Chapter 14
Generating Complex Animated Characters of Various Art Styles With Optimal Beauty Scores Using Deep Generative Adversarial Networks

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ABSTRACT

A generative adversarial network (GAN) is a generative model that is able to generate fresh content by using several deep learning techniques together. Due to its fascinating applications, including the production of synthetic training data, the creation of art, style-transfer, image-to-image translation, etc., the topic has gained a lot of attraction in the machine learning community. GAN consists of two networks: the generator and the discriminator. The generator will make an effort to create phony samples in an effort to trick the discriminator into thinking they are real samples. In order to distinguish generated samples from both actual and fraudulent samples, the discriminator will strive to do so. The main motive of this chapter is to make use of several types of GANs like StyleGANs, cycle GANs, SRGANs, and conditional GANs to generate various animated characters of different art styles with optimal attractive scores, which can make a huge contribution in the entertainment and media sector.

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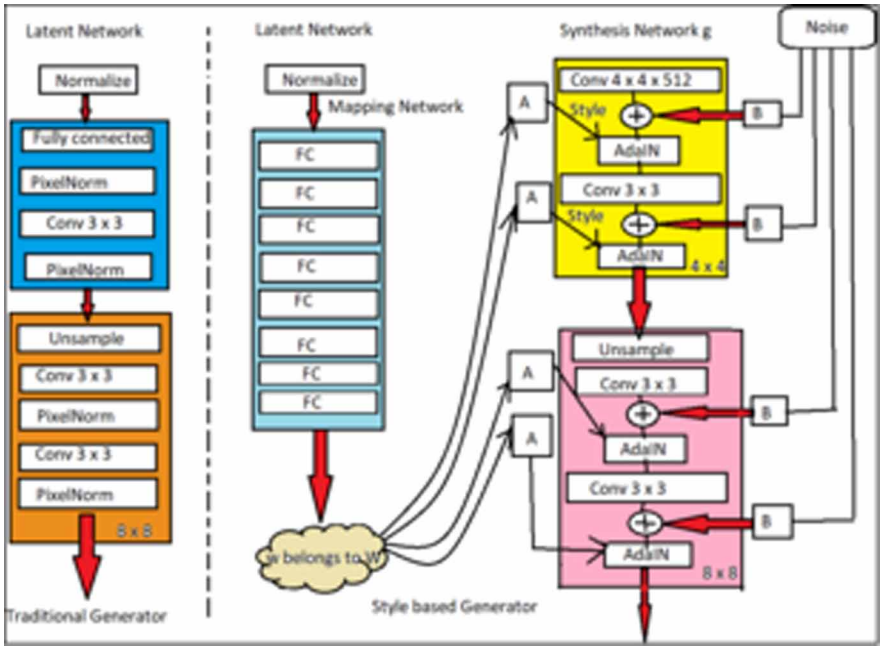
INTRODUCTION

GANs (Generative Adversarial Networks) are actually generative models which are capable of producing required and immaculate unmarked visual content. This subgenre, in the recent times, has attracted a lot of interest and attention in the deep learning community due to its compelling applications and creative results, which include not only the creation of synthetic training data, but also the creation of art, styletransfer, and image-to-image translation. GANs are made up of two networks: the generator and the discriminator. The generator will try to generate a certain user specified amount of phony samples/data in order to mislead the discriminator into thinking that they are some real samples. The discriminator will be useful in distinguishing generated samples from both the actual and the phony samples. In the year 2018 NVIDIA published a revolutionary paper introducing the concept of StyleGAN, "A Style-Based Architecture for GANs,". It introduced a new type of GANs generator architecture that allowed them to manage multiple levels of information in the generated samples, ranging from coarse to optimal finer end results.

Figure 1. StyleGAN architecture model



As visible from Figure 1, StyleGAN also uses the Progressive GAN principle, in which networks are trained on an initially small resolution (say, 4x4) at first, then the larger layers are gradually added once its confirmed that it has stabilized. This significantly reduces the training time and increases the training stability. StyleGAN enhances it even further by incorporating a mapping network in such a way that encodes the input vectors into an intermediate latent space, W, from which, we separate the present values, which are utilized to control various levels of detail. To meet client goals, the media and enter-