

Parallel Processing
MSCS_679L_271_17F
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Image Style Transfer

Objective: The basic idea of the image style transfer is to recompose the input images by inducing change and produce a new image which has both the content and features of the input images.

Description: This can be solved using the neural algorithm of artistic style and convolution neural networks. The neural networks consist of various layers which help in understanding the given image. We will have a neural network to which we are going to input two images namely a normal image and a style image. As a result, a mixed image is produced with the content and the texture from the two input images respectively. The resultant mixed image is mainly composed of the content from the normal image and the texture or effects from the style image. This process makes us understand the abstraction level a layer in the network has achieved in its image understanding.

The technique is done iteratively and is based on the concept of weighing the loss functions and normalization of these functions. We tend to create several loss functions for both the input images which are optimized. The loss function of the normal image tries to minimize the loss difference of the features that are present in the normal image and that of the mixed image which as a result produces the same content (edges and highlights) of the normal image into the mixed image.

The style image loss function tries to minimize the loss difference between the matrices dedicated to both the style image and mixed image respectively. This matrix is used to transfer the texture features of the style image into the mixed image.

The Tensorflow machine learning API is mainly used for determining the gradient and derivative of the loss functions automatically.

Dependencies: Python, Tensorflow, Numpy, Scipy, GPU, Matplotlib.

