

# HW3 8430 Report

April 22, 2022

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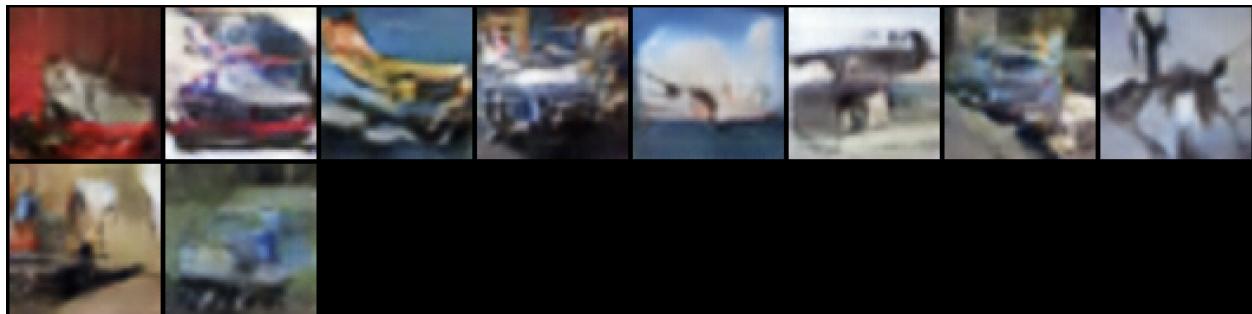
Dr. Lou

Issues: I was not able to gain access to palmetto training and therefore have a shorter training time. Fortunately while comparing my output to other output of GANs on the CIFAR dataset it appears that my model are still acceptable for how long they have been trained. The DCGAN model crashed 2 times while training, confirmed when the paper that my model wasn't wrong, it however experienced vanishing and exploding gradients causing it to become unstable.

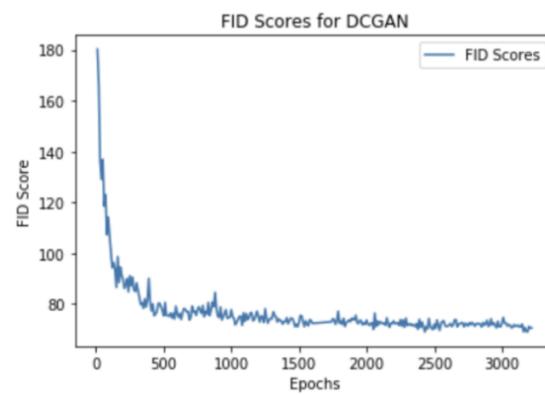
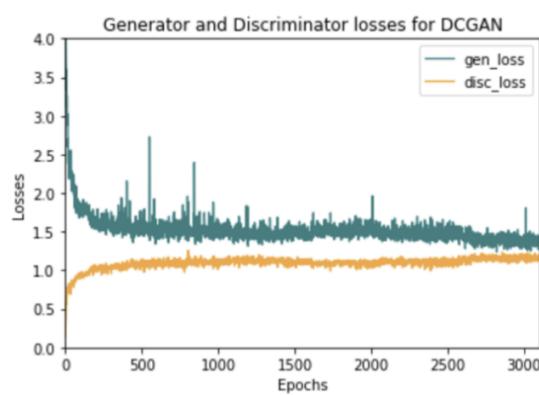
Performance Comparison using FID between DCGAN, WGAN and ACGAN is at the end of report.

## DCGAN

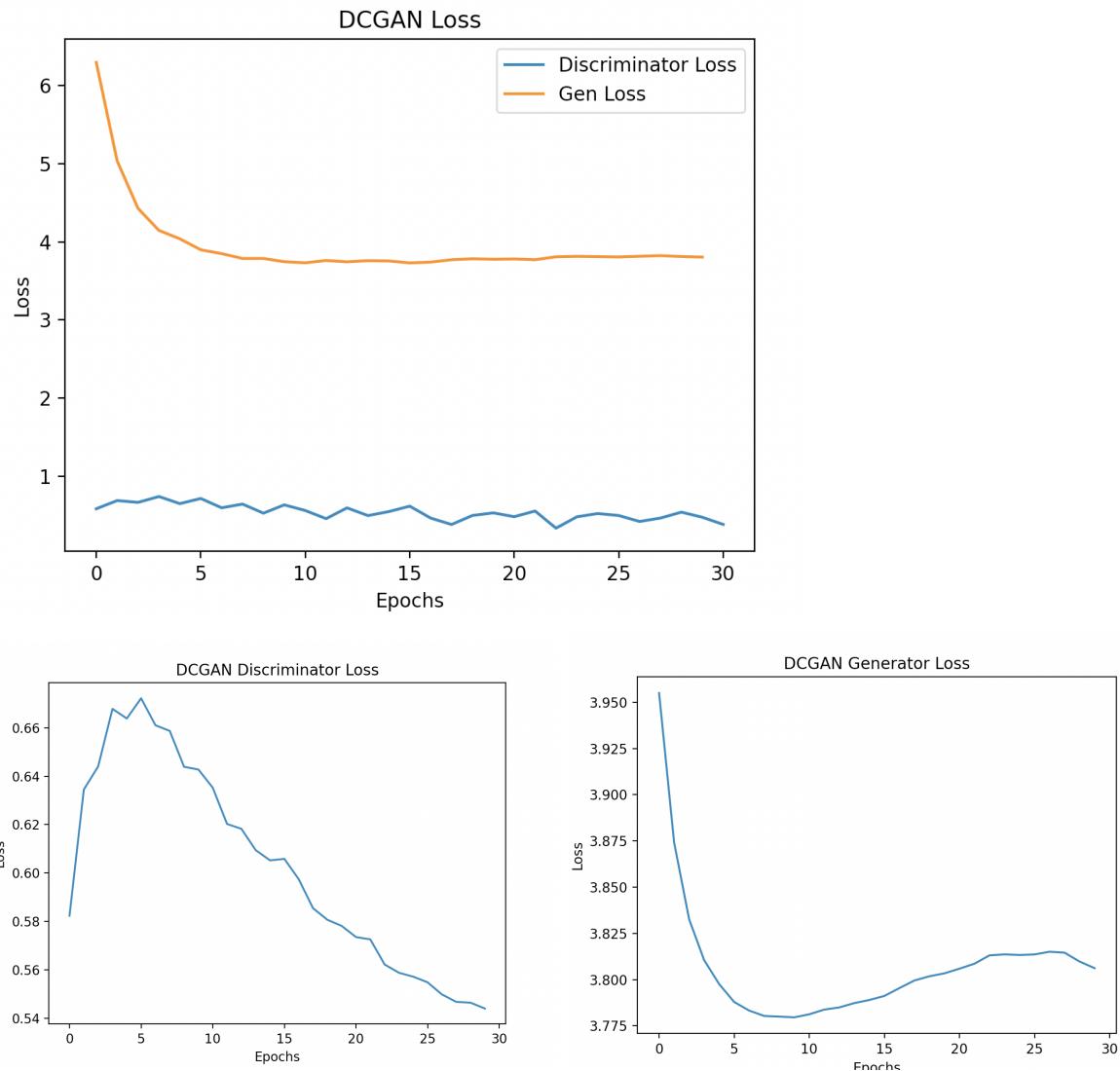
10 Best Images as defined by lowest FID



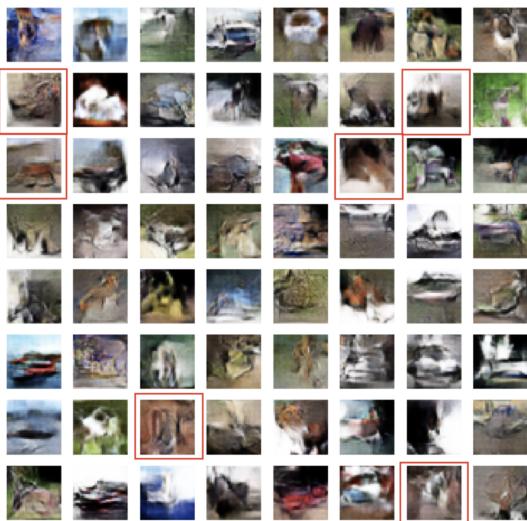
Compare to existing networks:



This image above was taken from this [article](#) analyzing DCGAN's performance. My DCGAN performance:



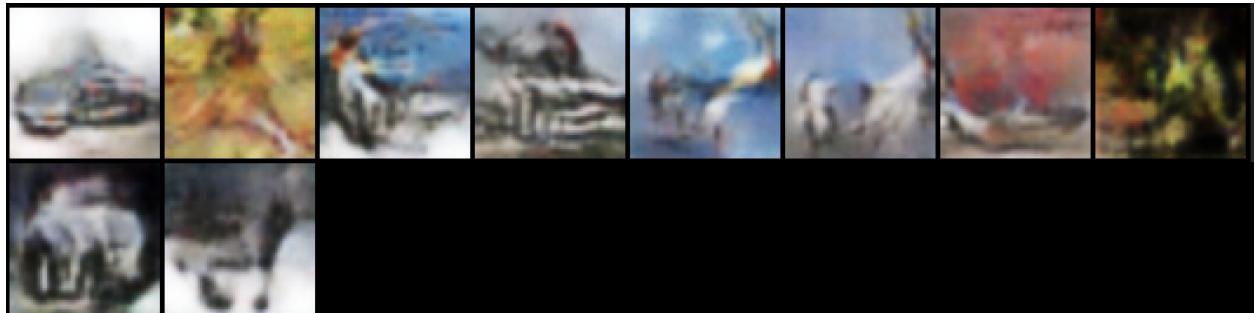
Individual Discriminator and Generator Loss are shown to show change over time.



These images were taken from the same [article](#). These are images produced after 3190 epochs which are not far off from mine.

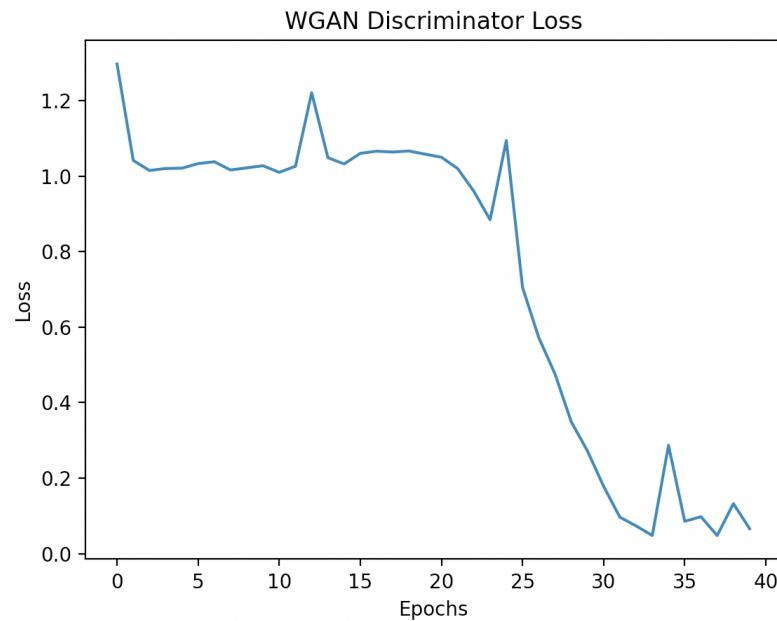
## WGAN

10 best images:

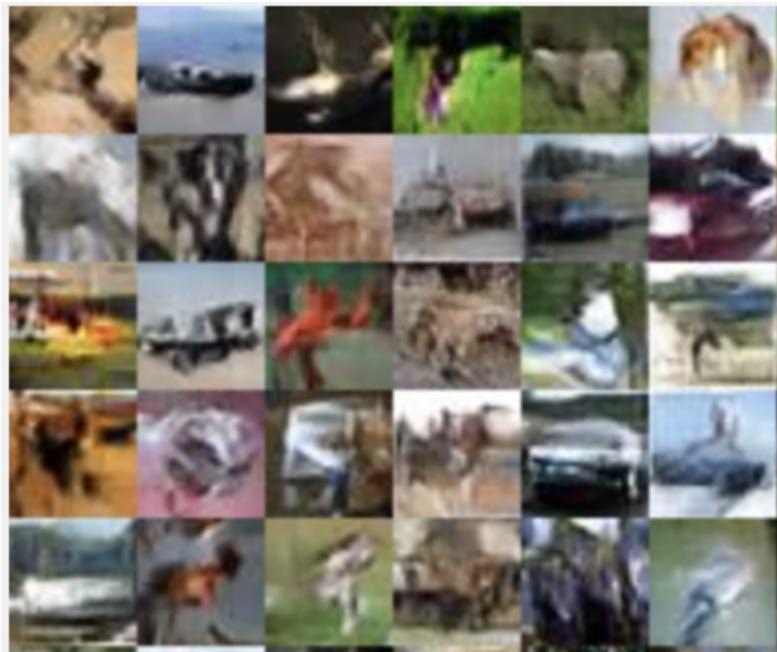


Performance Comparison with paper:

The authors in the paper noted that when plotting the loss of the wgan they found it better to record the -log of the loss, hence I have done the same.



This loss shown is the  $-\log_{\text{base}2}$  of the actual discriminator loss. The paper claims to use this trick in section 4.2.



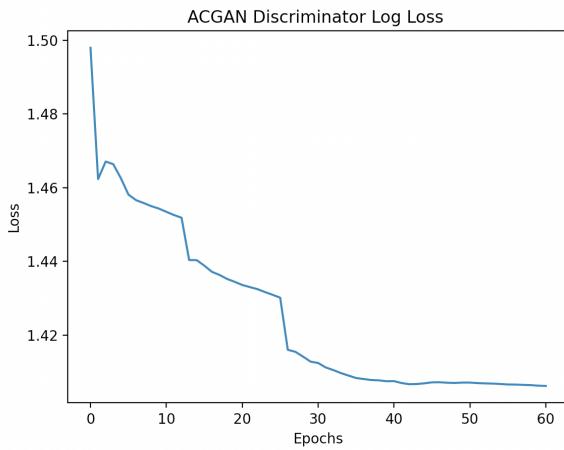
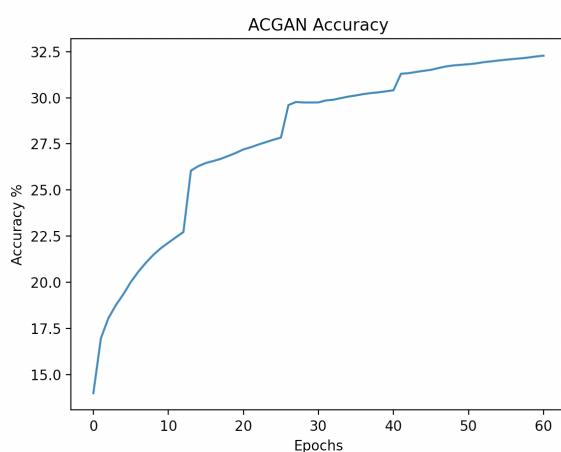
Here are some sample images of a trained wgan on the CIFAR dataset.  
(<https://modelzoo.co/model/wgan-gp>)

## Bonus - ACGAN:

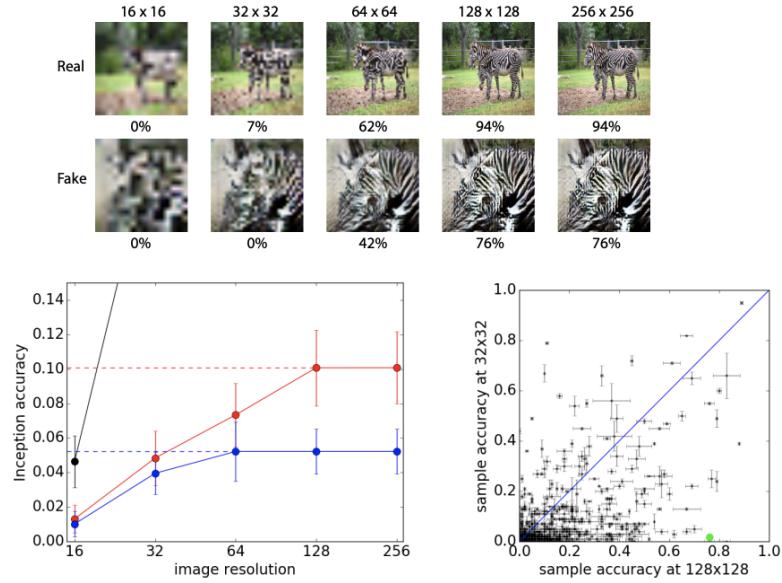
Best 10 Images:



Performance comparison:

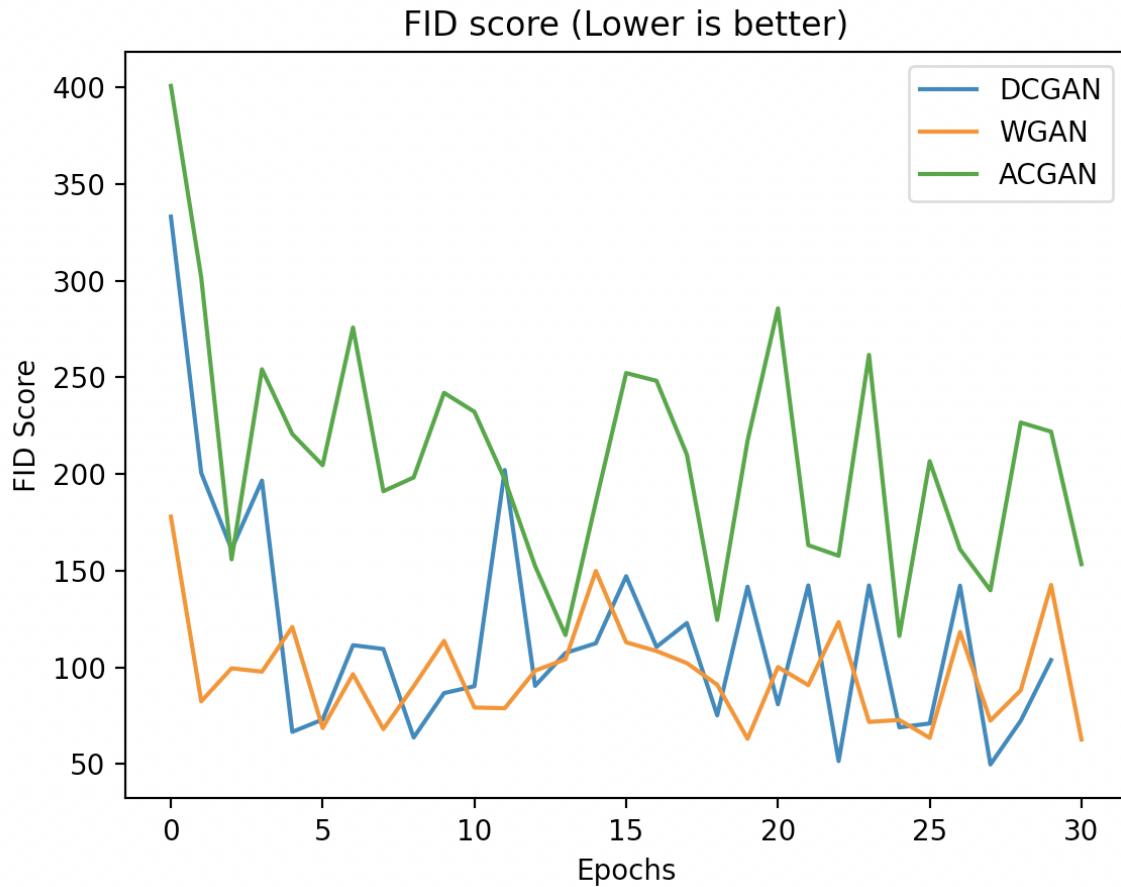


Above is the accuracy of the ACGAN model and the Loss of the discriminator over time. While the paper does not depict the Loss in a graph, it does evaluate based on the accuracy.



My model was trained with an image size of 64x64. From shown, a fake image can reach 42% accurate from that size. My model was slowly increasing in accuracy and could reach around that number if it was able to train for more time.

## Performance Comparison



For my performance comparison of the 3 models, I used the Fréchet inception distance (FID). This is a metric used to compare the quality of the images with the real images in GANs.