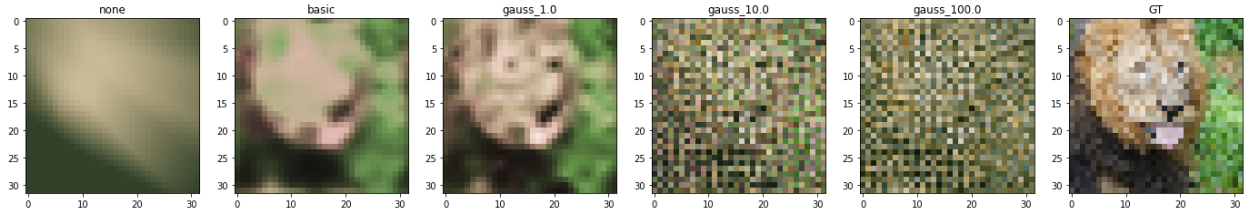
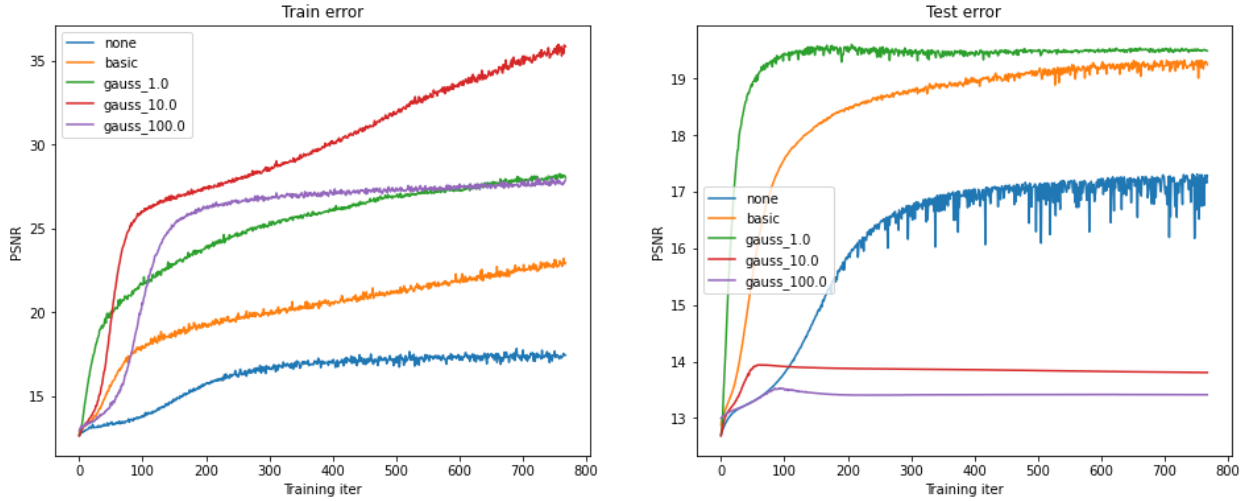
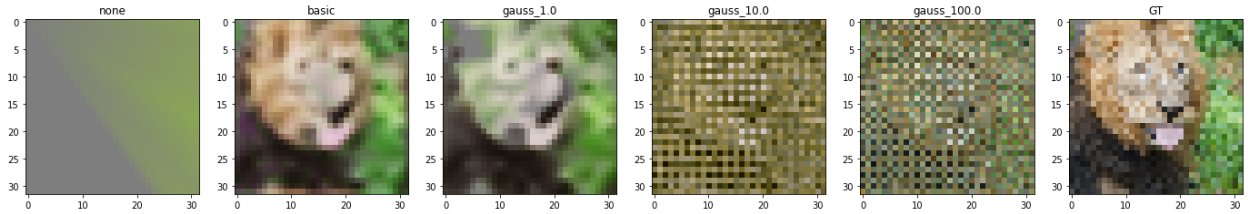
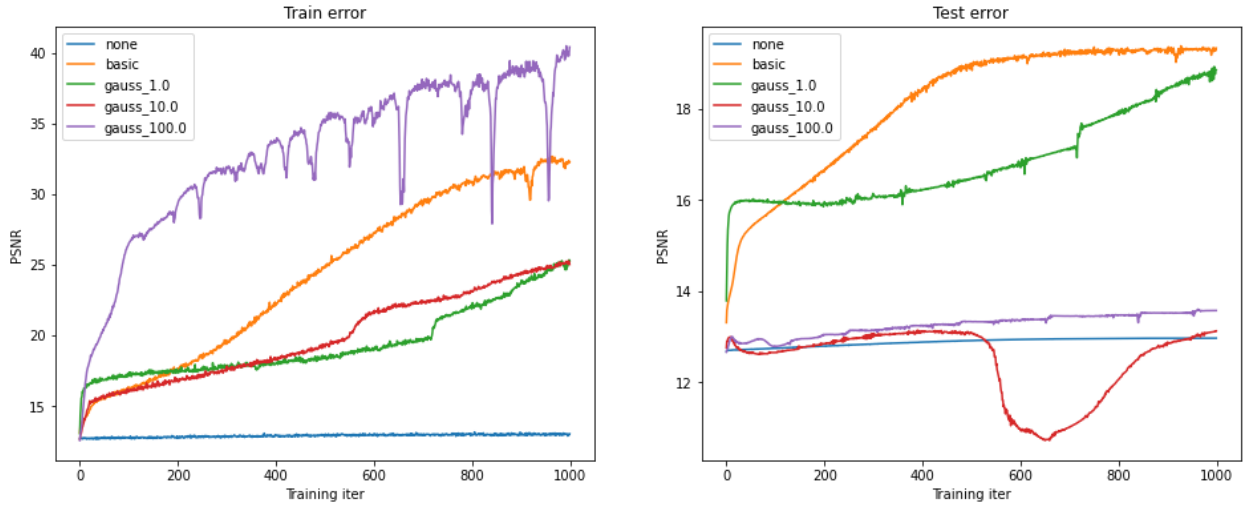
## Low resolution example with SGD



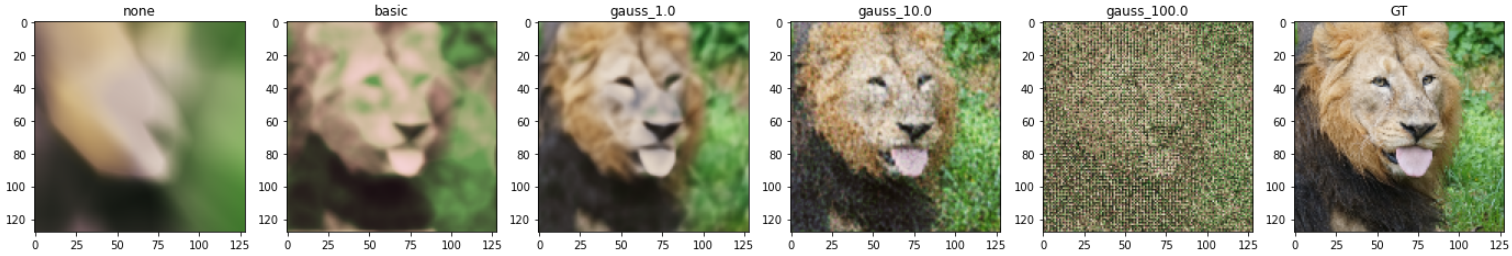



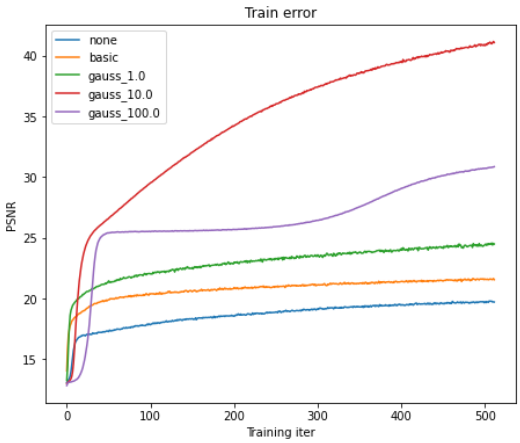

## Low Resolution example with Adam

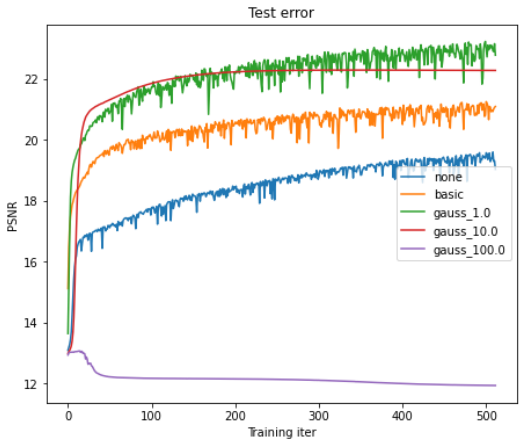


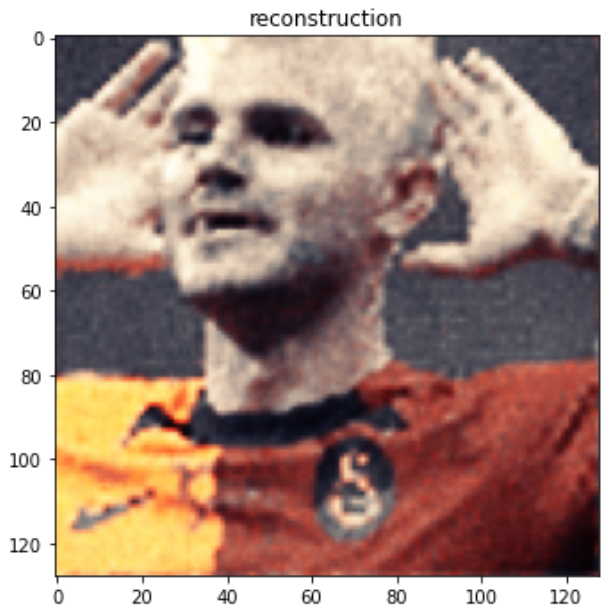



## High resolution examples

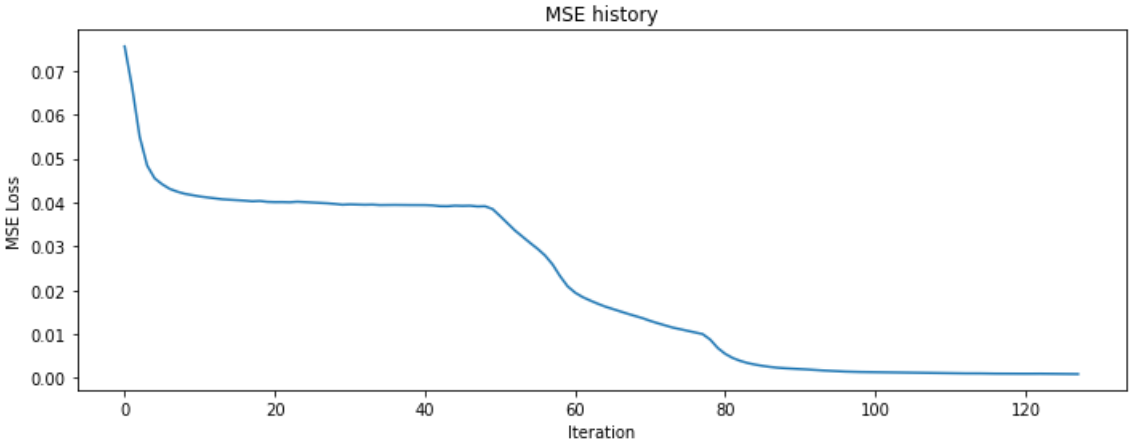


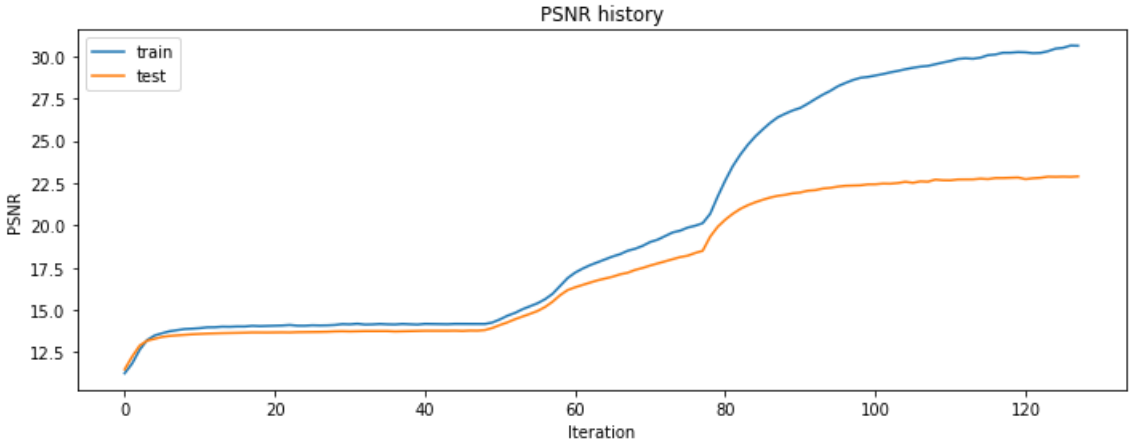




reconstruction
0
20
40
60
80
100
120


ground truth
0
20
40
60
80
100
120


MSE history
MSE Loss
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0
20
40
60
80
100
120
Iteration


PSNR history
train
test
PSNR
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
0
20
40
60
80
100
120
Iteration

**Result Discussion**

*Hyperparameter settings:*

First I tried to change learning rate, epochs, and different optimizer settings. I found that an epoch around ~850 worked well with smaller images while less epochs worked better with bigger images. The learning rate for SGD was 0.1 and for Adam was 0.0001.

I used the best settings I could find but I was still short of a good network. For the training I added mini batching which helped greatly, both improved how well out model predicted and also how fast it ran.

*SGD vs. Adam Optimizer*

Adam worked better for bigger images compared to SGD. Although both did a great job at reconstructing the images, at higher resolutions Adam worked well because it had less static in the gauss mappings. SGD seems to work better than Adam without mappings (the 'none' mapping)

*Different mapping choices*

No coordinate mapping was much worse than the others for all of the examples. It created very blurry images. Basic coordinate mapping was a great step up from none mapping as well as gauss_1.0. One thing to note is gauss_10.0 does not work well for low resolutions. I believe this is the same case with gauss_100.0. Even though I still got bad results running it on the 'high-res' on here, I think gauss_100.0 would be the best performing at higher resolutions.