VIDAR Visual Information Discovery And Recovery

Weekly Report

2018-2019   2018/09/03/-2018/09/09/   Jie Huang

I. Have Done

- 50%: Move the new project to the GPU cluster,train it by using the previous dataset.

- 50%: Done survey about hdrnet, DPED and so on (especially focus on the hdrnet),search for the improvement.

II. Future Plan

- 70%: Continue survey for the improvement,read some related paper.

- 30%: Run hdrnet again, compare it with the my method.

III. Problem

IV. Report

. The brief introduction of the new method and experiment

The structure of the network based on unet,which can be showed as follows:

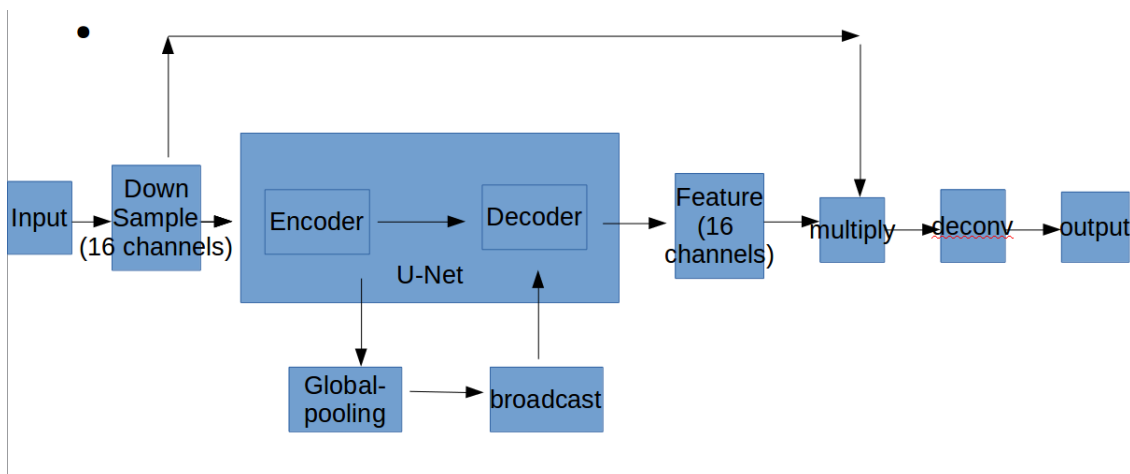Figure 1: The structure of the net-v1

The key ideas of the net-v1 can be showed as follows:

1.Extract the global feature by using global pooling instead of using fc,thus accelerate the speed. Without using global feature there will appear artifacts in the result.

2.The main part of the network learns the transform feature instead of learning the output directly, which will multiply the input at the end of the network. In fact,such an affine model have better performance in image enhancement task.

3.The last layer in the network use the tanh as the activation function due to it more focus on enhance the pixel that is not too light or too dark,which is suitable for our task.

4.The combination of the loss function is L1+MSSIM+MultiVGG+GAN+TV loss,the first two part can help increase ssim and psnr and MultiVGG loss can help increase the psnr significantly.

I improved the net-v1 to get net-v2 and the structure of net-v2 can be showed as follows:
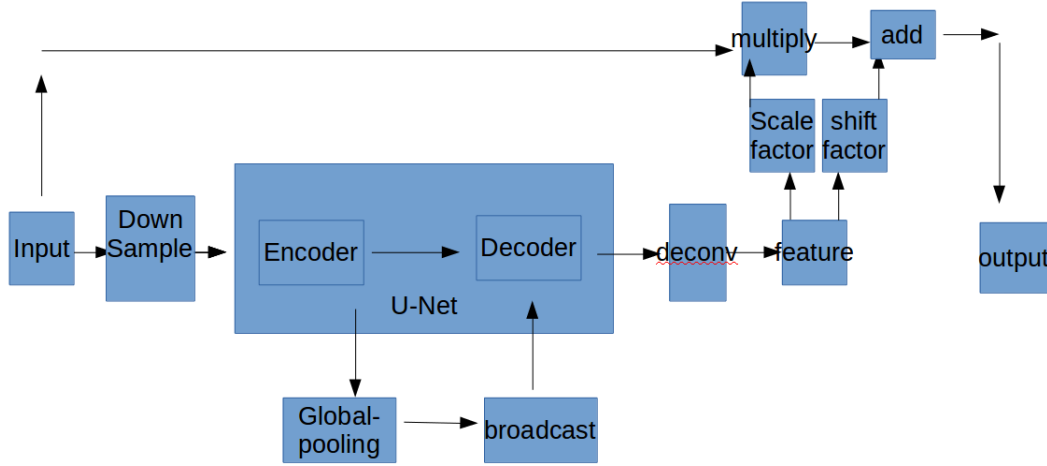

Figure 2: The structure of the net-v2

The main change of the structure is that the net-v2 learns two part:The scale factor directly operate on the original image instead of operate on the downsampled features,by using the multiply operation,it can scale the pixel of the input. The shift factor can learn the pixel difference between the input and target,add it with the scaled input can get better performance.

I moved the code to the GPU cluster and trained the two net by using the dataset that I used in the last term. Then I test the psnr,ssim and speed of the two net, and compared them with the baseline. Compared to baseline,my net is better in terms of these indexes,which can be showed as follows:

Table 1: The comparision between net-v1,net-v2 ,my net in the last term,and DPED

	PSNR	SSIM	Speed(ms/4 images)
DPED	22.17	0.9317	13780
my net	22.80	0.9345	10007
net-v1	22.94	0.9394	**464**
net-v2	**23.2**	**0.9408**	485

Though the net-v1 and net-v2 have higher objective indexes, there exsist few subjective problems. Due to time limit, the picture will be showed in the future.

. The survey of hdrnet,DPED and so on

Recently I reviewed the hdrnet and this time I eventually make out the principle of hdrnet,there are many methods that I can refer in the future work. I sort out hdrnet,DPED and my net-v2, conclude these methods as follows:

I.The method based on **affine model:**

1.1 Global affine model: The net-v1,v2 in this report, and a paper called "Aesthetic-Driven Image Enhancement by Adversarial Learning" also used this method.

Advantage:This method is adaptive,and the speed is fast,there will be little artifacts in the output images.

Disadvantages:The capability of the net is limited and the it can't realize local transform. Besides,the training procedure is unstable.

1.2 Local affine model: hdrnet.

Advantages: It is very fast and the artifacts is little.

Disadvantages:It can't generate more details.

II. The method based on **directly generate:**DPED

Advantages: It can generate more details,such as the producing more sharpen details.

Disadvantages: It is too slow, and it can produce artifacts easily. Besides,the network is too sensitive to the ratio of loss function, which make the training procedure is hard.

By comparing these methods, I want to search for a better method that synthesize their advantages and reduce the disadvantages as more as possible.

V. Mile-Stone

- September:
    - Continue to improve the net based on the tried methods.
    - Search for more idea from recent papers.