IMAGE COLORIZATION

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Contents

Image Colorization using CNNs and Inception-Resnet-v2:

- “Cats and Dogs dataset to train the model” dataset used.
- Batch size = 20.
- Number of Epochs = 20

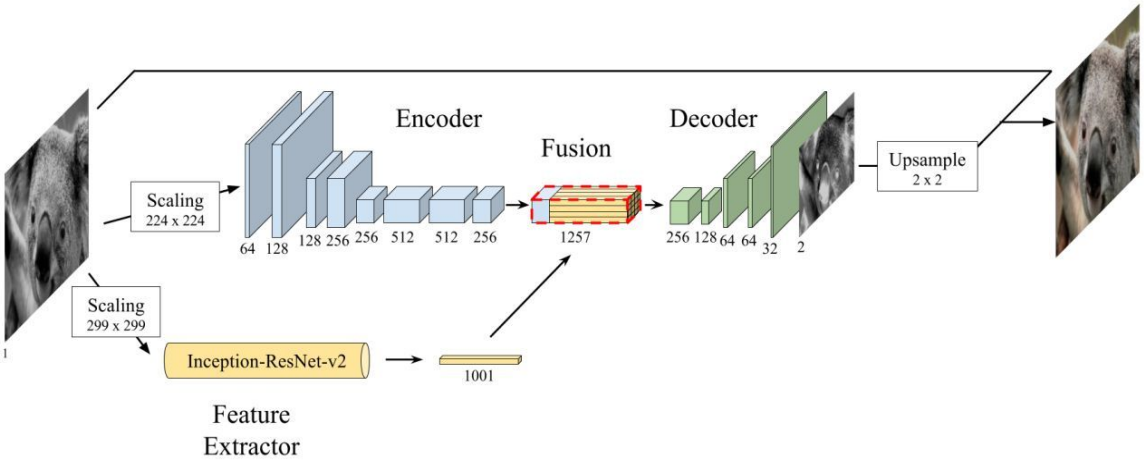
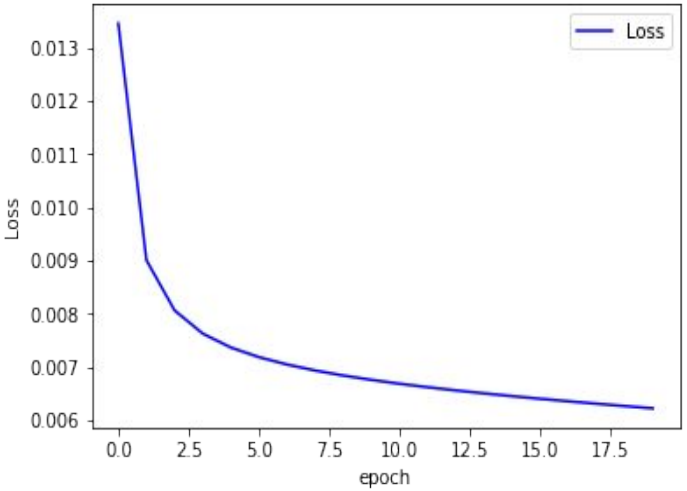


Image Colorization using CNNs and Inception-Resnet-v2:



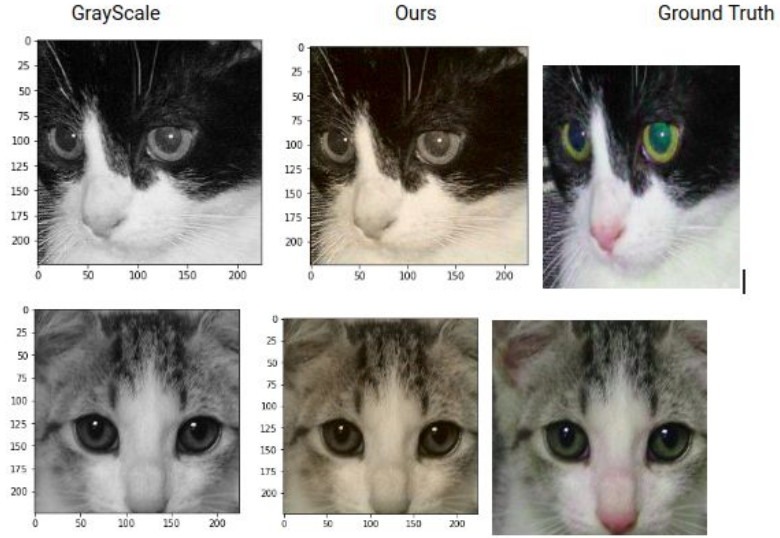


Image Colorization using CNNs and Inception-Resnet-v2:

Limitations:

- The implementation is able to color out high-level components of the image such as objects like water bodies, trees or sky. But for the small level components, the performance is not that satisfactory.
- As we only used a reduced subset of ImageNet, only a small portion of the spectrum of possible subjects is represented, therefore, the performance on unseen images highly depends on their specific contents.
- The paper for finding accuracy depended on the survey conducted for discriminating between generated output and what should be the ideal ground truth image.

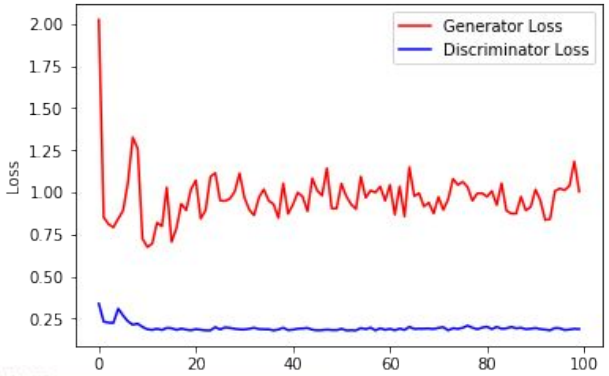
Image Colorization using CNNs and Inception-Resnet-v2:

Suggested Improvements:

- Training the model on a larger dataset should potentially help the model to learn variety while coloring the provided image.
- Output can be improved by following an approach similar to variational autoencoders, allowing for image generation by sampling from a probability distribution as done in the paper (https://arxiv.org/pdf/1603.08511.pdf).
- Discriminator can be applied for discriminating between generated output and ground truth image.
- For factors in the context provided with the image we can use the FILM model as done in the paper (https://arxiv.org/pdf/1804.06026v1.pdf) which uses captions to generate the output.

Image Colorization using Generative Adversarial Network:

- “CIFAR10” dataset
- we use only 5000 training images and 1000 for testing.
- Number of Epochs = 100
- Batch size = 50



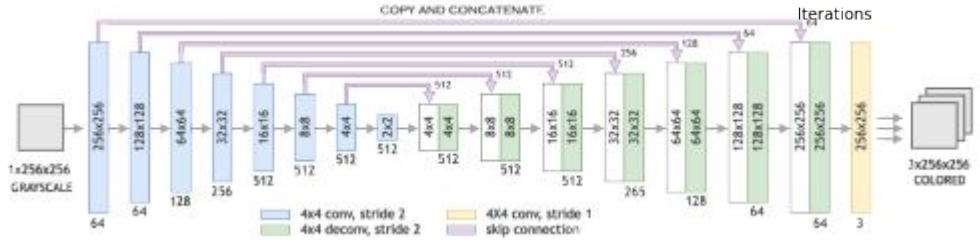


Image Colorization using Generative Adversarial Network:

Gray Scales

Ours

Ground Truth

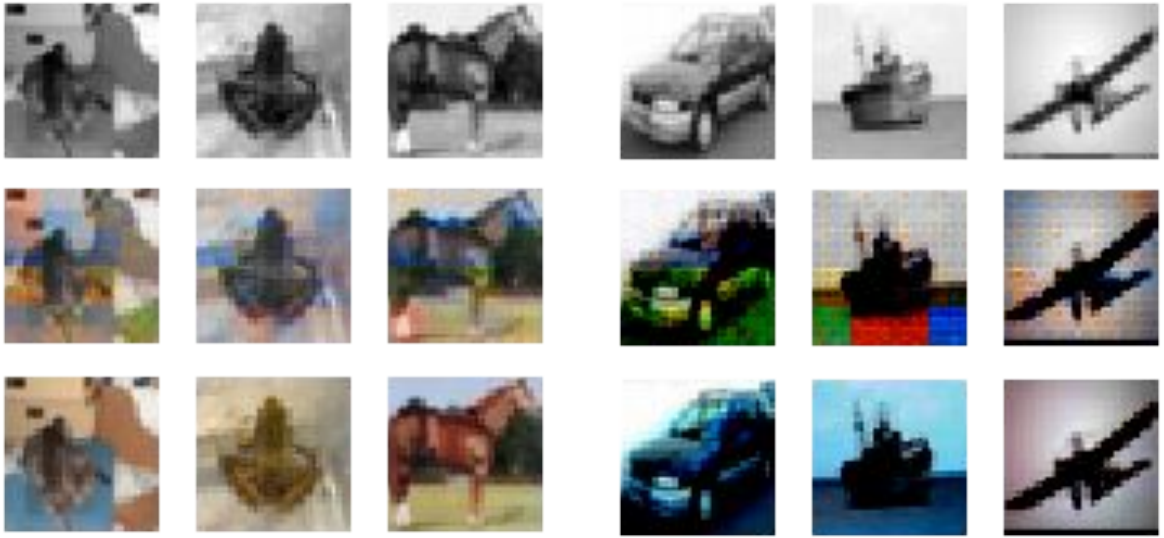


Image Colorization using Generative Adversarial Network:

Limitations:

- GAN colorizes images using the colors that occur more frequently in the dataset. Example - Many car images were colored red by the GAN since most of the images had red cars.
- Areas of images with a lot of features were colored green since the dataset contained images of green fields which has a lot of fluctuations in pixel intensity values.
- Color leaks were seen in the colorized images. Better object detection is required to overcome this issue.

Image Colorization using Generative Adversarial Network:

Suggested Improvements:

- We can add ResNet block in the generator which helps us to identify the high-level features of the image. This will help in better isolation of objects which finally leads to more accurate colorization.
- To counter color leaking we can use the EdgeNet model on Generator's output and its output will reflect edges more clearly as done in this paper (https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8451230&tag=1)
- Output can be improved by following an approach similar to variational autoencoders, allowing for image generation by sampling from a probability distribution as done in the paper (https://arxiv.org/pdf/1603.08511.pdf).

Thank You !!