

CIS680 Assignment 4: Deep Generative Models

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1 Variational Autoencoders

1.1 Autencoder: CUFS dataset

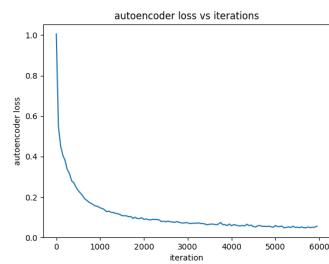


Figure 1: AE loss vs Iterations



Figure 2: Autoencoder reconstruction result final iteration



(a) Random: Iter 1000



(c) Random: Iter 2000



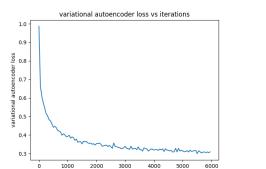
(b) Reconstruction: Iter 1000



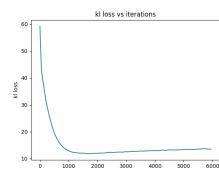
(d) Reconstruction: Iter 2000

Figure 3: Autoencoder random vector and reconstruction results at 1000 and 2000 iterations

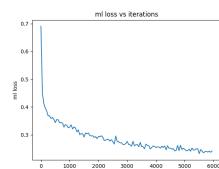
1.2 VAE: CUFS Dataset



(a) VAE loss



(b) KL loss



(c) ML loss

Figure 4: Losses in VAE

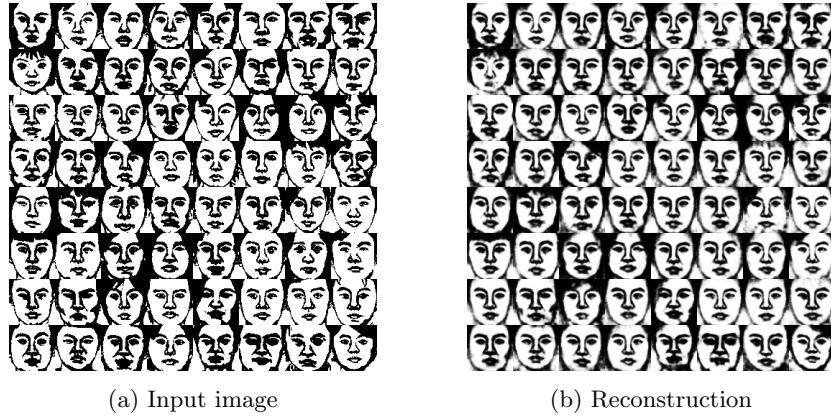


Figure 5: Variational Autoencoder reconstruction result final iteration

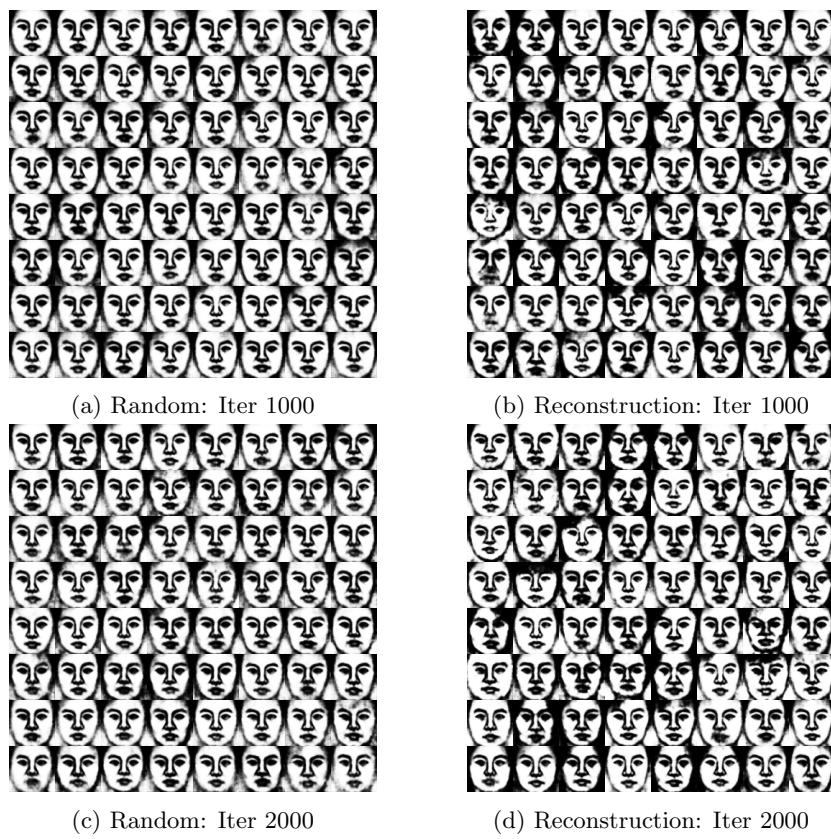


Figure 6: Variational Autoencoder random vector and reconstruction results at 1000 and 2000 iterations

1.3 AE and VAE: CelebA Dataset

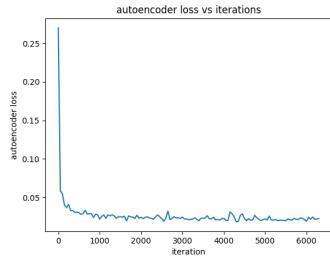


Figure 7: AE loss vs Iterations



(a) Input image

(b) Reconstruction

Figure 8: Autoencoder reconstruction result final iteration

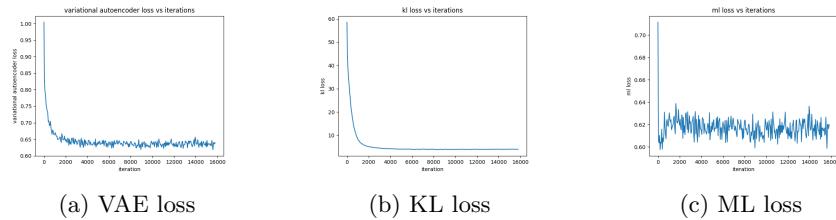


Figure 9: Losses in VAE

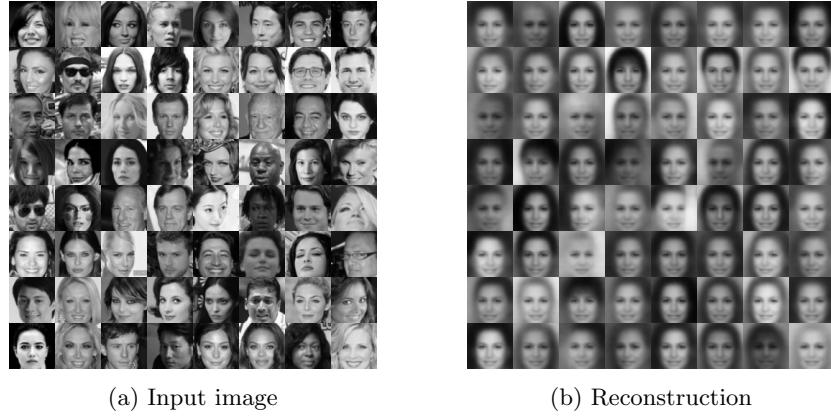


Figure 10: Variational Autoencoder reconstruction result final iteration

2 Generative Adversarial Networks

2.1 DCGAN:CUFS

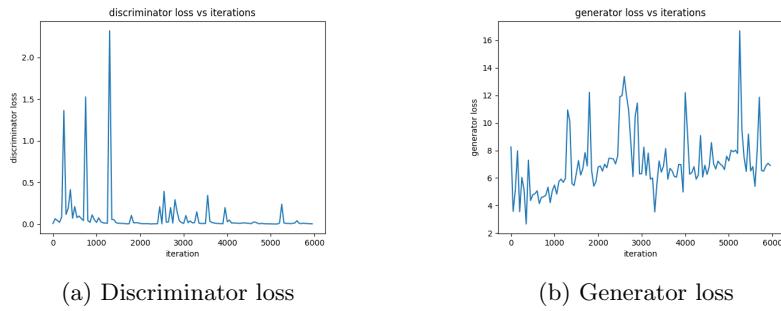


Figure 11: Losses in DCGAN

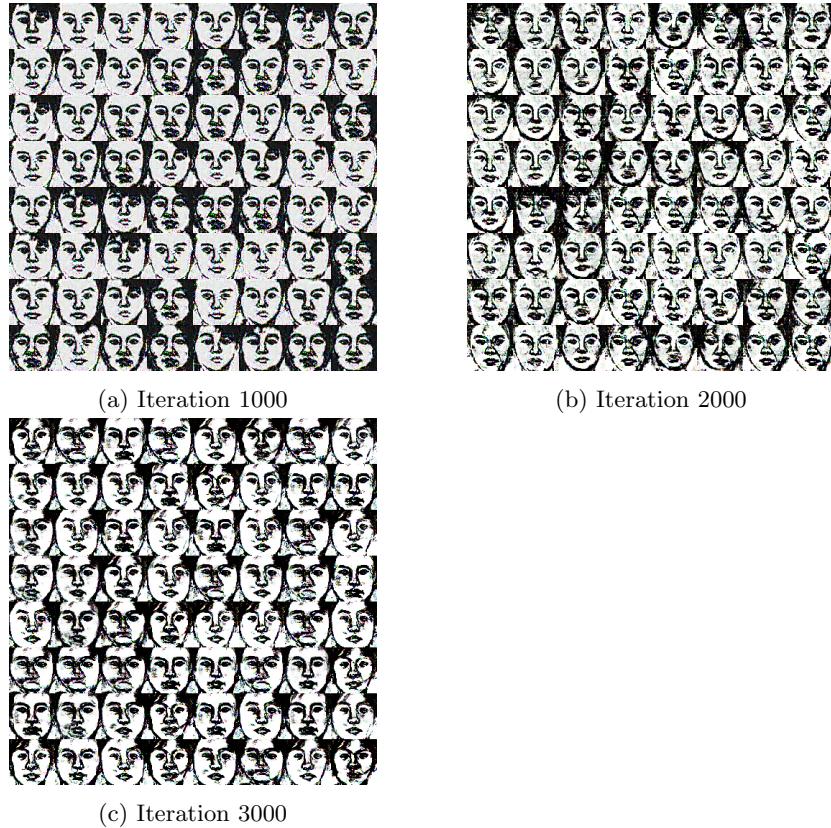


Figure 12: Results after passing through generator at different iterations for DCGAN

For the CUFS dataset we see that the generated images lack variety. This can be attributed to the less number of images in the dataset.

2.2 DCGAN and LSGAN : CelebA

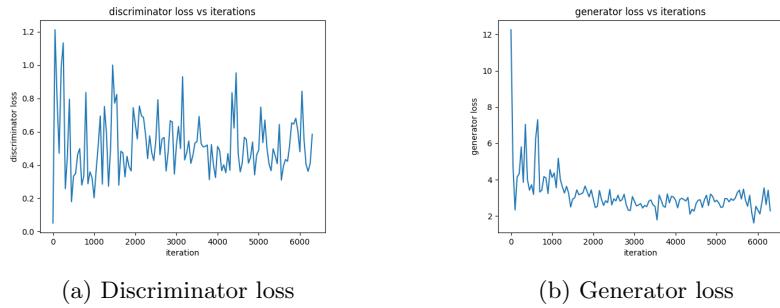
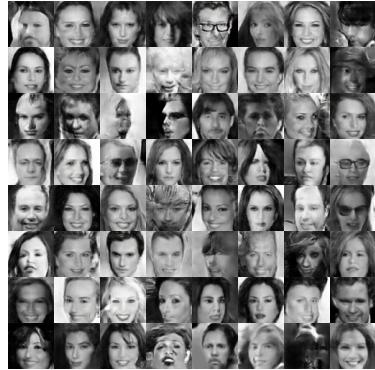


Figure 13: Losses in DCGAN





(e) Iteration 5000



(f) Iteration 6000



(g) Iteration 7000

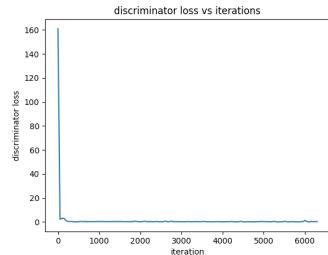


(h) Iteration 8000

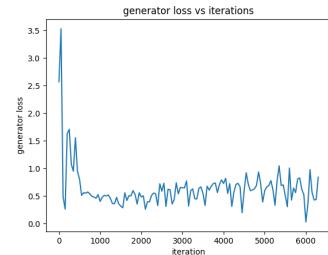


(i) Iteration 9000

Figure 14: Results after passing through generator at different iterations for DCGAN

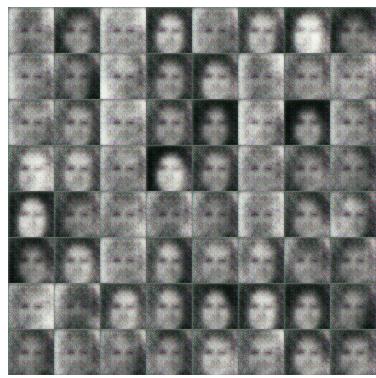


(a) Discriminator loss



(b) Generator loss

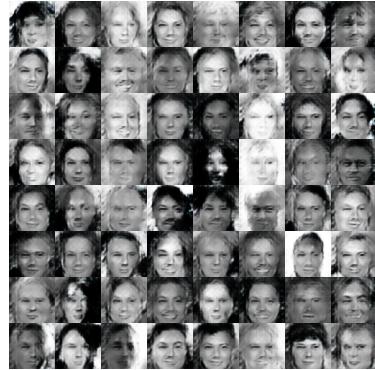
Figure 15: Losses in LSGAN



(a) Iteration 1000



(b) Iteration 2000



(c) Iteration 3000



(d) Iteration 4000



(e) Iteration 5000



(f) Iteration 6000



(g) Iteration 7000



(h) Iteration 8000



(i) Iteration 9000

10

Figure 16: Results after passing through generator at different iterations for LSGAN

As can be seen in the CelebA dataset, the images generated are of extremely large variety. This can be attributed to the large number of images in the dataset.

2.3 LSGAN:CUFS

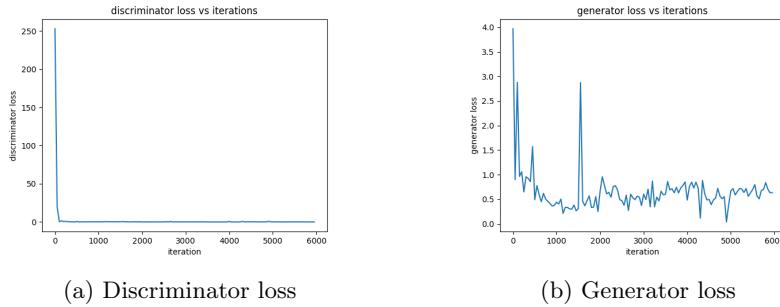
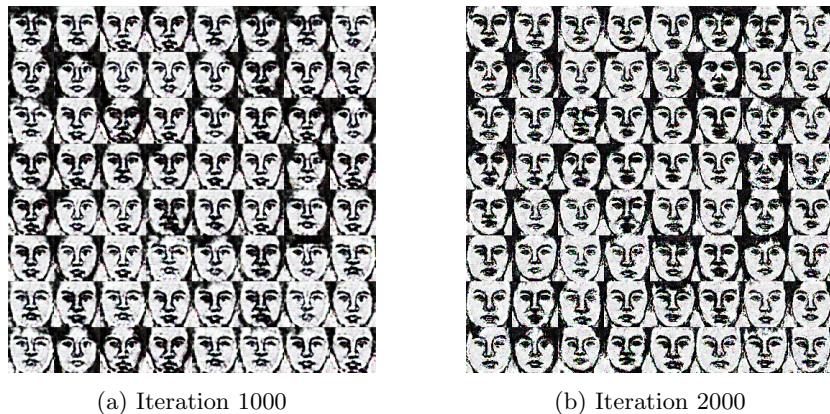


Figure 17: Losses in LSGAN





(c) Iteration 3000

Figure 18: Results after passing through generator at different iterations for LSGAN

3 Image-to-Image Translation

All the cases have below have been tested for 2 images from the dataset and 4 of our images (2 each from Rachit and Qiaoyu) to complete the requirements of part 2 of this section

3.1 Colour to Sketch (No skip connection)

3.1.1 Losses

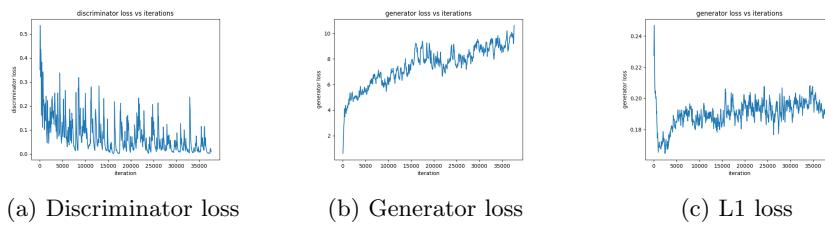


Figure 19: Losses

3.1.2 Test images from dataset

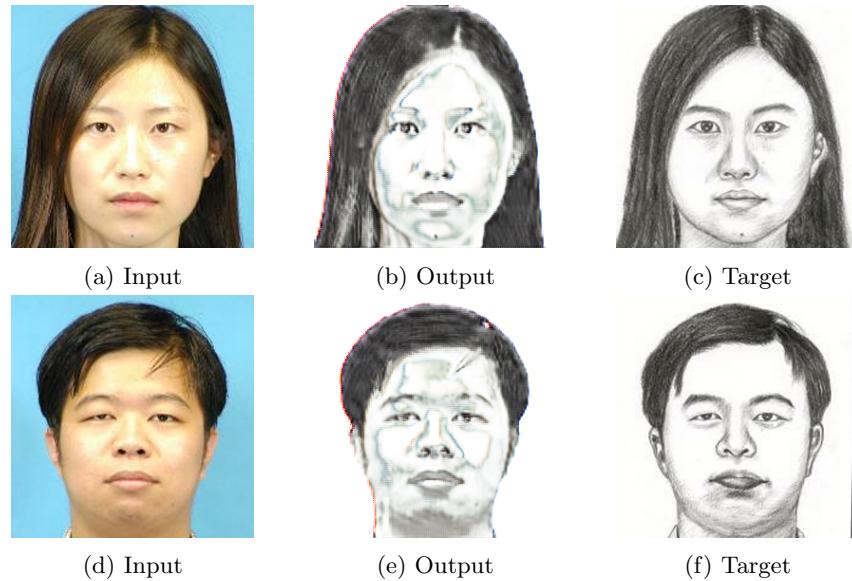
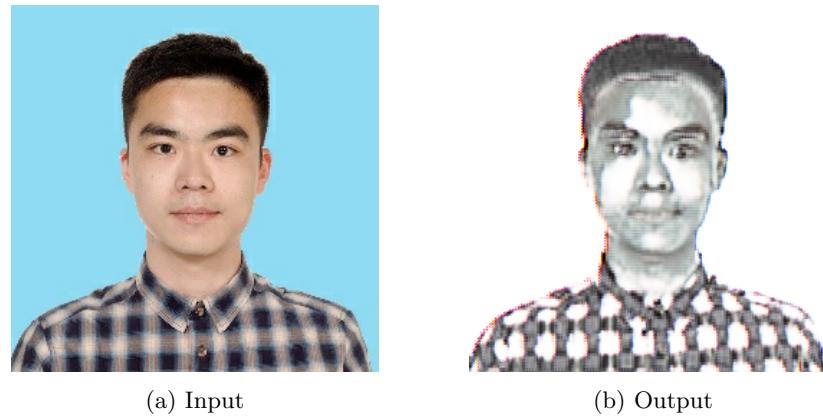


Figure 20: Colour to sketch (no skip connections) on test images from dataset

3.1.3 Our own images



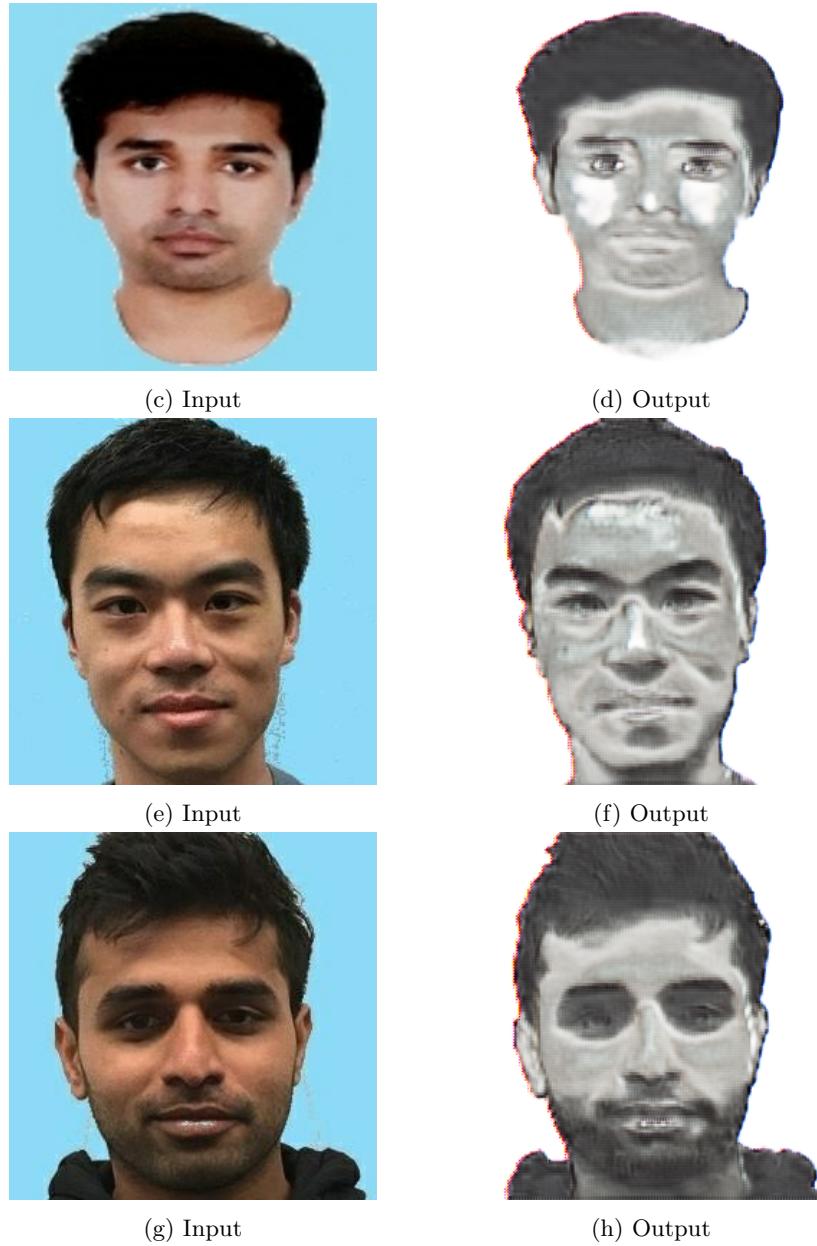


Figure 21: Colour to sketch (no skip connections) on our own images

3.2 Sketch to colour (No skip connection)

3.2.1 Losses

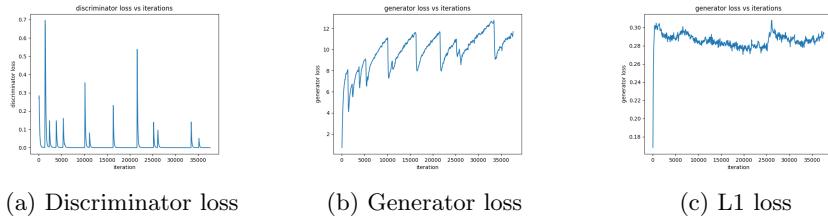


Figure 22: Losses

3.2.2 Test images from dataset

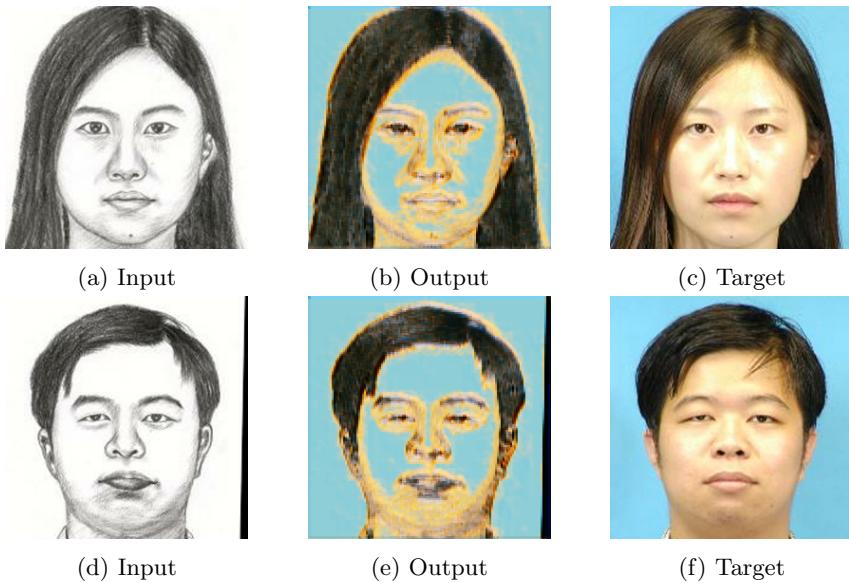


Figure 23: Sketch to Colour (no skip connections) on test images from dataset

3.3 Colour to Sketch (With skip connection)

3.3.1 Losses

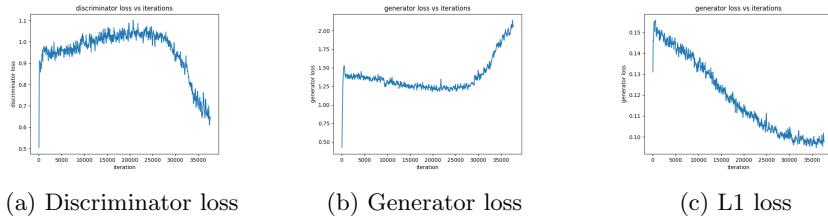


Figure 24: Losses

3.3.2 Test images from dataset

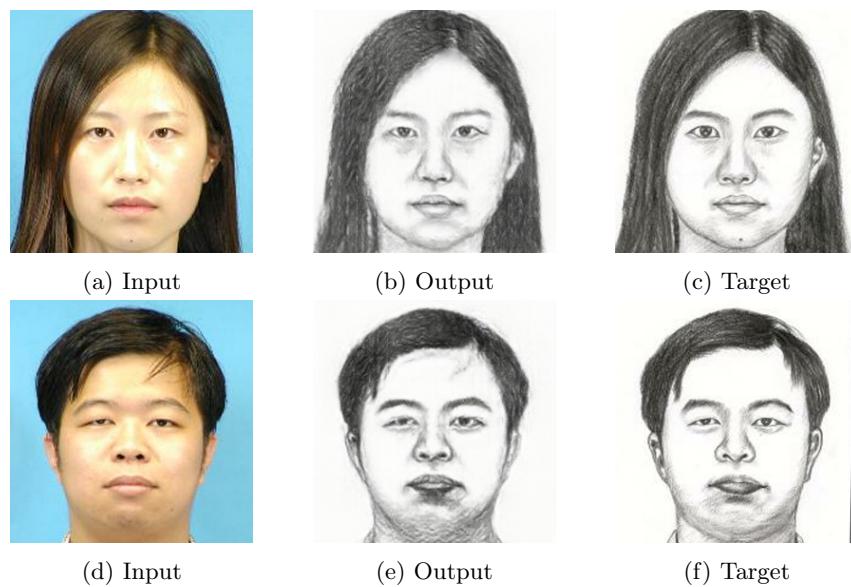


Figure 25: Colour to sketch (with skip connections) on test images from dataset

3.3.3 Our own images



(a) Input



(b) Output



(c) Input



(d) Output



(e) Input



(f) Output



(g) Input



(h) Output

Figure 26: Colour to sketch (with skip connections) on our own images