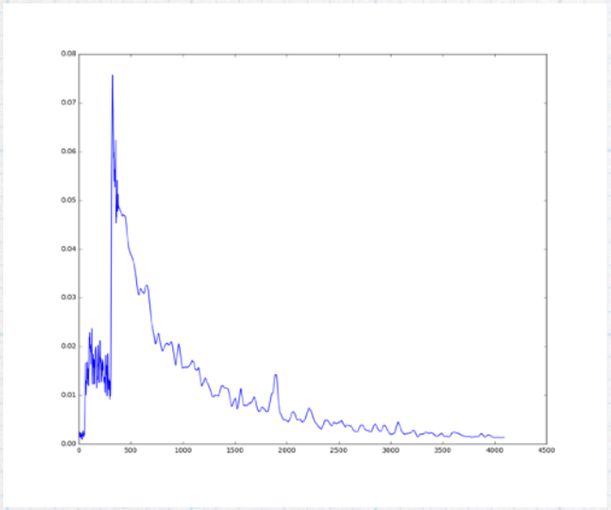
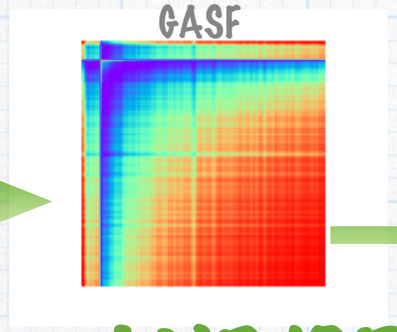
# Exploratory studies: Extracting Features from waveforms

Ken 12th March 2017 NAP

## A brief recap:-

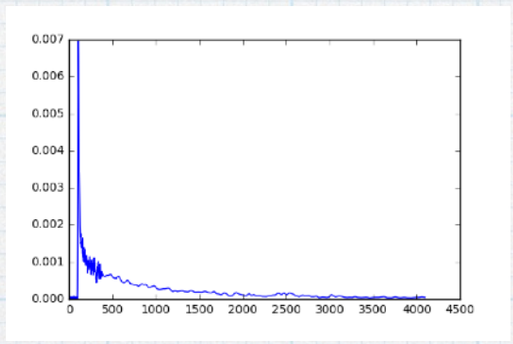


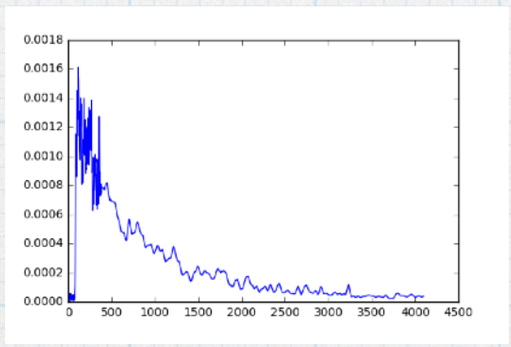
a set of Waveforms

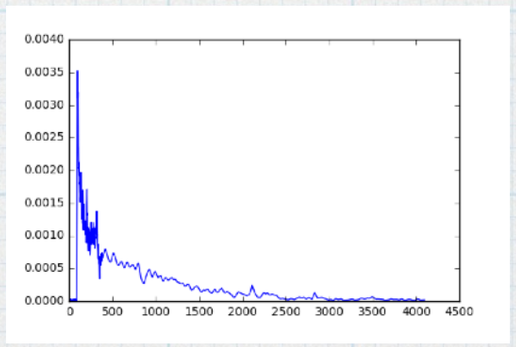


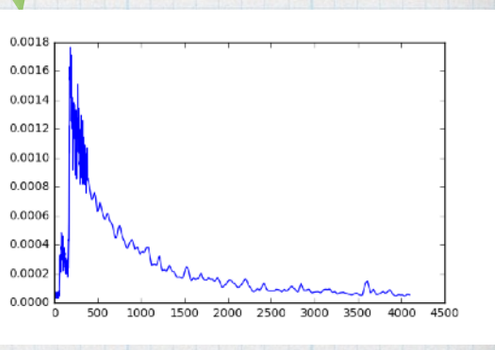

AND/OR

Convolution Neural Network







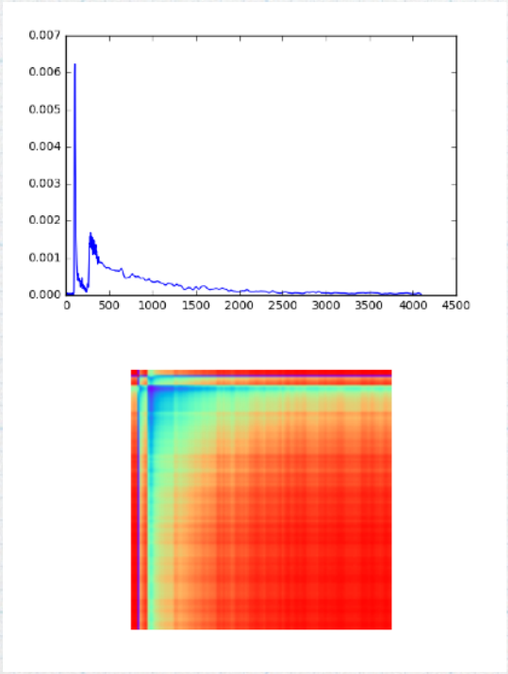
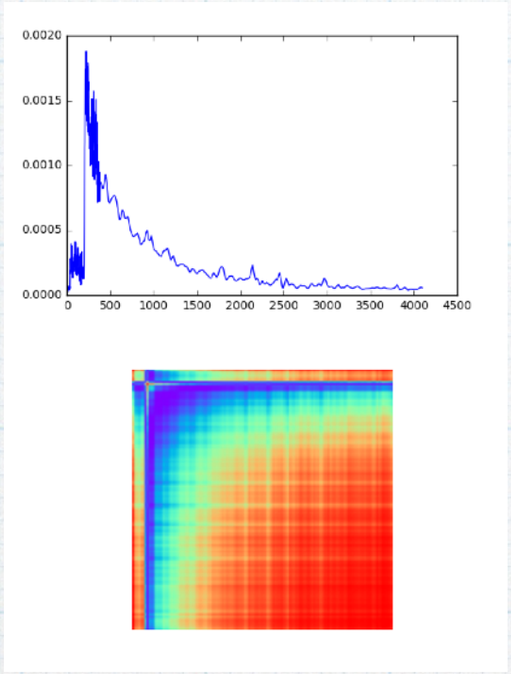
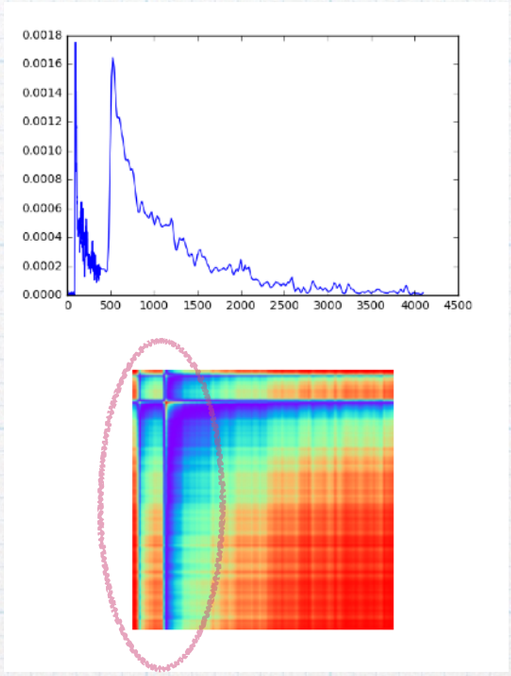


# Why transformed 2D waveforms?
# because of the double/piled up waveforms

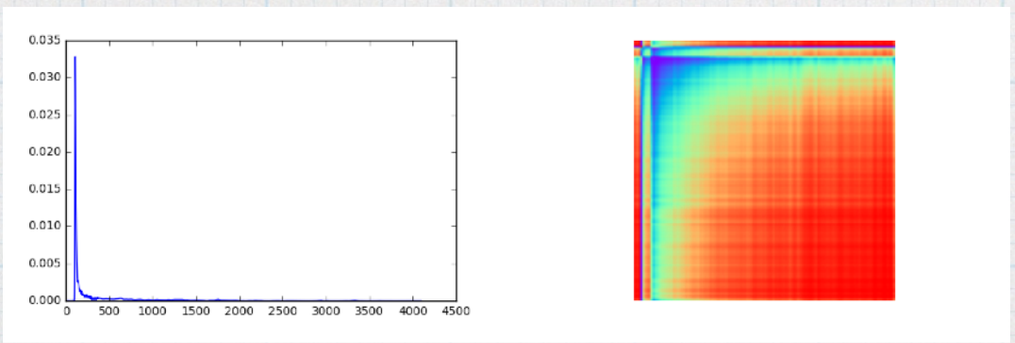
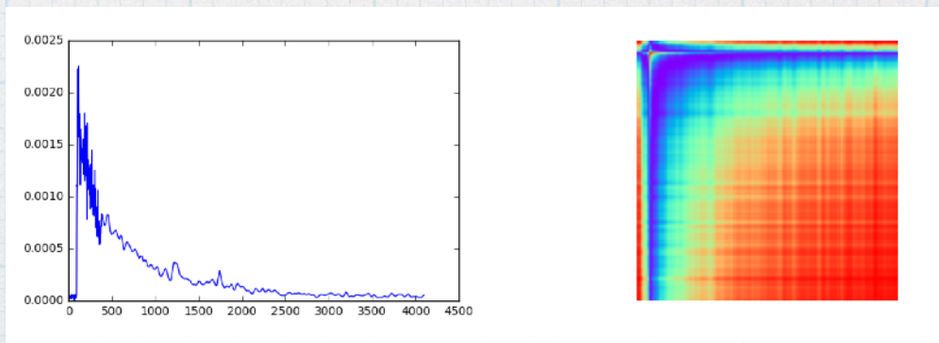
I could better identify these piled up events than using the 1D waveform inputs to CNN. Using 1D waveform only, I get more "contamination". With the 2D waveform, I get "cleaner" results. (By plotting 20 "classified" samples randomly)

from 10/20~ to 19/20~ correctly identified.

(factors such as the NN structure also affect it but the combination can be endless)

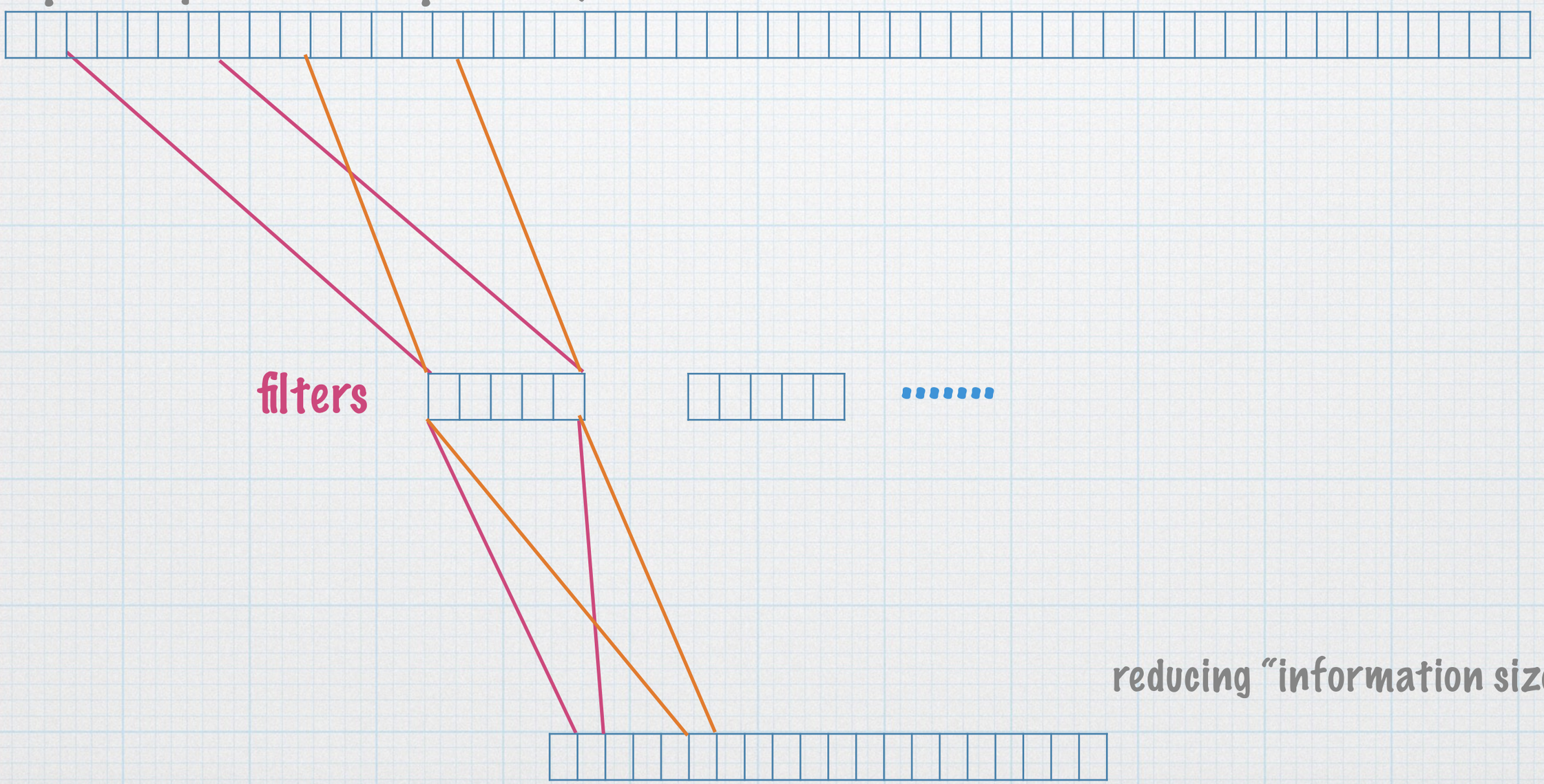
As for other kind of waveforms, .....

# The filters in the Convolution layer of CNN

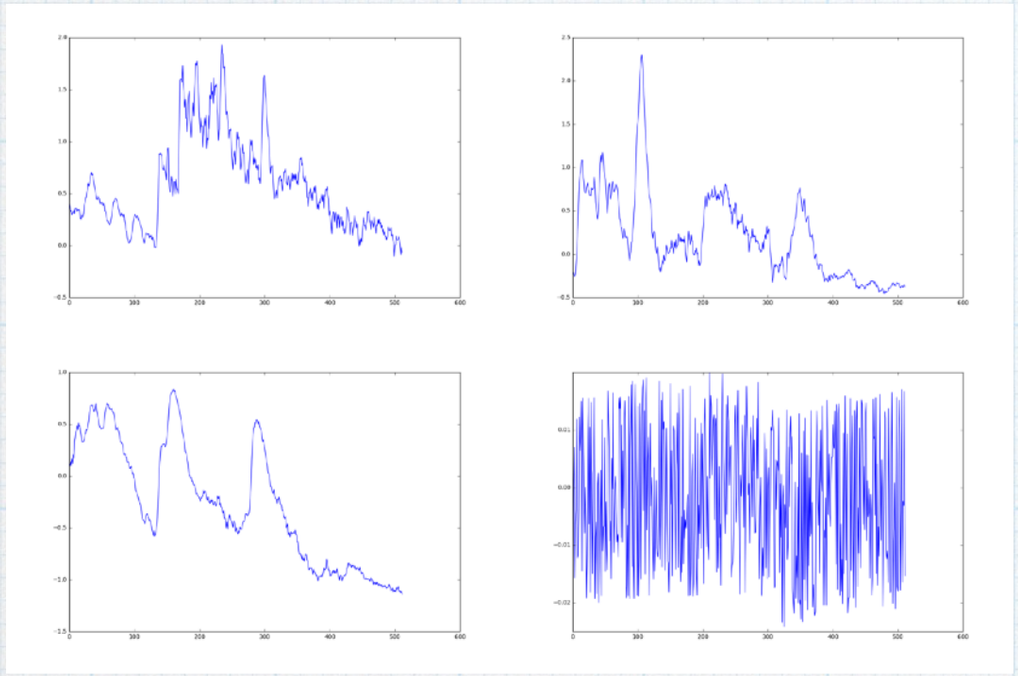
**A general consensus is that the convolution layer of a CNN is an excellent tool at extracting features from 2D images.**

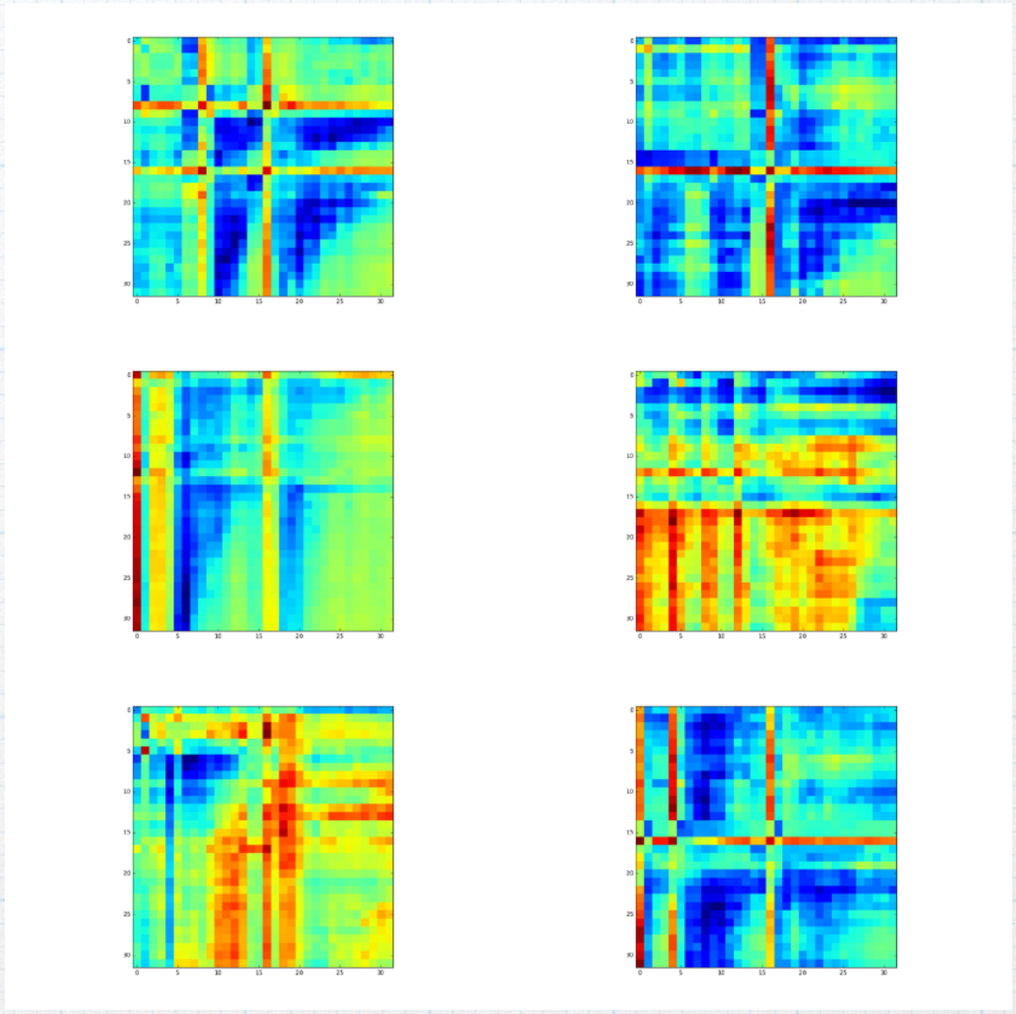
Convolution layer of CNN
Conceptually can be explained, ...



# The filters in the Convolution layer of CNN

*Examples of filters learned in the convolution layer.





Rather "hand design" the filters, aka.curve fitting, this way we might be able to extract features of the waveform itself?

*each filters applies to a small portion of the waveform, each filters has a weight to it.

There are some problems still, such as symmetry, input has to be normalised, etc.