Artistry Mimicking
Painting Image Generation infused with artists styles using GANs

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Objective:
This project seeks to explore the boundary between art and artificial intelligence, evaluating the capability of GANs to emulate the nuanced brushstrokes and color palettes characteristic of Monet's and Vincent Van Gogh's works. Through the interplay of a generator and discriminator, we aim to produce 7,000 to 10,000 Monet-style images, which demonstrate the potential for data science to mimic the creativity of renowned artists.

Current State of Art:
The introduction of Convolutional Neural Network (CNN) enabled image style transfer, but faced limitations in resolution and noise. Generative Adversarial Networks (GAN) improved generative methods, leading to enhanced image quality. Pix2Pix, a conditional GAN, excelled in image-to-image translation. It conditions the generation of an output image on an input image, with a discriminator assessing the plausibility of the transformation. This concept laid the groundwork for the subsequent CycleGAN architecture.

AttentionGAN (AttnGAN) incorporates attention mechanisms into GAN architecture to facilitate fine-grained text-to-image synthesis, allowing for the generation of images based on textual descriptions, particularly well-suited for artistic and creative applications. On the other hand, SinGAN (Single Image GAN) is tailored for unconditional image generation from a single input image, capable of producing diverse and high-quality images, making it especially suitable for artistic and creative endeavors.

Approach:
Generative Adversarial Networks (GAN) involve a generator and a discriminator. The generator creates images to fool the discriminator, responsible for distinguishing between real and generated images. CycleGAN introduces a cycle consistency loss, enabling training without paired data. In unpaired datasets, where meaningful transformations are undefined, the model utilizes two generators. The initial one transforms an input image from one domain to another, and the subsequent generator converts it back, emphasizing the need to preserve the original image structure in the absence of paired examples. This output image must be close to the original input image to define a meaningful mapping that is absent in unpaired dataset.

Data:
The data consists paintings of Claude Monet and Vincent Van Gogh in .jpg format (Publicly Available)
https://www.kaggle.com/datasets/balraj98/monet2photo
https://www.kaggle.com/datasets/ipythonx/van-gogh-paintings

Progress Timeline:
Project start date: 02/12/2024
Week 1: Topic selection, Understanding the data, and Preliminary data collection
Week 2: Gain a deeper understanding about Generative Adversarial Networks (GANs) and its architectures
Week 3: Explore python libraries related to building the generator and discriminator
Week 4 & 5: Designing, Building, and training the GAN model
Week 5: Hyperparameter tuning to achieve a high quality output
Week 6: Test the model and performance optimization

Deliverables:
Final paper, Jupyter Notebook (Code), Generated images (Result)