

Part A

1.

Name	Size	# of filters
downcov1	3	32
downcov2	3	64
rfconv	3	64
upcov1	3	32
upcov2	3	3
finalcov	3	3

Totally 6 convolution layers

2. There are 25 epochs.
3. As we increase epochs, the training loss is decreased, and the output images are more and more clear and more perfect. on the contrary, if we decrease the number of epochs, the training loss is increased, and the image becomes blur and inaccuracy.
4. The RGB color space is different from human perception of color. In color space, sometimes if the squared distance of points is same, it might look different in human perception of color.
5. Here we can make a set of color so that the output of color needs to belong to one of the colors in that set.

Part B

2. The final result image for this one is kind of 'better' than the previous model, it is more comfort to our vision.

Part C

2. This model has less training loss, so it is more accurate. The skip connections do improve the validation loss and accuracy. We might lose important details through some convolution layers, however, in UNet model the last two layers can fix this. On the other hand, having more connections to the last two layers will let this model has more accuracy on doing backpropagation.

3. As we increase the size of the batch and keep the same epochs, the training and validation loss are both increased, and the output images are more blur. Oppositely, if we decrease the size of batch, we got less training and validation loss so the final images are clearer.

Part D

1. The resolution of input image is 4 times the resolution of the output image.

2. The output image of UNet is clearer and has more detail than output of CNN. As I explained above, UNet is more accurate than CNN.

Part E

1. For the first few layers, it has more images than the latter layers and each of them is clearer.
2. I found that last two activations of UNet is clearer than the activations of CNN and they have more details.
3. I found that it is more blur than the activations of colorization.

Part F

1. We can tune learning rate, number of convolution layer, size of max pooling, number of filters, kernel size.
2. It will not change.
3. We can evaluate that the details of the image itself like what type of the image it is.
4. We can split the image into small patches with size 32x32 and colorize each of them, and combine the result of each of them as final result.