Image to Image Translation using GANs

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Abstract

Image-to-image translation in general means that we try to map a certain image from source to a target image. It is one of the most prominent applications we have in computer vision. From photo enhancements to transfigurations, this mechanism has many real-world applications.

We aim to develop such a translation model using **Generative Adversarial Network(GAN)**. We want to utilize the **Pix2Pix model** which is a type of conditional GAN network structure that can be used for general purpose image to image translation. The structure of the model is as follows: It contains a generator model which outputs the newly generated synthetic images , a discriminator model that can classify if an image is real or fake depending on if it is taken from the dataset or a synthetic one.

The Pix2Pix model is a type of GAN; a conditional model where the output generated is subjected to the conditional input image. The discriminator component which was discussed earlier is provided with both the source and target and it should be able to determine whether the model has efficiently generated the correct transformed version of the source image.

Another approach we might explore while performing the image to image translation is by using the **cycleGAN**. It is another GAN variant to train deep convolutional neural networks. Unlike the previously discussed approach, cycleGAN uses the unsupervised learning approach. It means that without actually training the model with the images of target images, image translation tasks can be carried out. Hence the overhead of finding the perfectly matched pairs can be eliminated. It follows a mechanism called "**cycle-consistency constraint**".

Hence the translation tasks are becoming very important for those especially that involve highly structured graphical outputs. GANs learn a loss that is adapted to the task and data in hand which is hence paving the way for a variety of applications right from image distortions, image reconstructions and enhancements to image transfigurations.