MHF-net with CBAM

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1 Introduction

In the phase 2 I have attempted to add CBAM layers in the model to check whether adding attention modules help improve the performance of the original model.

2 CBAM

CBAM consists of two parts namely, channel-wise attention and spatial attention which focuses on inter-channel relationships and the spatial features respectively.

I implemented CBAM in three different ways, as following:

2.1 CBAM1

CBAM1 includes only two CBAM layers introduced in the model, that too in the first stage. The objective was to check whether adding attention in the beginning layers helps improving the model.

The performance slightly improved compared to the original method. The below is one example of the CBAM1 output.

Figure 1: Left is the output while right is the ground truth image.

2.2 CBAM2

CBAM2 includes more CBAM layers than the CBAM1 especially each in 2nd-19th stage.

The objective was to check whether adding attention in the in between feature layers helps improving the model. However the result was not quite positive and the overall performance of the model declined. The below is one example of the CBAM2 output.

Figure 2: Left is the output while right is the ground truth image.

2.3 CBAM3

CBAM3 includes same number of attention layers as CBAM2, however the spatial attention layer was removed to check whether focusing just on the inter-channel relationships helps the model.

The result was better than CBAM2, but due to large number of channel attention the overall performance was low compared to CBAM1. The below is one example of the CBAM2 output.
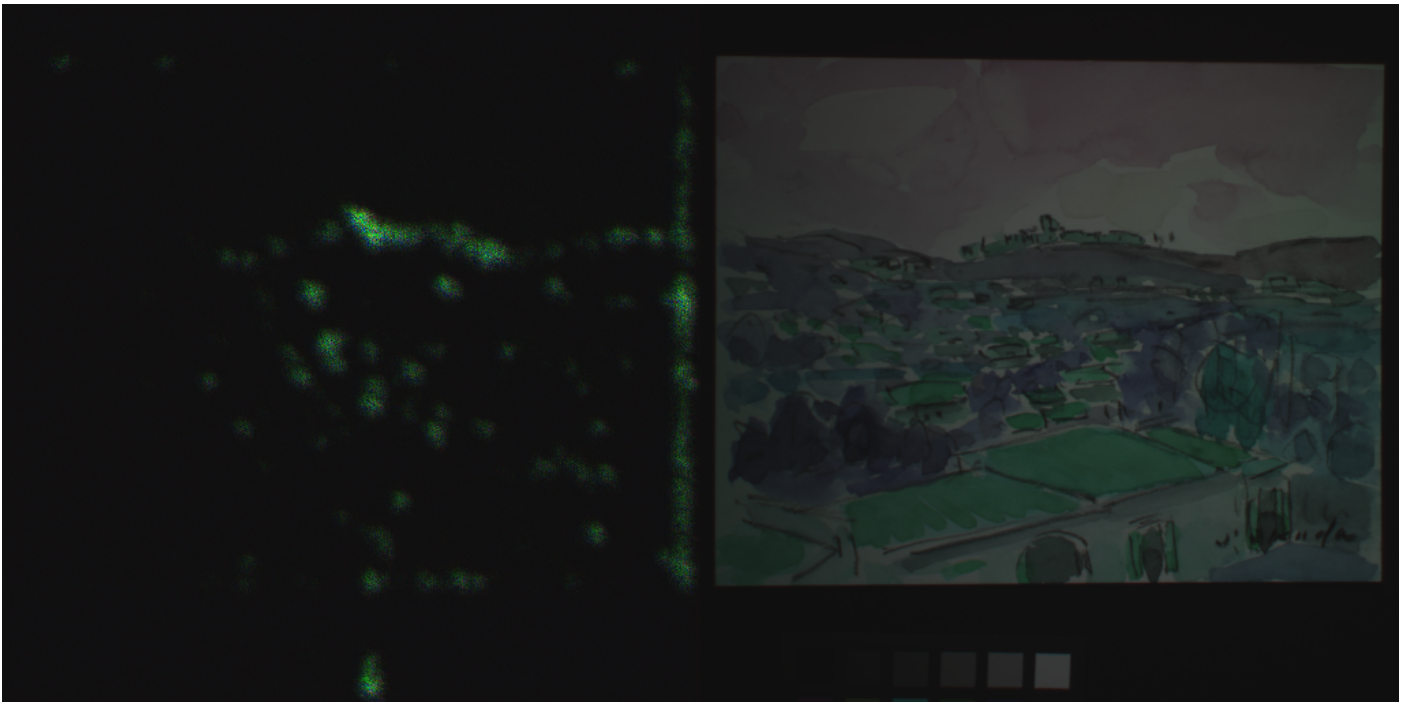

Figure 3: Left is the output while right is the ground truth image.

3 Original method

Below is an example of output by original method in the paper, for reference.

Below is table depicting the Loss values and other metrics for all the methods to compare their performances.
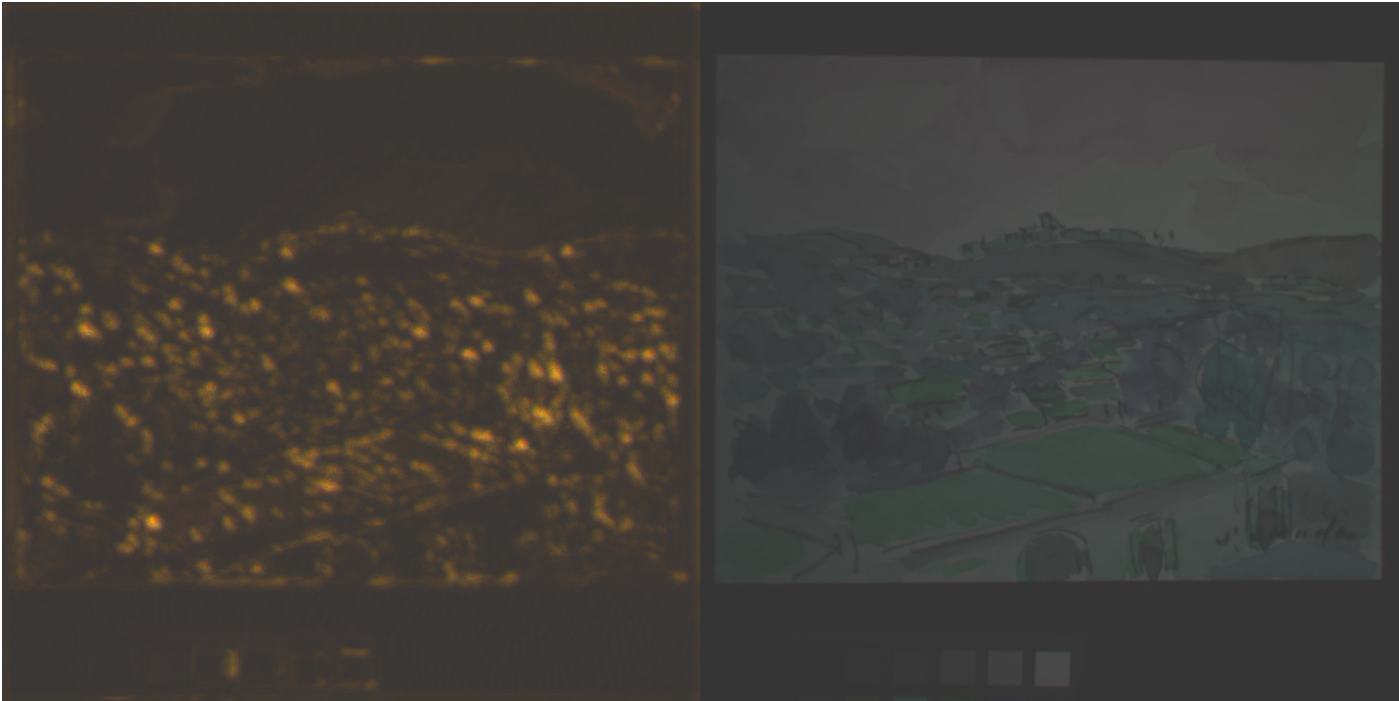
Figure 4: Left is the output while right is the ground truth image.

Model	Training loss value	Valid loss value	PSNR ranges	SSIM ranges
Original-paper	0.0140	0.0208	10-14	0.94-0.98
CBAM1	0.0137	0.0158	11-16	0.98-0.99
CBAM2	0.0178	0.0486	9-15	0.98-0.99
CBAM3	0.0170	0.0339	11-14	0.96-0.97

Figure 5: All the models were trained with Epochs = 15 and Batch iterations = 100

4   Conclusion

Adding attention modules can help in improving the performance of the network, as it helps in identifying minute spatial features, however addition of layers has to be done carefully since large number of attention layers might end up decreasing the performance and lead to computation overhead.