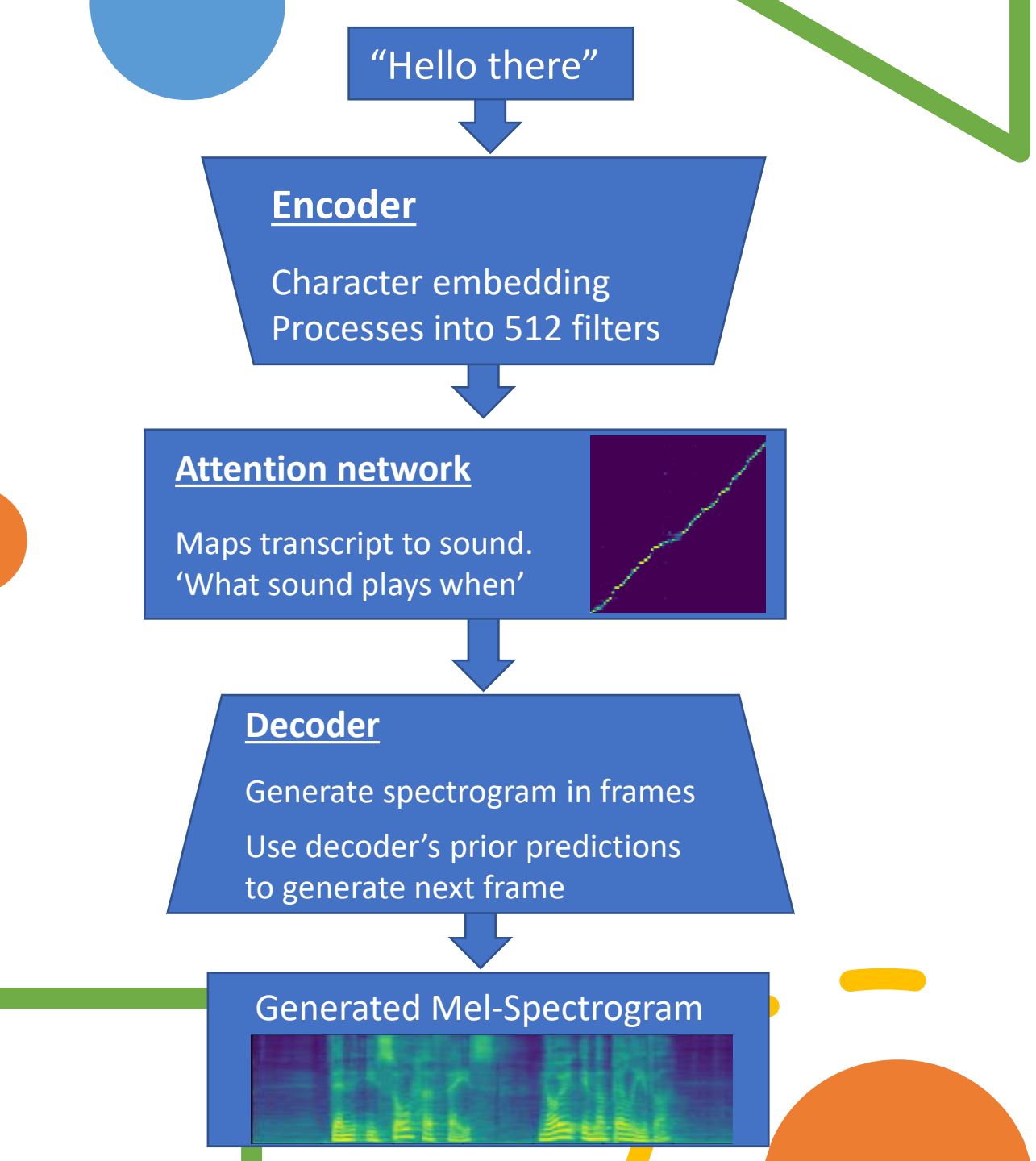


"Then I saw her face, now I'm a believer" (Jones, D. 1967)

What is a spectrogram?

- Audio converts to spectrogram, but not vice-versa.
- *Kinda*
- Algorithms estimate original audio.
  - *Pattern playback, Griffin-Lim, Wavenet, Waveglow*



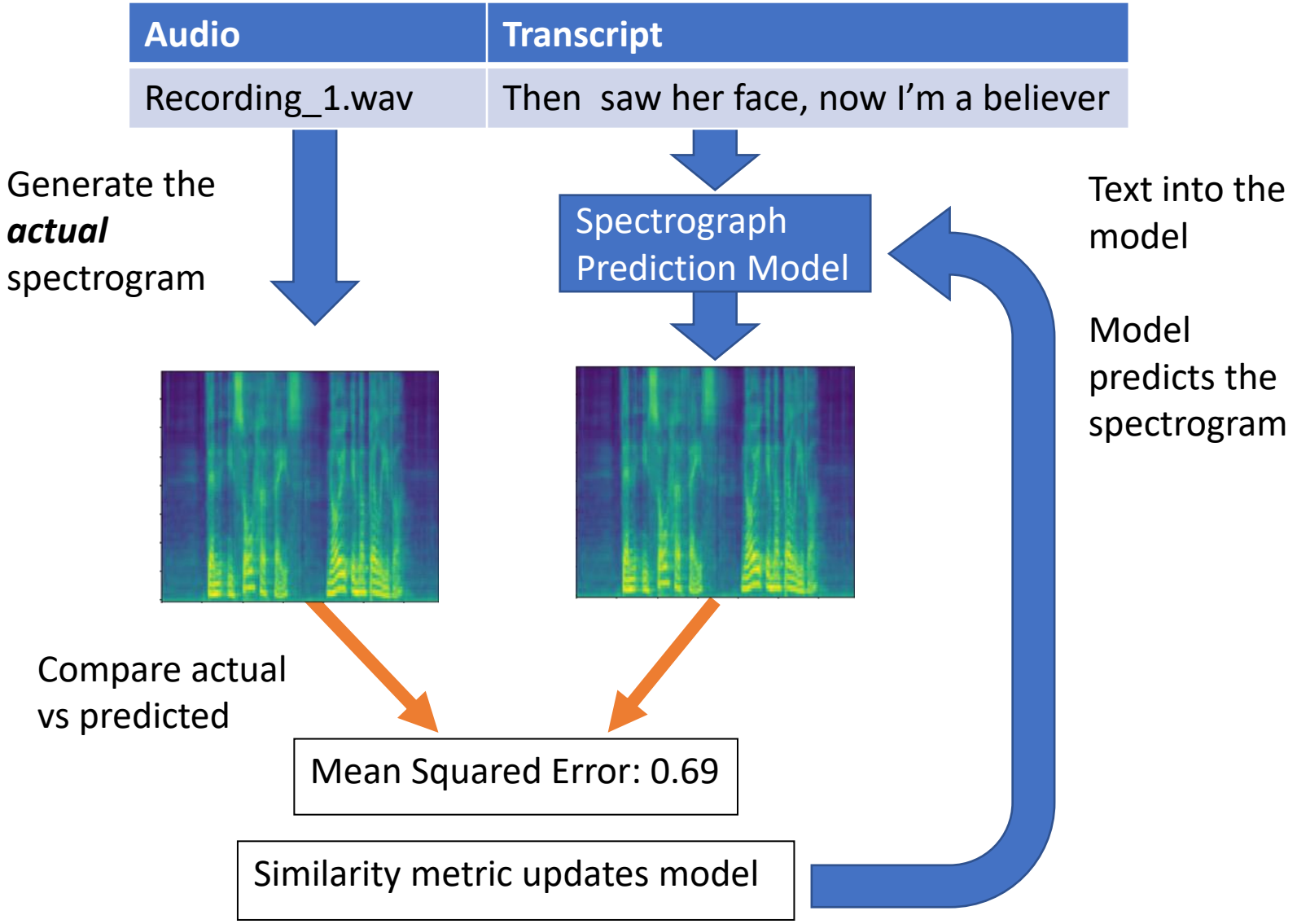


Tacotron 2, Summarised

- Encoder/decoder neural network
- Encoder: text to vector
- Decoder: vector to spectrogram
- Vocoder: spectrogram to audio

How to Train Your Tacotron 2

- Input: audio and transcript
- Generate spectrogram from audio.
- Predict spectrogram from transcript
- Prediction's accuracy updates model.



LJ Speech Dataset

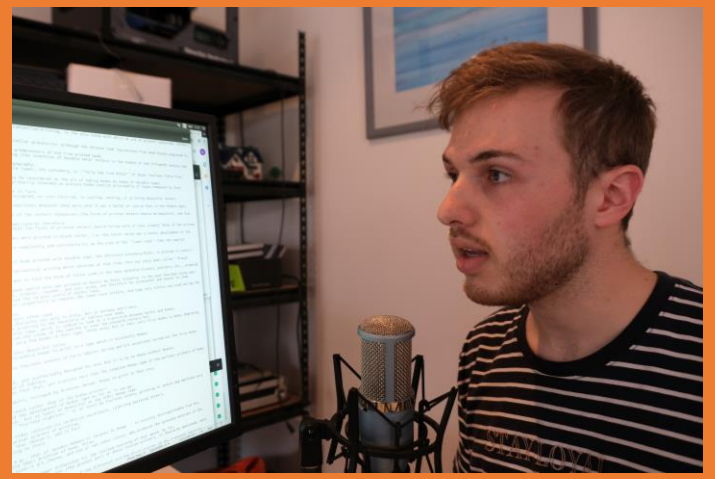
- Voice actress reading passages
- 13,100 files – 13,821 words
- 24 hours of audio
- Low sample rate – 22.05kHz

2.6
gigabytes

LibriVox

Methodology

- Download LJ Speech dataset
- Extract each audio file's transcript
- Harry read out each transcript
- Replace LJ speech audio with Harry Audio



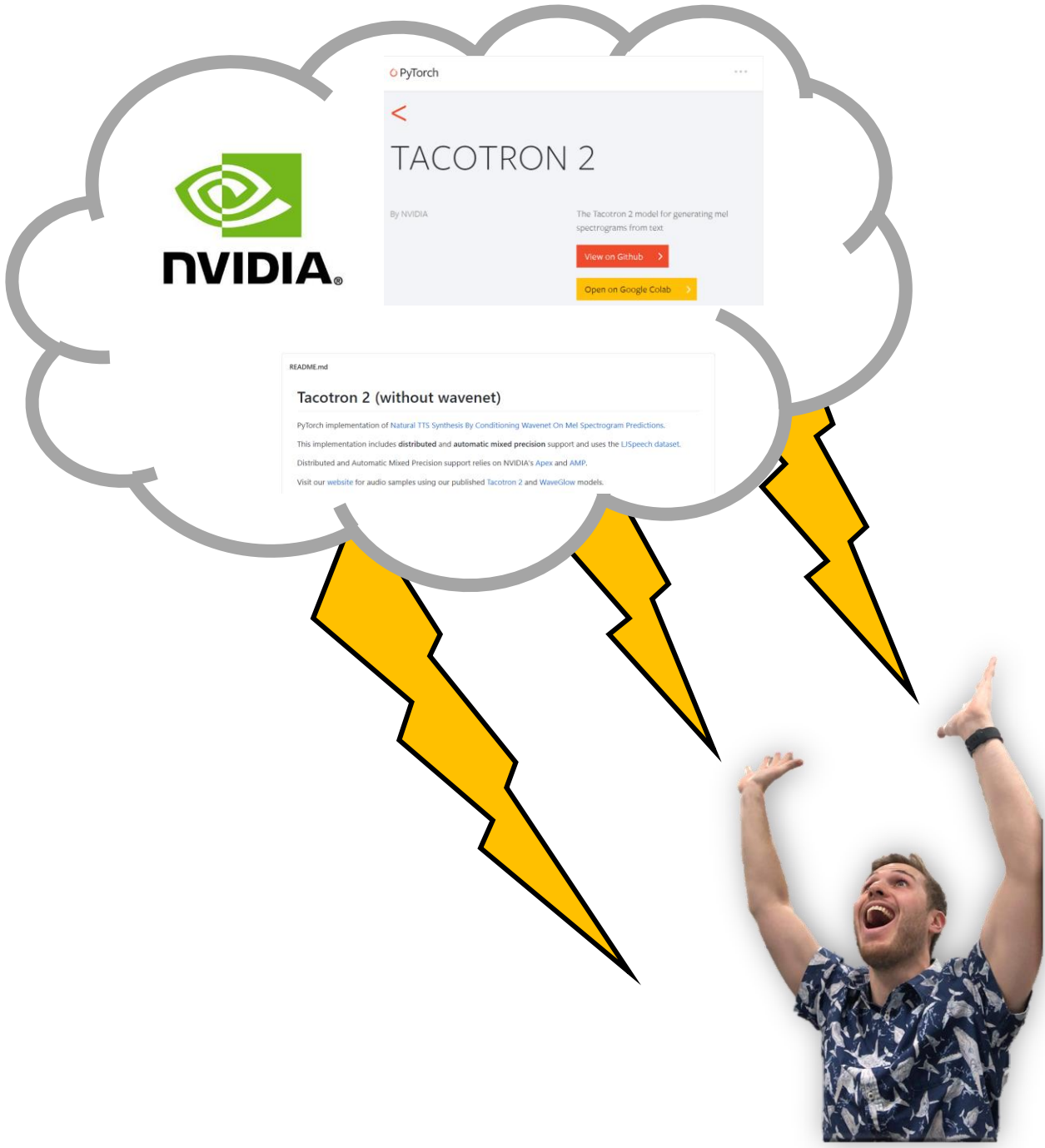
```
HarrysSoundRecordings/LJ001-0002.wav|in being comparatively modern.
HarrysSoundRecordings/LJ001-0003.wav|For although the Chinese took
relief for centuries before the woodcutters of the Netherlands, by
```

Data Creation

- Take LJ Speech Dataset
- (Audio and corresponding transcript)
- Record Harry reading transcripts
- Replace audio with Harry’s

Help from High Places

- Nvidia’s Tacotron/Waveglow implementation
- Use pretrained model weights
- Saves time and money
- Retrain Tacotron - keep Waveglow

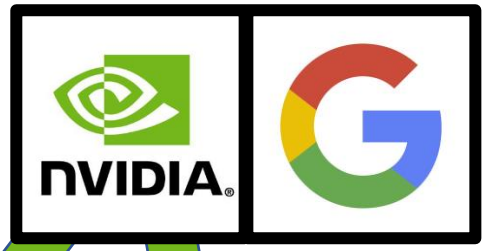


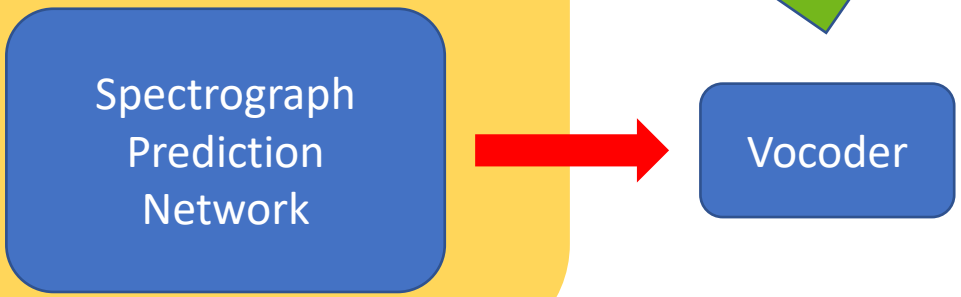
Lol nope.

- Only retrain spectrograph generator
- Keep vocoder as is

Train both parts concurrently.

It can't work otherwise





An Important discovery

- Pretrained Waveglow - Big surprise!
- Concurrent discovery in Stockholm
- Researchers agree with us.
- Won "Best Paper Award"

The Shyamalan Plot Twist

- CC: You've probably figured it already, but the speech you've been hearing is all synthesized by our model!

Tongue twisters

CC: Do you actually think the real Harry can say any of the following…?

CC: Peter Piper picked a peck of pickled peppers. A peck of pickled peppers Peter Piper picked. If Peter Piper picked a peck of pickled peppers, Where's the peck of pickled peppers Peter Piper picked?

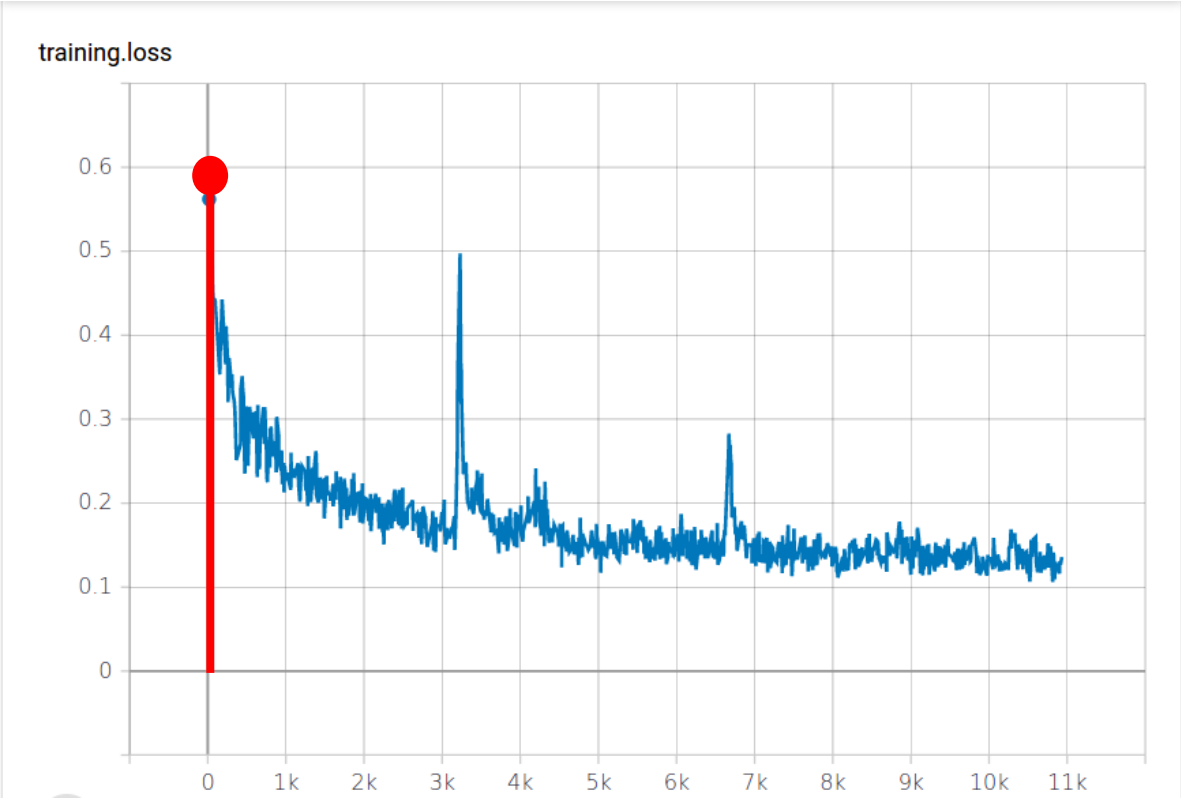
CC: She sells seashells on the seashore. The shells she sells are surely sea shells.

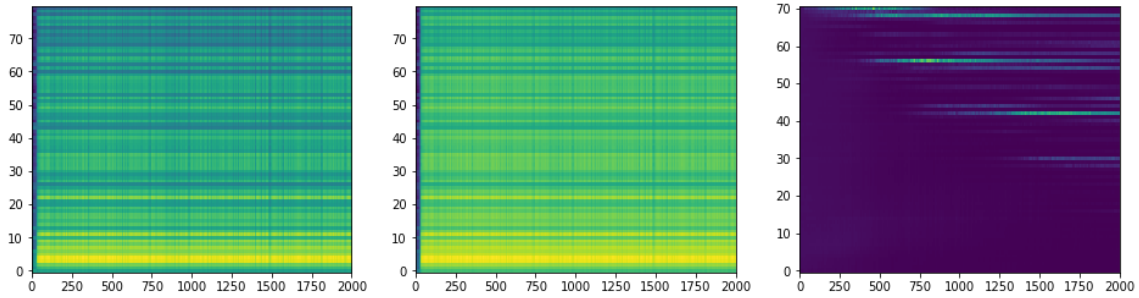
CC:Betty Botter bought a bit of butter. The butter Betty Botter bought was a bit bitter and made her batter bitter. But a bit of better butter makes better batter. So Betty Botter bought a bit of better butter making Betty Botter's bitter batter better.

Gibberish

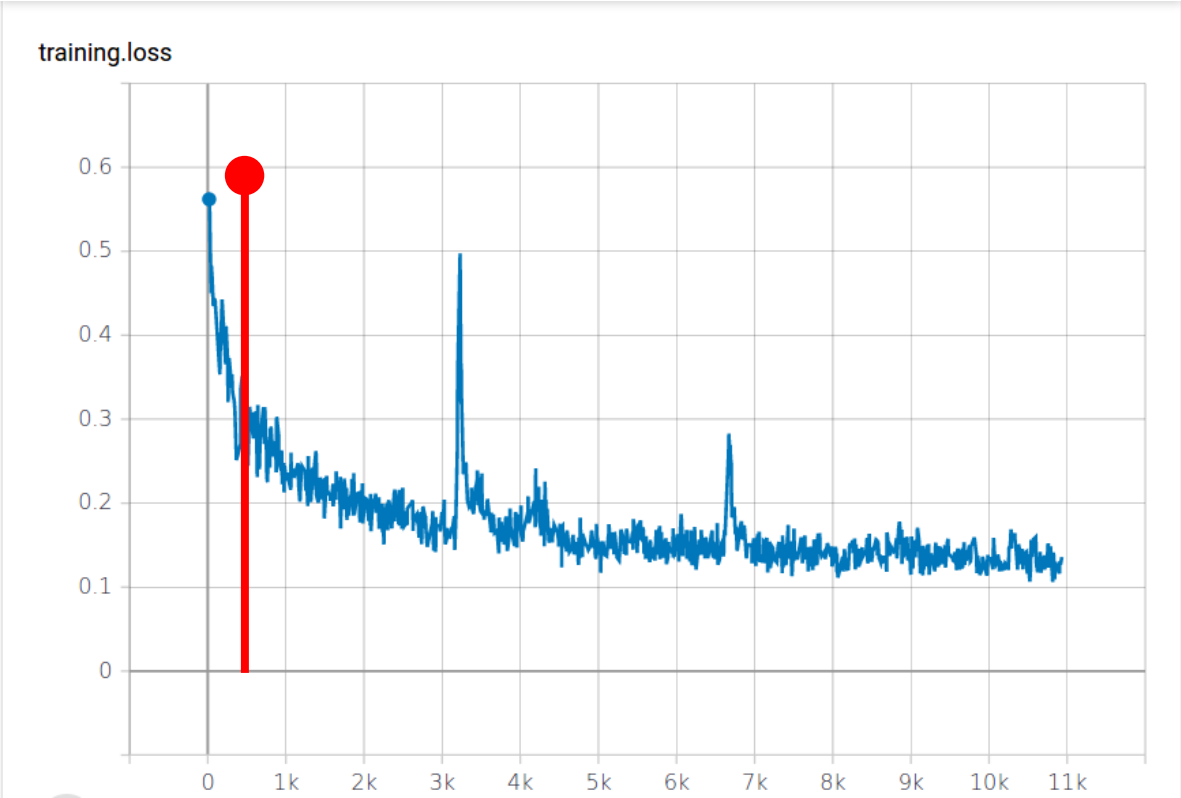
CC: Here is an example on how the model can produce gibberish. “And then…” [Gibberish]

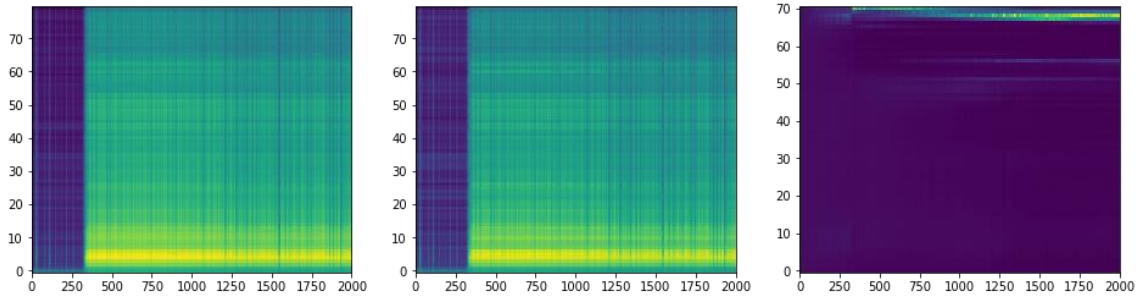
Results



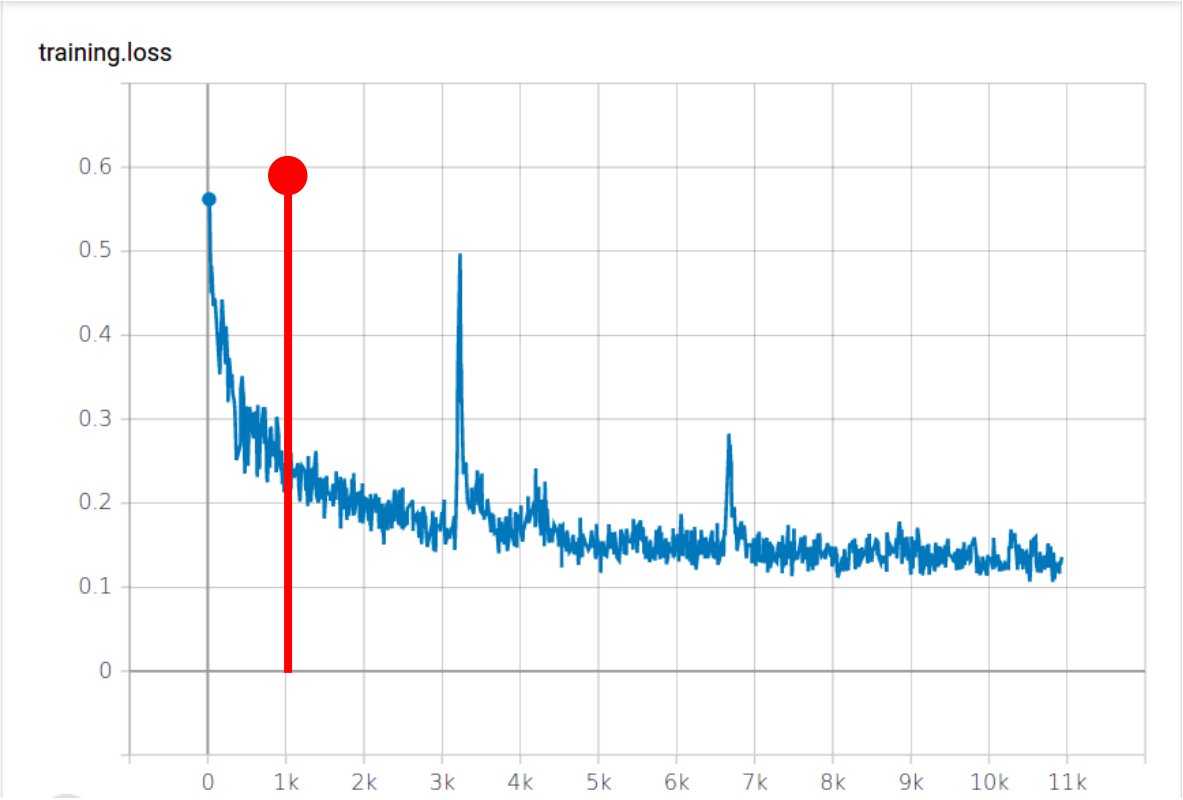


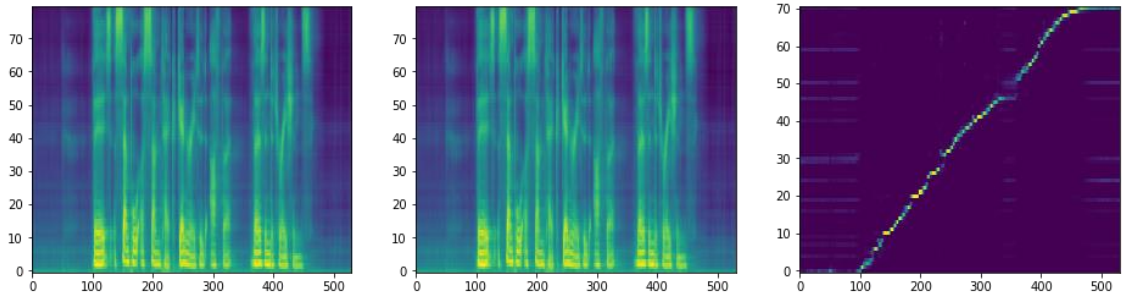
“CC: Here is a sample of some text, generated after one iteration.”



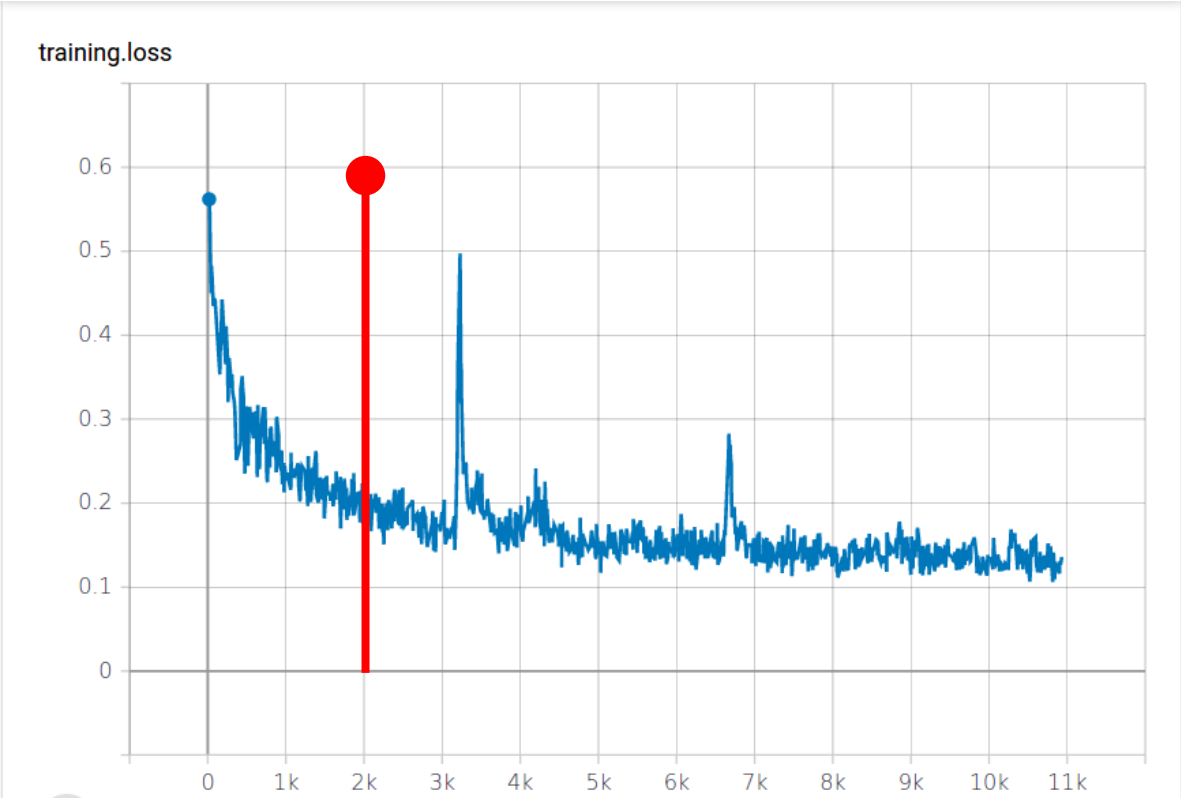


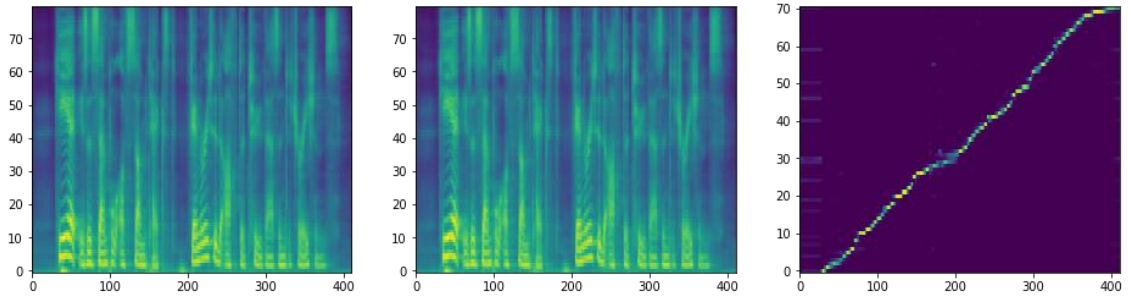
"CC: Here is a sample of some text, generated after 500 iterations."



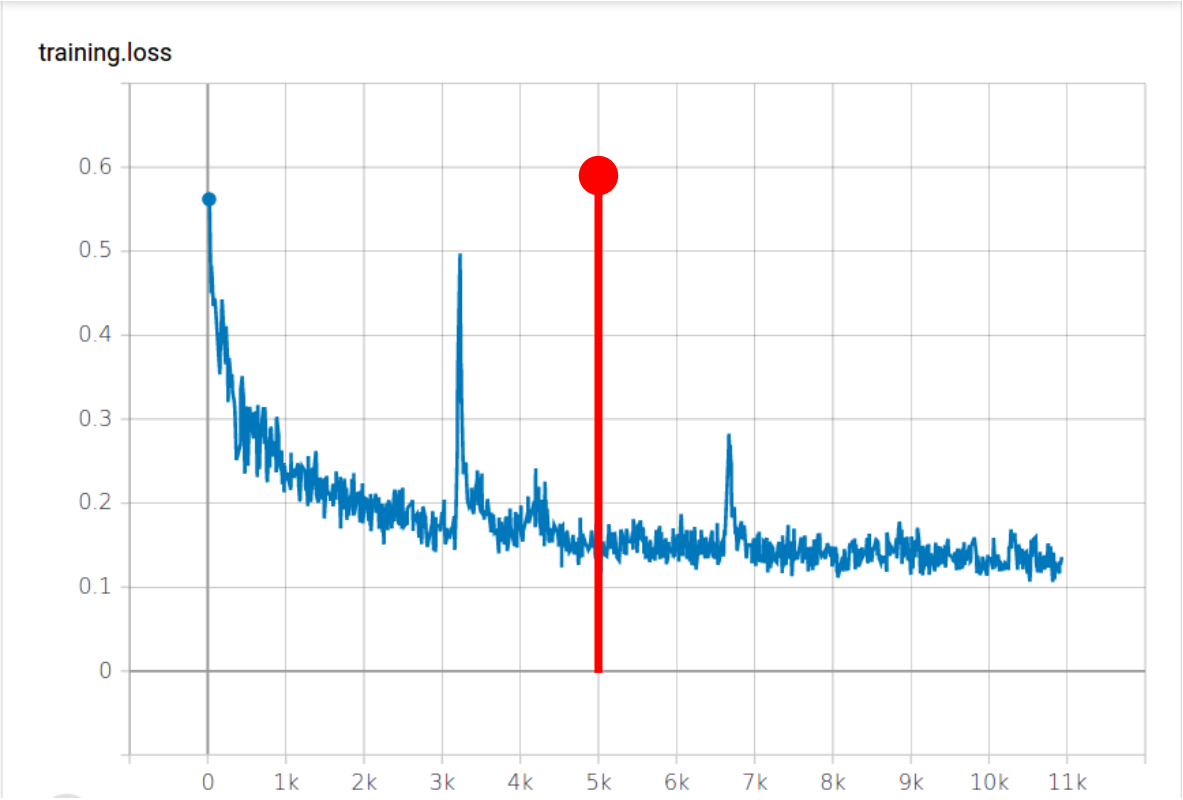


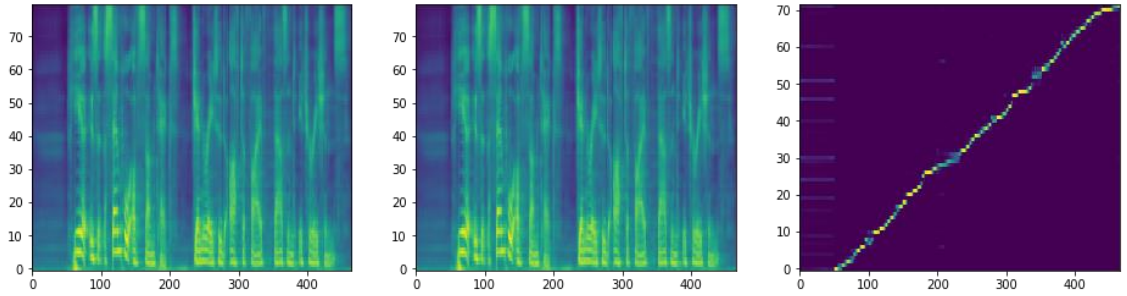
"CC: Here is a sample of some text, generated after 1000 iterations."



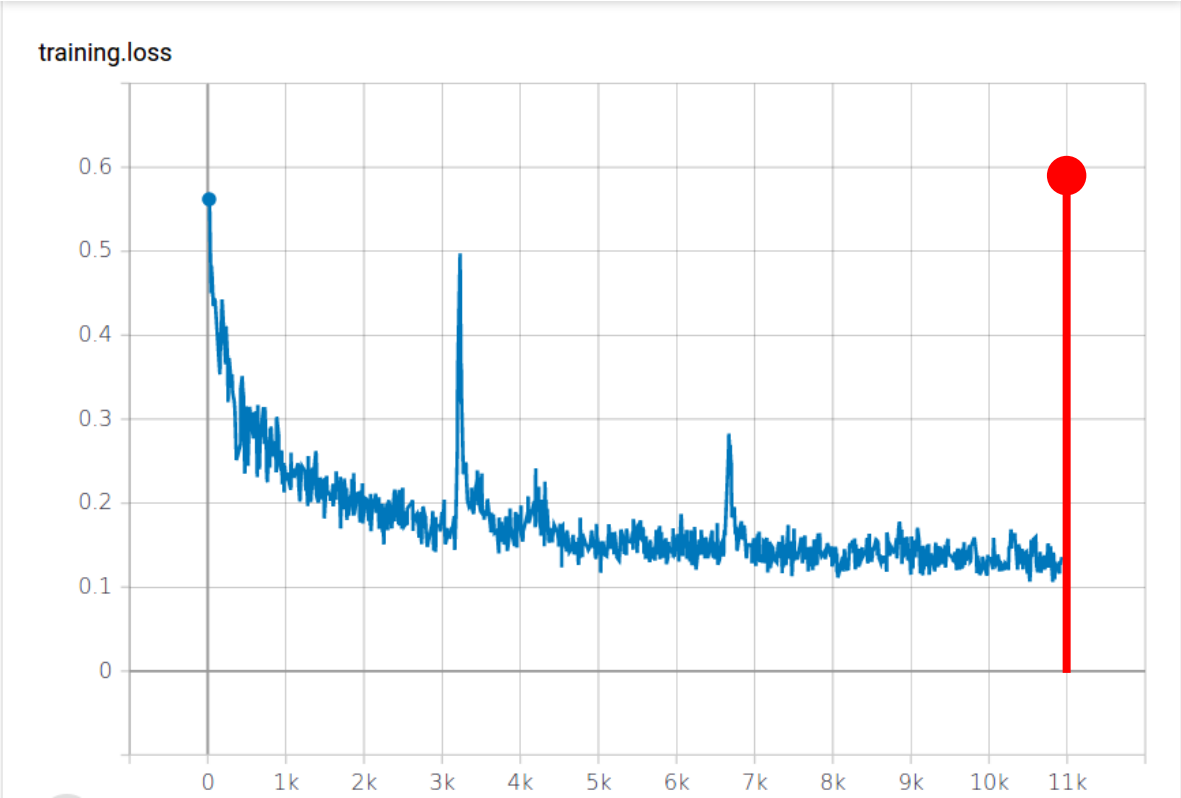


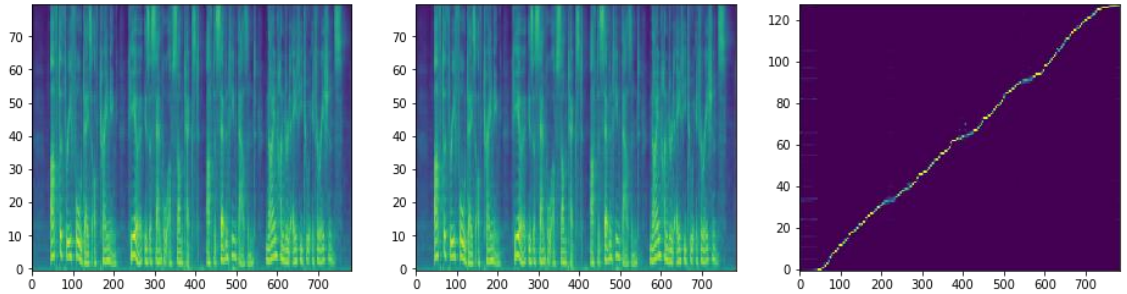
"CC: Here is a sample of some text, generated after 2000 iterations."





“CC: Here is a sample of some text, generated after 5000 iterations.”





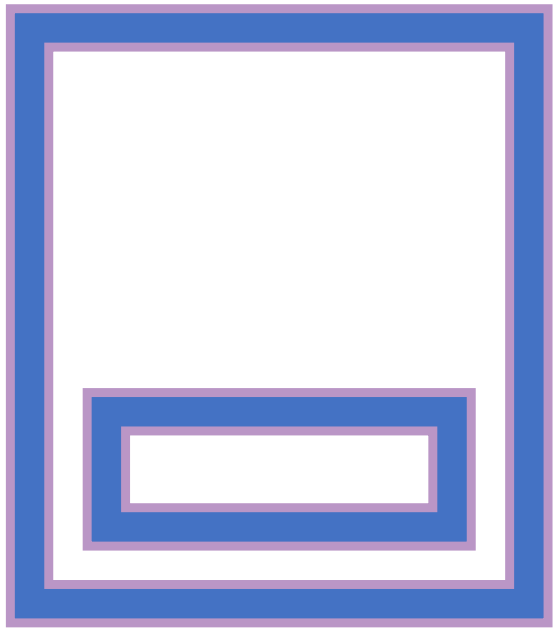
“CC: After 3 full days of training, here is a sample of some text, after 17,982 iterations”

Discussions

Conclusions

References

References



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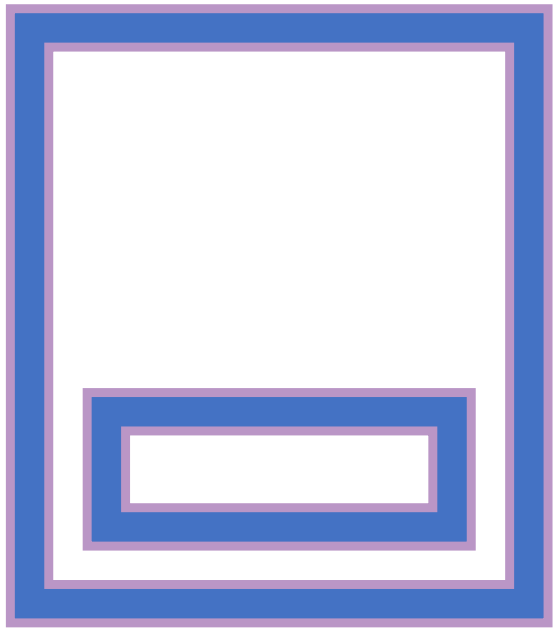

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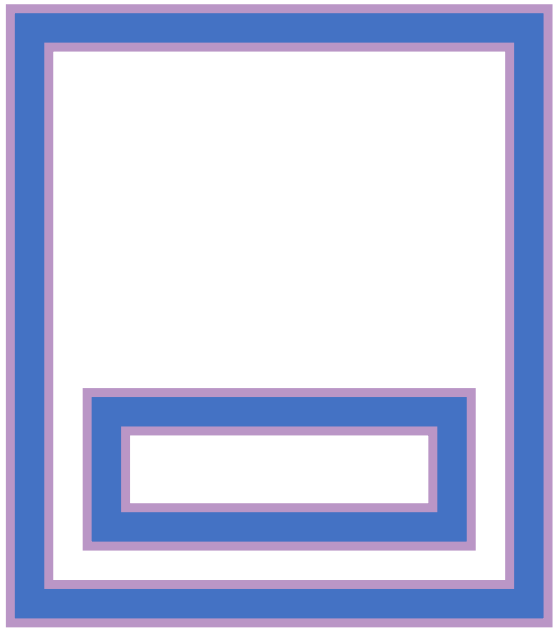

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Problems

LJ Speech 24 hours!

Ours' much smaller – 1hr

Leads to overfit synthesis

New words generalise badly

Future

Use phonetic pangrams?

- Sentences with every sound
- Bigger isn’t always better