

**NANYANG
TECHNOLOGICAL
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SINGAPORE

**REPORT FOR AI6126:
ADVANCED COMPUTER VISION**

Project 2
Blind Face Super-Resolution

ZENG ZHENG

G211941J
zzeng006@e.ntu.edu.sg

School of Computer Science and Engineering
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1 Project Description

The goal of this mini-challenge is to generate high-quality (HQ) face images from the corrupted low-quality (LQ) ones.

Dataset The data for this task comes from the FFHQ¹. For this challenge, we provide a mini-dataset, which consists of 4000 HQ images for training and 400 LQ-HQ image pairs for validation. Note that we do not provide the LQ images in the training set. During the training, you need to generate the corresponding LQ images on-the-fly by corrupting HQ images using the random degradation pipeline. This pipeline contains 4 types of degradations: Gaussian blur, Downsampling, Noise, and Compression. We will give the code of each degradation function as well as an example of the degradation config for your reference.

Evaluation During validation and testing, algorithms will generate an HQ image for each LQ face image. The quality of the output will be evaluated based on the **PSNR** metric between the output and HQ images. Higher values indicate better results.

2 Experiment Setup

Model SRResNet is used for training.

Loss Function We use L1 loss (Mean Absolute Error, MAE) as the loss function, the goal is the least absolute deviations (LAD) to minimise the sum of the absolute differences between the ground truth and the predicted/generated image. MAE reduces the average error, whereas MSE does not. Instead, MSE is very prone to being affected by outliers. For Image Enhancement, MAE will likely result in an image which appears to be a higher quality from a human viewer’s perspective.

Parameters The number of parameters of my model is **1517571**.

Environment Specifications The specifications of my training machine are listed in Table 1. I used the Google Colab IDE to conduct my experiments, using one Tesla T4 GPU to train my models. In addition, the CUDA version is 11.2 and Pytorch version is 1.6.0.

Table 1: Specifications of my training machine

Specifications	Parameters
IDE	Google Colab
number of GPUs	1
GPU model	Tesla P100-PCIE-16GB
CUDA Version	11.2
Pytorch version	1.6.0

¹FFHQ <https://github.com/NVlabs/ffhq-dataset>

3 Training Curves

After 400,000 iterations, the loss curve during training is as Figure 1.

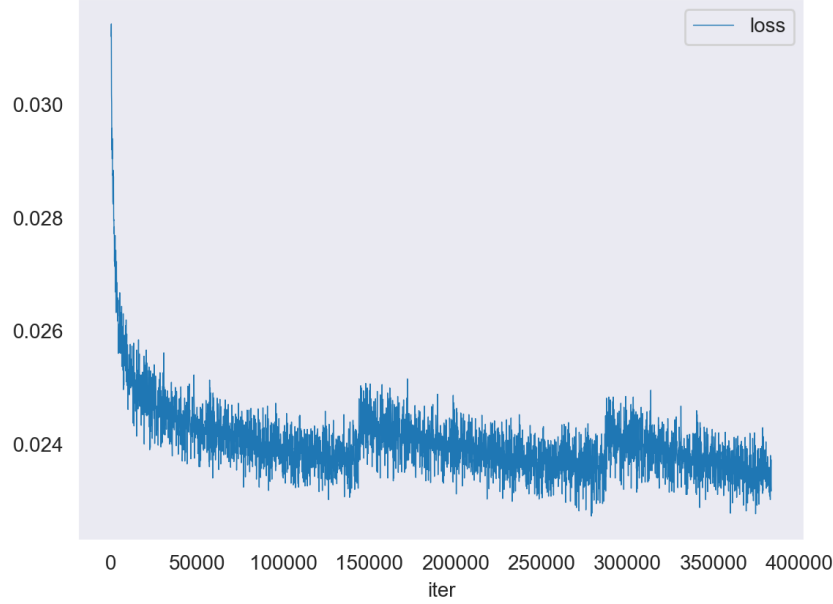


Figure 1: The loss curve for test set

4 PSNR Curves

We performed validation every 2,500 iterations, and after 400,000 iterations, the PSNR and SSIM curves are plotted as Figure 2 and Figure 3, respectively. It seems that the best PSNR and SSIM are reached around 40,000 iterations (around 28.89411).

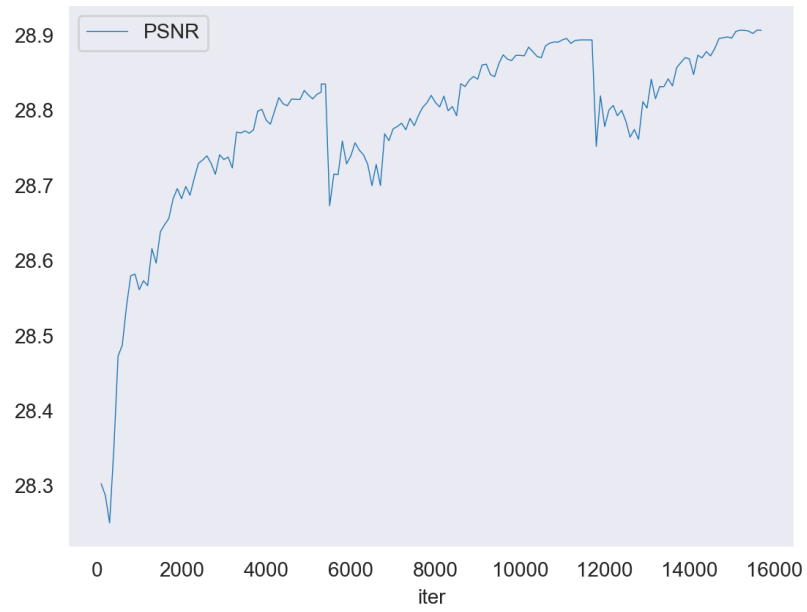


Figure 2: The PSNR curve for val set

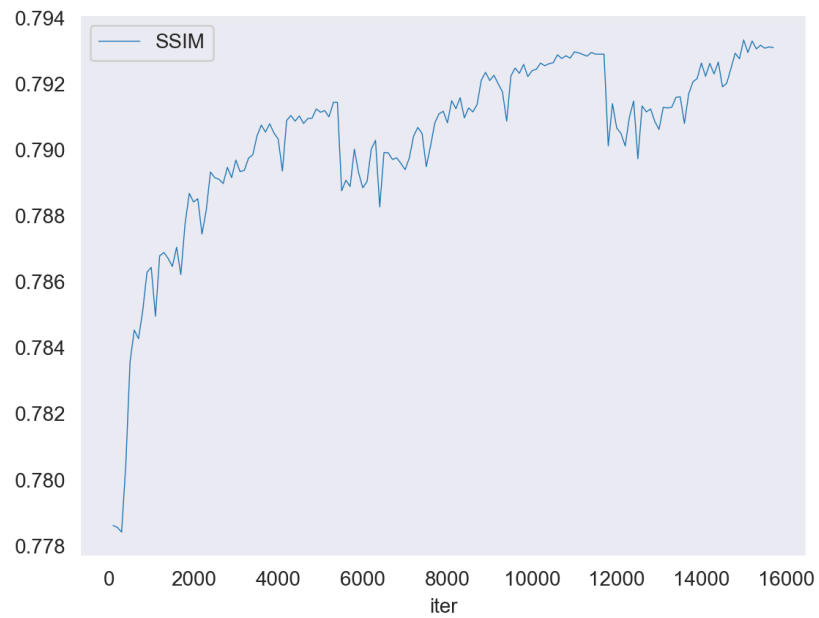


Figure 3: The SSIM curve for val set