2017-07-03

- Initial set up of neural net, based on leNet-5, no signal out, most likely due to using unprocessed data.
- The data is very padded, this has been reduced with the function `cropHeart(inp)`, but I will need to make sure all the files are the same size before they get fed into the CNN.
- I could try normalising the data to get a signal, but will need to get the unpadded data working first.

2017-07-04

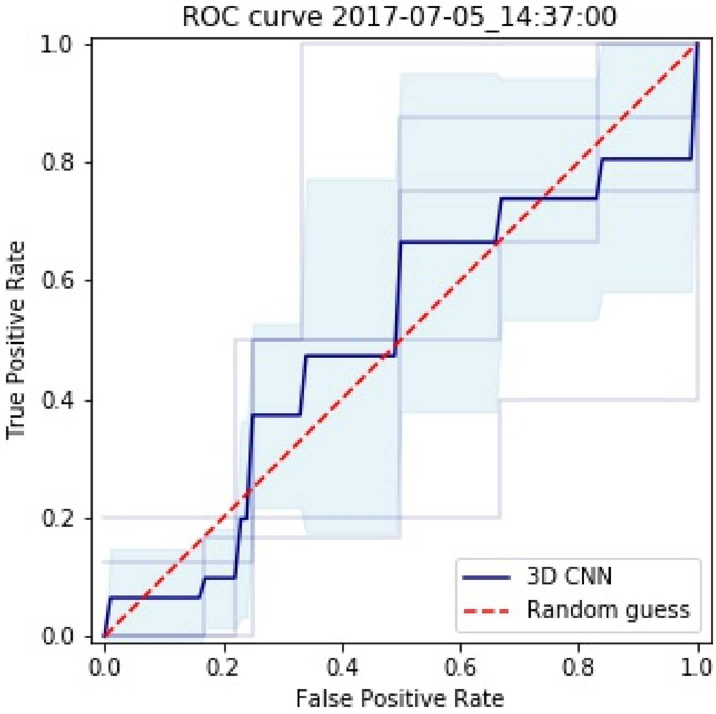
- Wrote a visualisation of the data (`visualisation.py`).
- Still working on repadding the cropped data (It's a bit of a pain).

2017-07-05

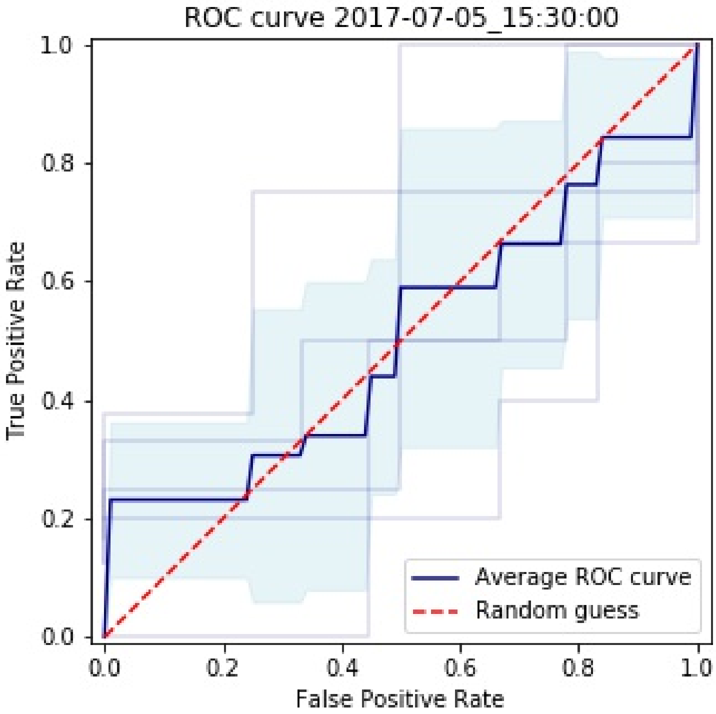
- Repadded the cropped data, it is now of size [68,34,34].
- Retrying the CNN with the new data doesn't get a signal. Maybe there isn't enough data to make it work?
- I will fiddle with the hyperparams to see if I can pick something up.
- Maybe normalising the data will help.

Got some results using 2D slices:

- I have used 2d slices of the data and it works well (halfway through the z-axis). It uses:
    - Slice of rest and slice of stress on z axis. Spacial x and spacial y on x and y axes.
    - LeNet-5 CNN with 3D convolution and subsampling.
    - [2,5,5] filters, pooling 2 with step 2.
    - learning rate of 0.0001, with ADAM optimiser, and batch size of 10.
    - After 50 epochs of 58 images it learns to ~95%.
- I will now apply a k-fold x-validation to it to see if it's not just picking up noise.
- The k-fold x-validation shows that the CNN is learning the noise in the data, although this could be due to the small amount of images in each k-fold (only 10!):

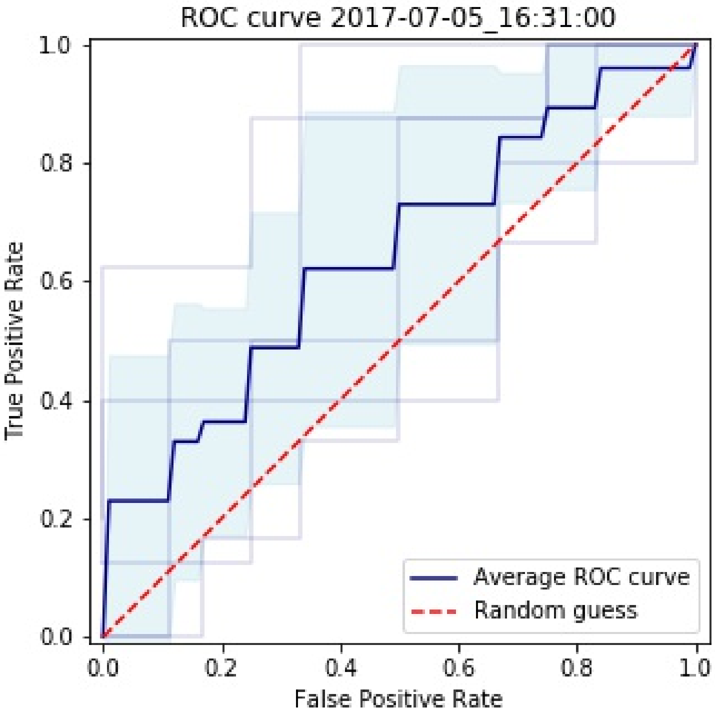


- I tried normalising the arrays, with no luck. It stopped overfitting the data, but still hasn't learnt significantly:



- I think the issue is still the massive amount of blankspace. I should try and scale the arrays so that they are the same size.

Have a signal!

- I have got a signal with the following CNN:
    - Slice of rest and slice of stress on z axis. Spacial x and spacial y on x and y axes.
    - LeNet-5 CNN with 3D convolution and subsampling.
    - [2,10,10] filters, pooling 2 with step 2.
    - learning rate of 0.0001, with ADAM optimiser, and batch size of 10.
    - 5 k-folds.
    - After 50 epochs of 47 images it learns to ~95%.
    - Avg Spec: 0.583, Avg Sens: 0.633
    - ROC curve:
        - 
ROC curve 2017-07-05_16:31:00
True Positive Rate
False Positive Rate
Average ROC curve
Random guess