P2

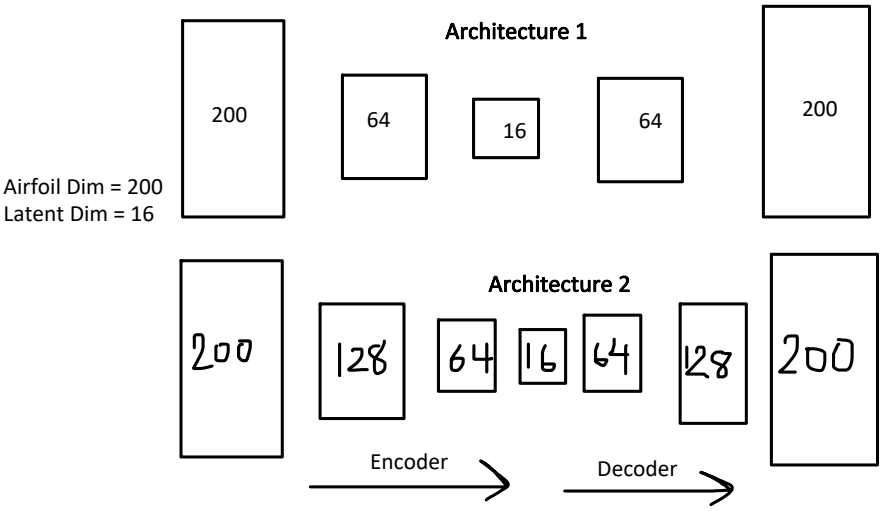
Saturday, April 3, 2021 3:22 PM

Model:

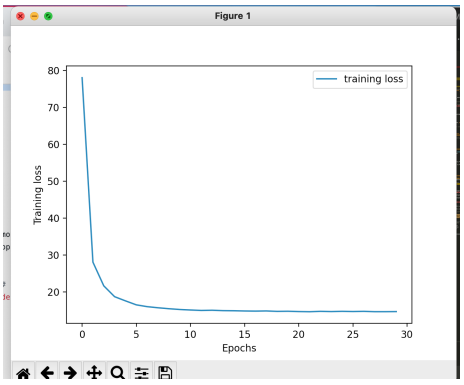
For the variational autoencoder architecture, I used these hyperparameters to yield optimal results: (Hidden layers: 2, Batch size: 16, Epochs: 30, Learning Rate = 0.0001)

Hidden Layers:
I tried two different approaches.
Architecture 1: One hidden layer, hidden dimension: 64.
Architecture 2: Two hidden layers, with dimensions 128 and 64.

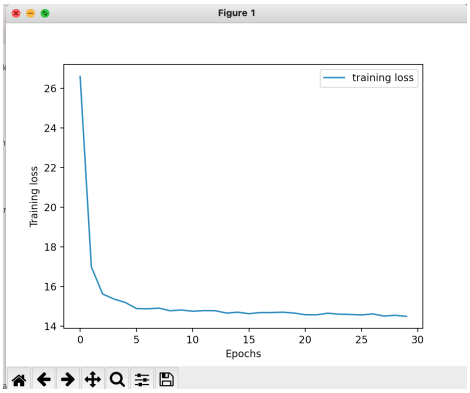
I noticed that as opposed to just using one hidden layer, having two hidden layers helps to decrease the initial training loss, but is more unstable during training. Additionally, the reconstructed airfoils for Architecture 2 is much weaker/grainier than approach 1.



Using Architecture 1
(more stable, but higher initial training loss)

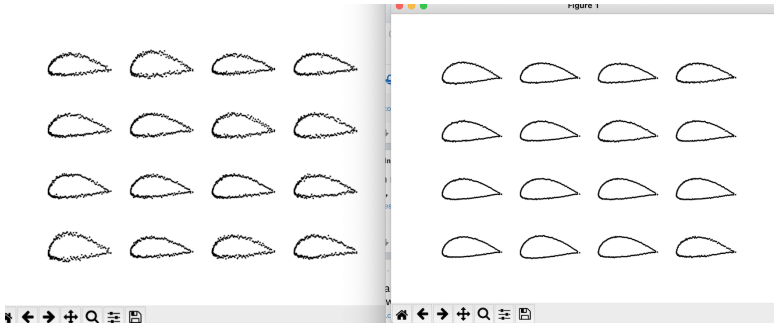


Using Architecture 2



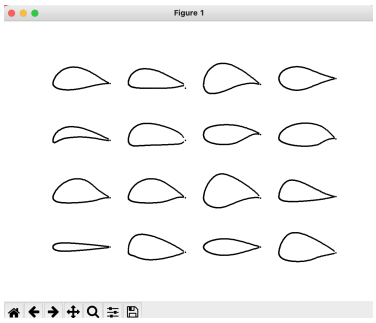
Learning Rate:
I was surprised to see that decreasing the learning rate to 0.00005 generates blurrier/grainy reconstructed images, and a very high initial training loss. Thus, I kept the learning rate at 0.0001.

Learning rate=0.00005 **Learning rate = 0.0001**

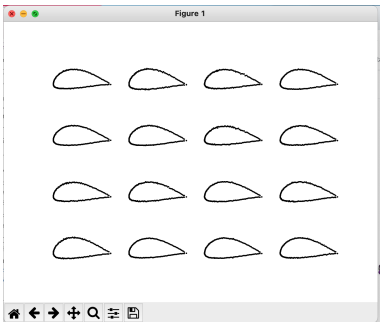


Epochs: I did not see a significant difference in using 30 epochs versus a higher number (e.g. 50).

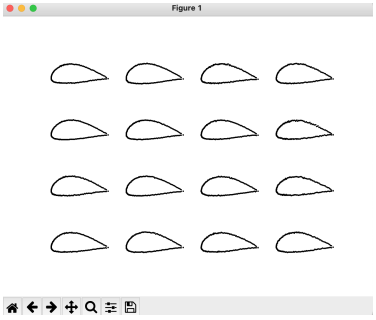
Final Graphs:



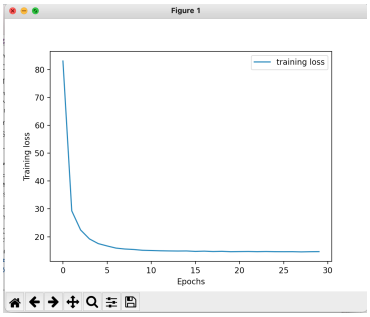
Real



Reconstructed



Generated



Training loss over epochs