Image Colorization using CNNs and Generative Adversarial Networks

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April 12, 2019

1 Project Description

In this project, we would like to try implementing neural network algorithms for image colorization problem. Image colorization is a task which we are given gray-scale pictures and colorize it based on the learned features in our neural network models. This problem will be addressed using CNNs and Generative Adversarial Networks. The inspiration of our approaches comes from the papers by Nazeri et al.[2], Zhang et al.[3] and Baldassarre et al.[1].

The implementation will be done in python with Keras and Tensorflow library. We will use Imagenet dataset for traninig and testing our model. We will use a pretrained model to extract high-level features for our CNN-based autoencoder model to enhance the coloring process. Our main focus for now is to implement the image colorization using CNN and pre-trained model. After that we plan to implement the Generative Adversarial Networks for the image colorization.

2 Methods

The outline of our project would be:

1. Use autoencoder model with pretrained model feautres and pixel-pixel loss

2. Implement GAN with adversarial training loss on downsampled gray-scale images

3. If time permits we experiment and extend the GAN training on original size gray-scale image

3 Learning Outcome

Basically, by doing this proposed project, each everyone of us would like to acquire skills/knowledge in the following topics:

1. Convolutional Neural Network

2. Autoencoder

3. Efficiently using Pre-Trained models

4. Generative Adversarial Network

References

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[3] Richard Zhang, Phillip Isola, and Alexei A Efros. "Colorful image colorization". In: *European conference on computer vision*. Springer. 2016, pp. 649–666.