**Name: CHENG Yunfeng**

**LumiNUS Account: A0215320Y**

**Email: e0535410@u.nus.edu**

**NRIC / Passport / NUS Matriculation No.: E97388794**

(Choose and provide one applicable)

**1. Your personal contribution to the project.**

In this project, I came up with some ideas that we can use GAN to do this project, which is a trending method but not covered too much during the class.

I am in charge of the style swapping part. So, I use CycleGAN to finish this part.

**2. What you have learnt from the project.**

I think it should be generative methods. I come to realize that there are some methods that can generate new things rather than just recognize existing things, which is very interesting. I know that there are VAE and GAN can do these things so far and have read the classic papers in these two fields. But just because our project more focused on GAN, so I pay more attention to the GAN models. Now I think I’m familiar with different GAN’s architecture.

For basic GAN. The input is noise sampled from one distribution like gaussian distribution and the output can be an image (The noise here is that it wants to generate different images). The key idea of GAN is to learn the distribution of the given dataset. So, if the training dataset is mnist, then GAN should learn the distribution of those images with digital data. It can know which region represents for images with digital data if we consider it in a 2D level.

The architecture of GAN consists of two parts: generator and discriminator. Let X denotes features and Y denotes classes. In this case, for discriminator it aims to find out P(Y|X), while for generator, it aims to find out P(X|Y).

Based on basic GAN, there are many improved GANs. Like LSGAN, WGAN and so on. But there are two papers impressed me a lot. The first one is ConditionalGAN, in this paper, it shows that we can also control some elements of the output. We can see that many later works are based on this paper. The second one is CycleGAN, at first I have heard Image Style Transfer, but as I was more familiar with supervised methods, so I was always wondering if there was such a big dataset which has many paired images. After read CycleGAN paper, I came to realize that the idea was perfect. With CycleGAN, we can do many things, just like what have been shown in their website. I have also read some other papers, just think that they only make little changes in the architecture of generator or discriminator, or there are some tricks during the training process to handle the model collapse problem. They are also very useful.

Apart from that, I also get more familiar with PyTorch, knowing how to design neural networks in PyTorch.

**3. How you can apply this in future work-related projects.**

For me, the starting point of this project is to learn trending methods and to see what we can do using these methods. I am glad that finally we did it. Now I am much more familiar with GAN than before. I think we can do something like what have been shown in the class before. To generate something easily, like drawing a picture, we only need to specify the content of the architecture, then GAN can help us draw the details of the picture.

In addition, I think it is also very good to get familiar with PyTorch and Tensorflow. Because we definitely need to use these frames in the future work.