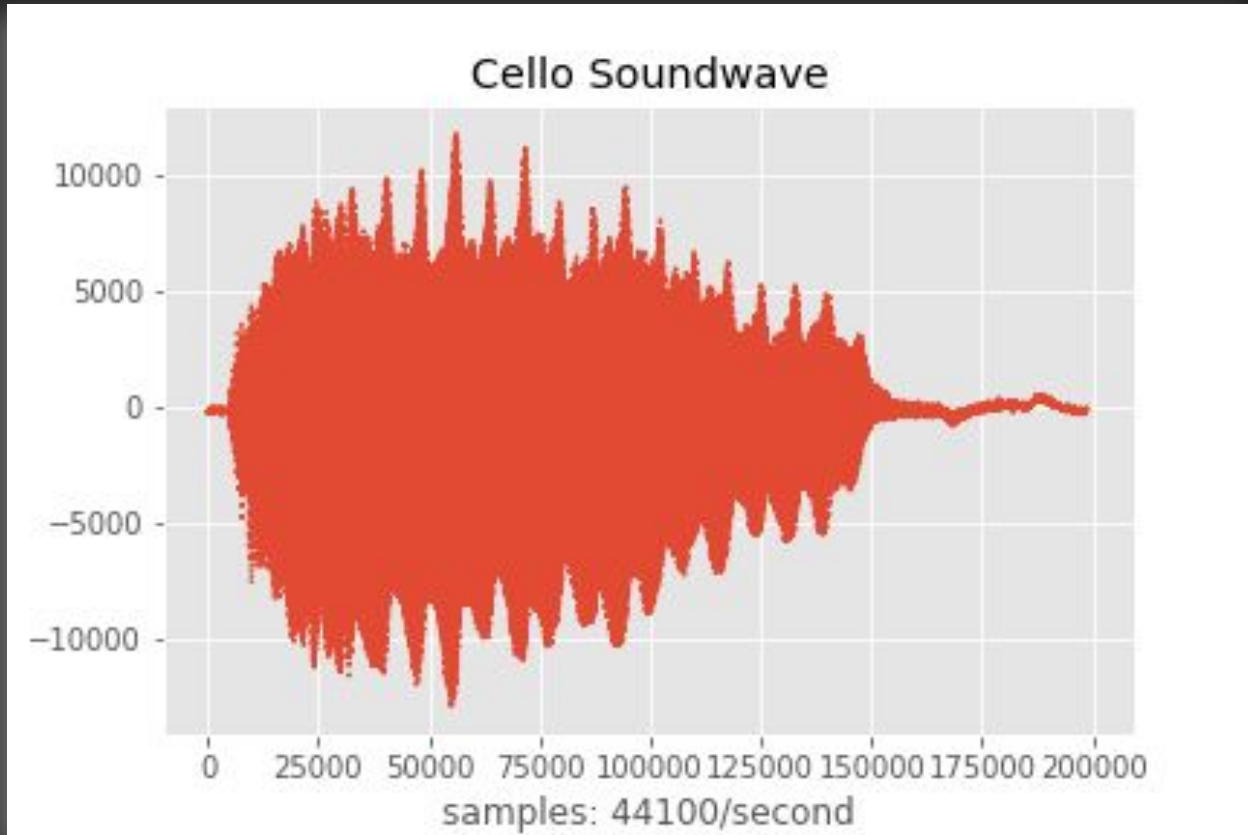


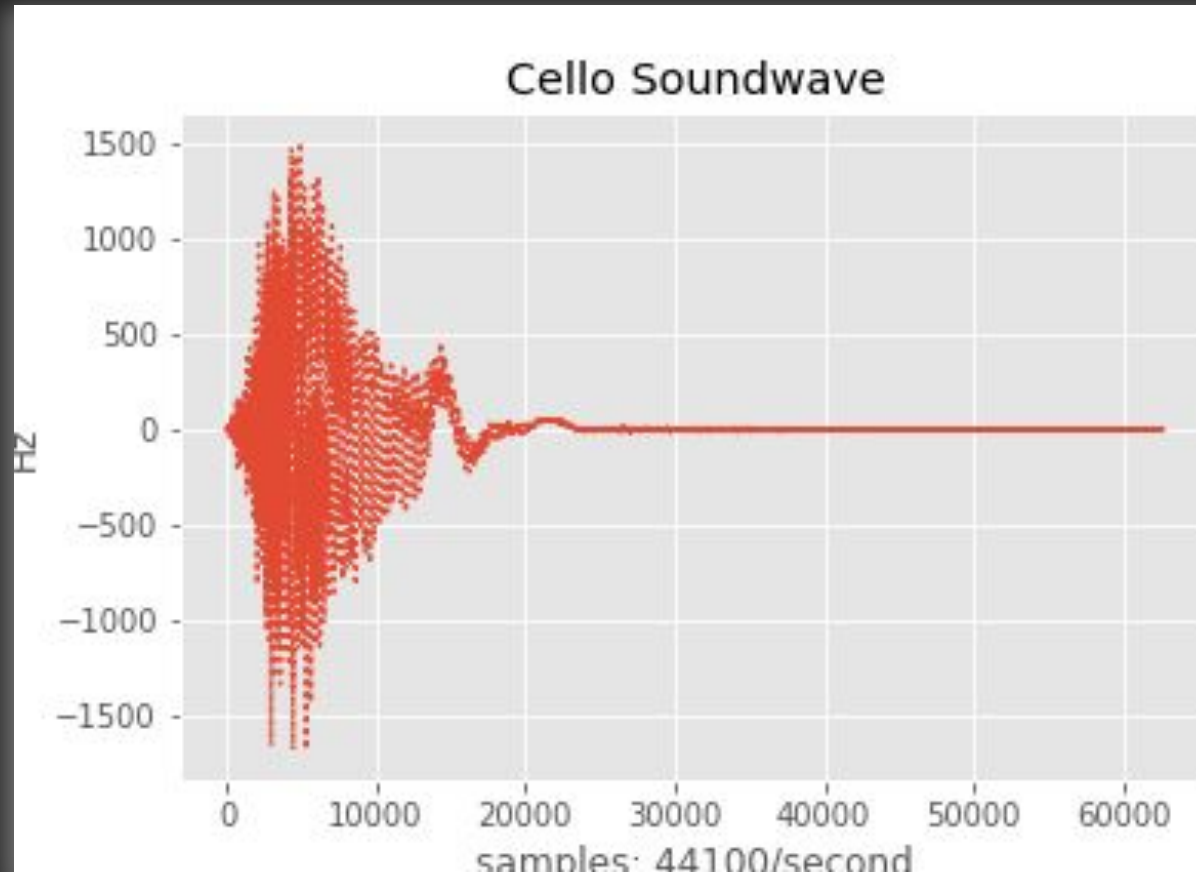
Intro to Signal Processing



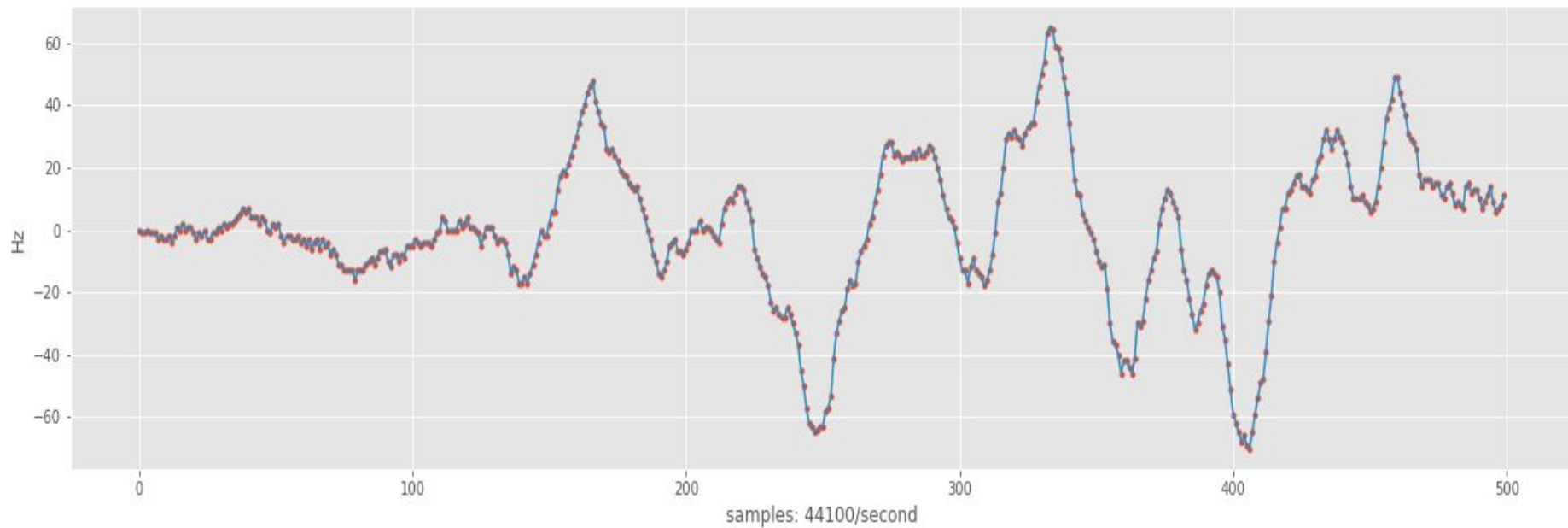
Sound is Vibration



Sound is Vibration



Cello 1st 500 Frames

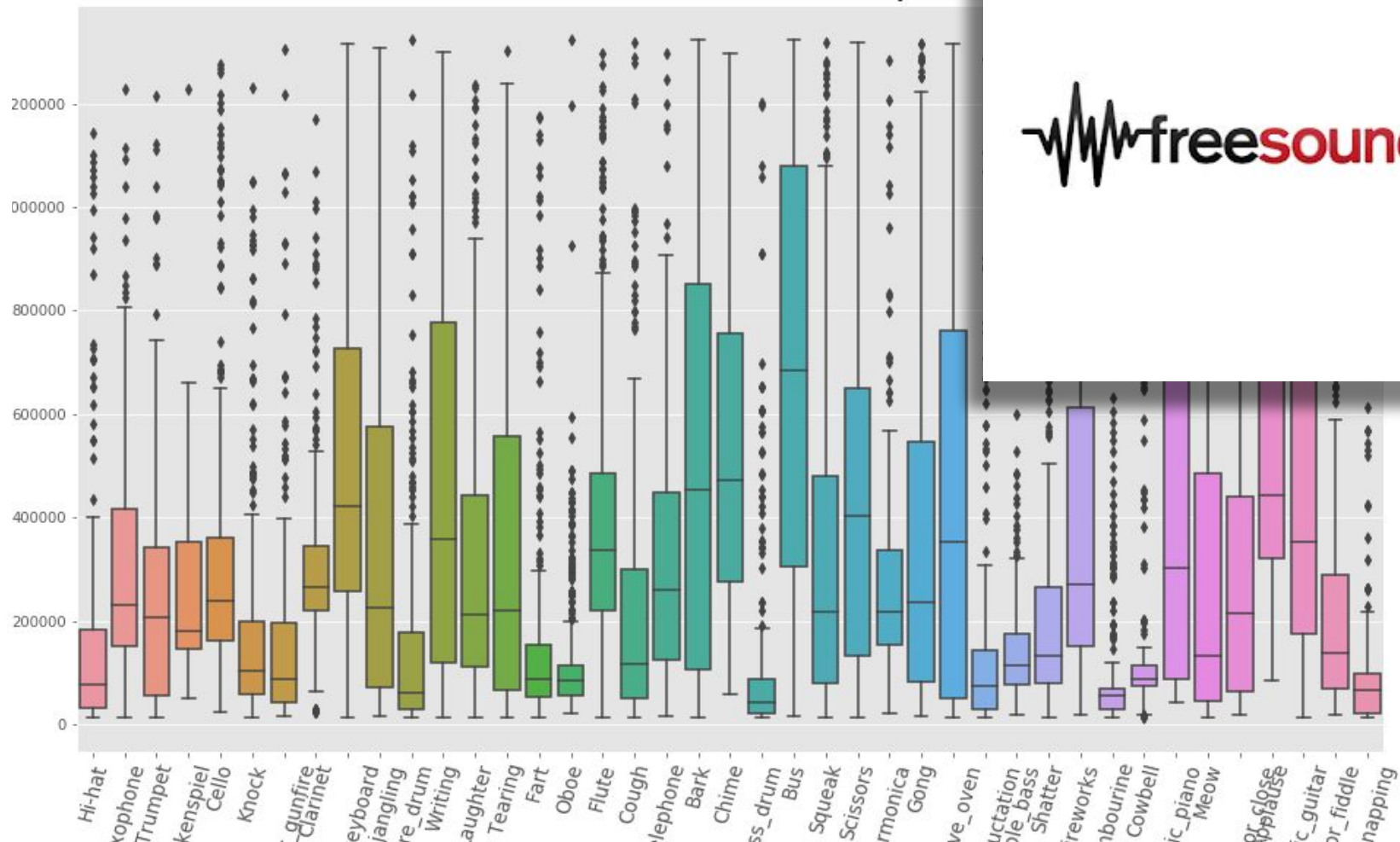


CNN or RNN

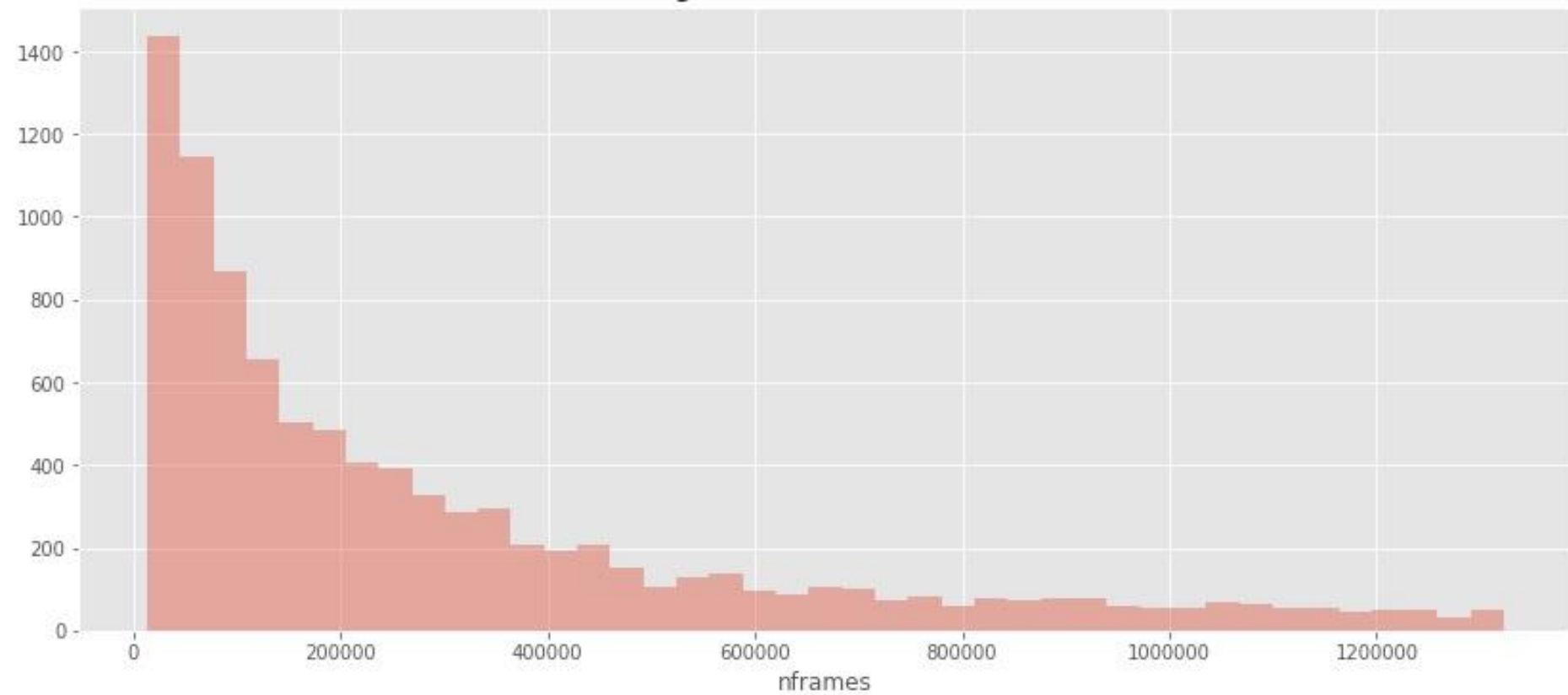


Distribution of Audio Frames Divided by Class

Audio Length (# samples)

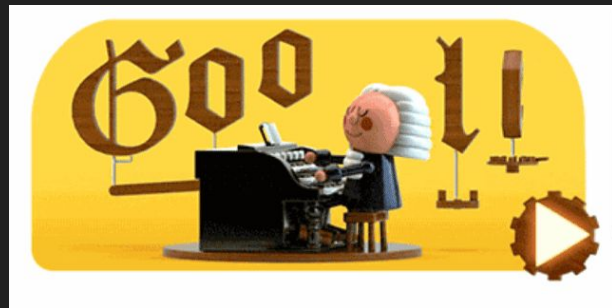


Histogram of Number of Frames

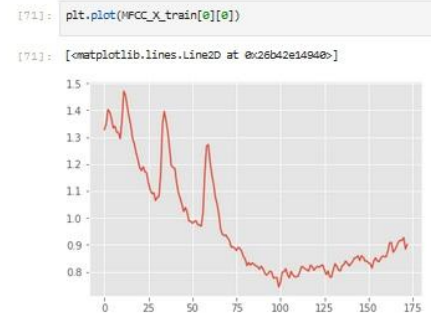
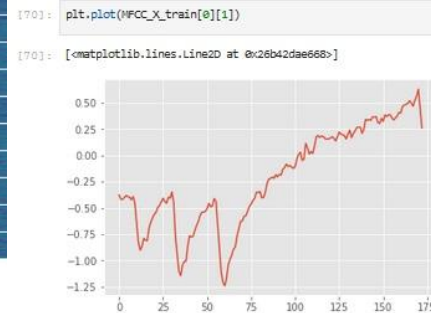
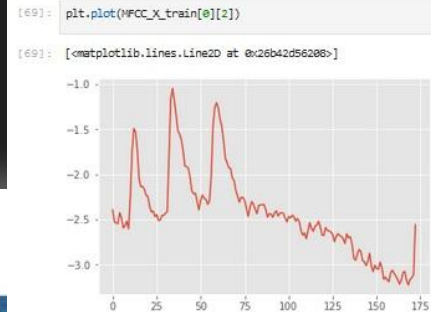
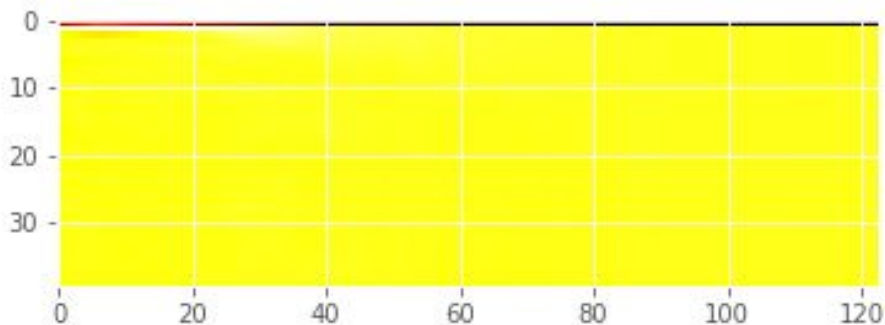
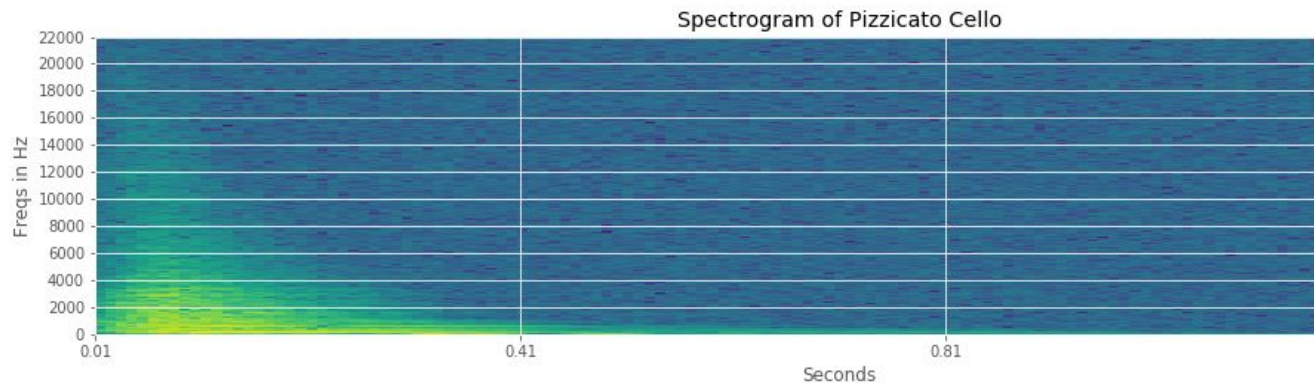


Composing

1. Join audio files on labels
2. Preform data augmentation



Data Augmentation



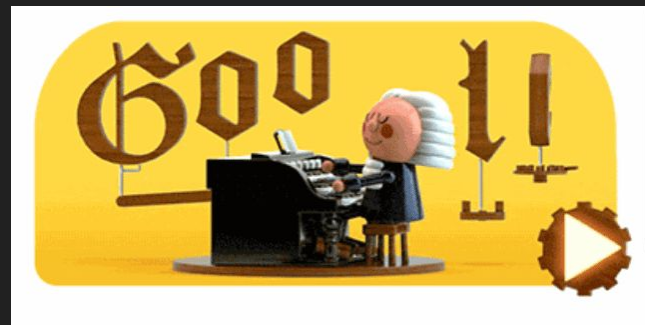
```
[79]: MFCC_X_train[0].shape
```

```
[79]: (48, 175, 1)
```

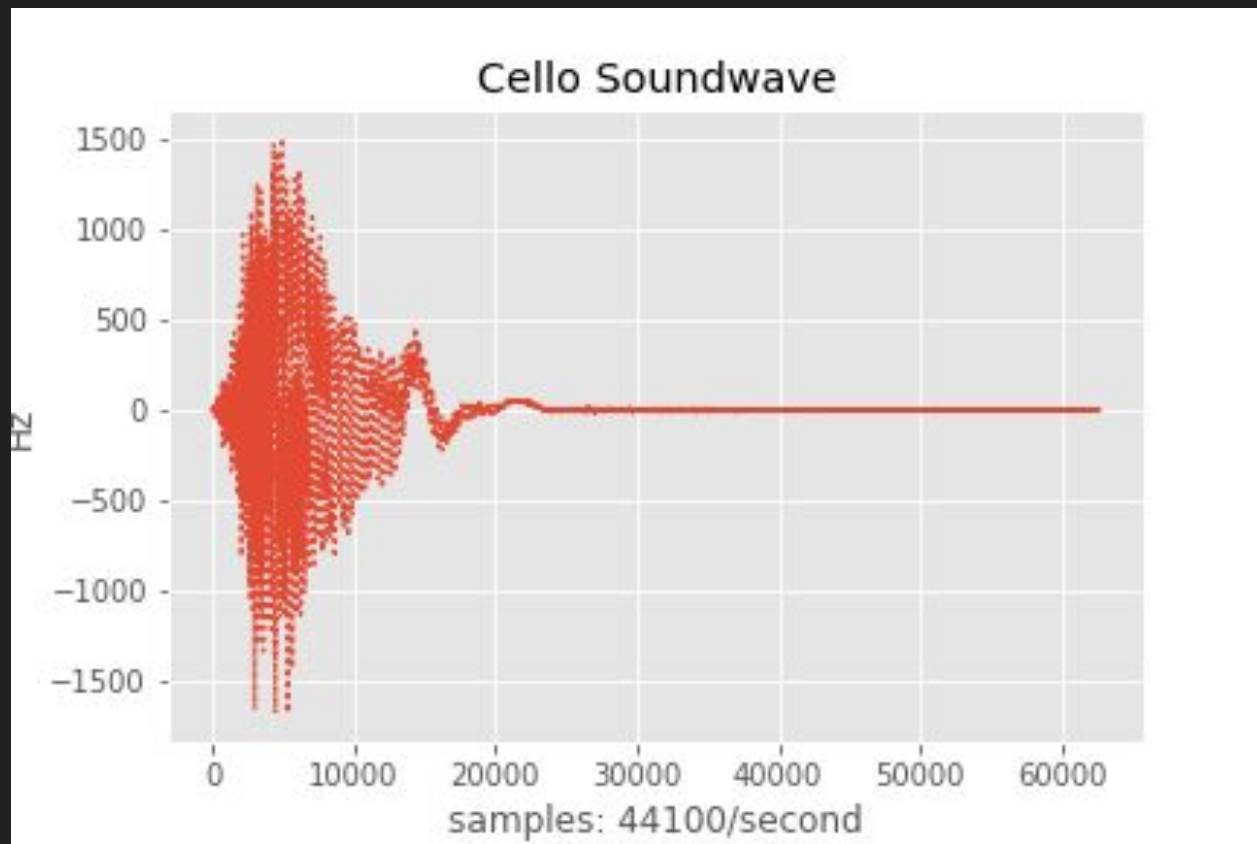
Composing

3. Clean data (windowing & signal from noise)

4. Train model



Cropping Audio



1D CNN

```
Fold: 0
####
Epoch 1/1
14/14 [=====] - 133s 9s/step - loss: 3.7228 - acc: 0.0078 - val_loss: 3.7255 - val_acc: 0.0132

Epoch 00001: val_loss improved from inf to 3.72551, saving model to best_0.h5
Fold: 1
####
Epoch 1/1
15/15 [=====] - 145s 10s/step - loss: 3.7226 - acc: 0.0219 - val_loss: 3.7186 - val_acc: 0.0270

Epoch 00001: val_loss improved from inf to 3.71864, saving model to best_1.h5
```

2D CNN

```
####
Fold: 0
Train on 1781 samples, validate on 219 samples
Epoch 1/2
1781/1781 [=====] - 65s 36ms/step - loss: 3.5222 - acc: 0.1078 - val_loss: 3.2974 - val_acc: 0.1644

Epoch 00001: val_loss improved from inf to 3.29743, saving model to best_0.h5
Epoch 2/2
1781/1781 [=====] - 65s 36ms/step - loss: 2.9545 - acc: 0.2212 - val_loss: 3.0789 - val_acc: 0.1918

Epoch 00002: val_loss improved from 3.29743 to 3.07893, saving model to best_0.h5
2222/2222 [=====] - 17s 0ms/step
```

Further Reading...

<https://www.kaggle.com/fizzbuzz/beginner-s-guide-to-audio-data> : audio classification

<https://towardsdatascience.com/recognizing-speech-commands-using-recurrent-neural-networks-with-attention-c2b2ba17c837> : RNN for speech recognition

<https://ai.google/research/teams/brain/magenta> : generative audio model

<https://www.google.com/doodles/celebrating-johann-sebastian-bach> : Google doodle using magenta

<http://coding-geek.com/how-shazam-works/> : how Shazam works!!

<https://www.linkedin.com/in/mark-ehler-85052548/> : me