Report On

Monet-Style-Transfer-with-CycleGAN

Submitted in partial fulfillment of the requirements of the Course project in
Semester VIII of fourth year Artificial Intelligence and Data Science

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CERTIFICATE

This is to certify that the project entitled "Monet-Style-Transfer-with-CycleGAN" is a bonafide work of "Shlok Gaikwad (Roll No. 04) Priyanshu Kamble(Roll No. 07) Dhruv Mewada (Roll No. 12)" submitted to the University of Mumbai in partial fulfillment of the requirement for the Course project in Semester VIII of fourth year Artificial Intelligence and Data Science engineering.

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Chapter 1: Introduction

1. Introduction

   The project utilizes CycleGAN, a variant of GANs, to morph photos into Monet-style paintings. It aims to explore GANs' prowess in image-to-image translation and their potential in generating diverse artworks. CycleGAN excels in unsupervised learning, making it ideal for style transfer tasks. Monet's impressionistic style, famed for its emotive use of light and color, serves as inspiration. By leveraging CycleGAN, the project not only celebrates Monet's artistry but also delves into the intersection of AI and creativity. It epitomizes the fusion of technology and art, showcasing the transformative capabilities of machine learning in generating captivating visual experiences.

2. **Problem Statement & Objectives**

   Traditional image-to-image translation methods often require paired datasets for training, limiting their applicability in generating diverse artistic styles. Additionally, manually creating artwork in different styles is time-consuming and labor-intensive. Therefore, there is a need for an efficient and versatile solution to automate the conversion of images into various artistic styles.

   Objectives:

   1. Develop a CycleGAN-based model tailored for image-to-Monet-style painting translation without the need for paired data.

   2. Explore the capabilities of CycleGAN in generating high-quality Monet-style paintings from diverse input images.

   3. Evaluate the model's performance in terms of visual fidelity, style consistency, and computational efficiency.

Chapter 2: Proposed System

1. Introduction

To implement this project, we used the TensorFlow framework and trained the CycleGAN model on a dataset of paired images, consisting of original photographs and corresponding Monet-style paintings. The dataset used for this project was obtained from the Kaggle competition "I'm Something of a Painter Myself" which provided a set of 7028 images. The CycleGAN model consists of two generators, G_AB and G_BA, and two discriminators, D_A and D_B. The generator G_AB converts an image from domain A (original photograph) to domain B (Monet-style painting), while G_BA performs the opposite transformation. The discriminators D_A and D_B distinguish between real and generated images from their respective domains. The training process involves updating the generators and discriminators in a cyclical manner, with each iteration consisting of a forward and backward pass through the generators and discriminators. The objective function for the generators includes both adversarial loss and cycle-consistency loss, while the discriminator objective function is based solely on adversarial loss.
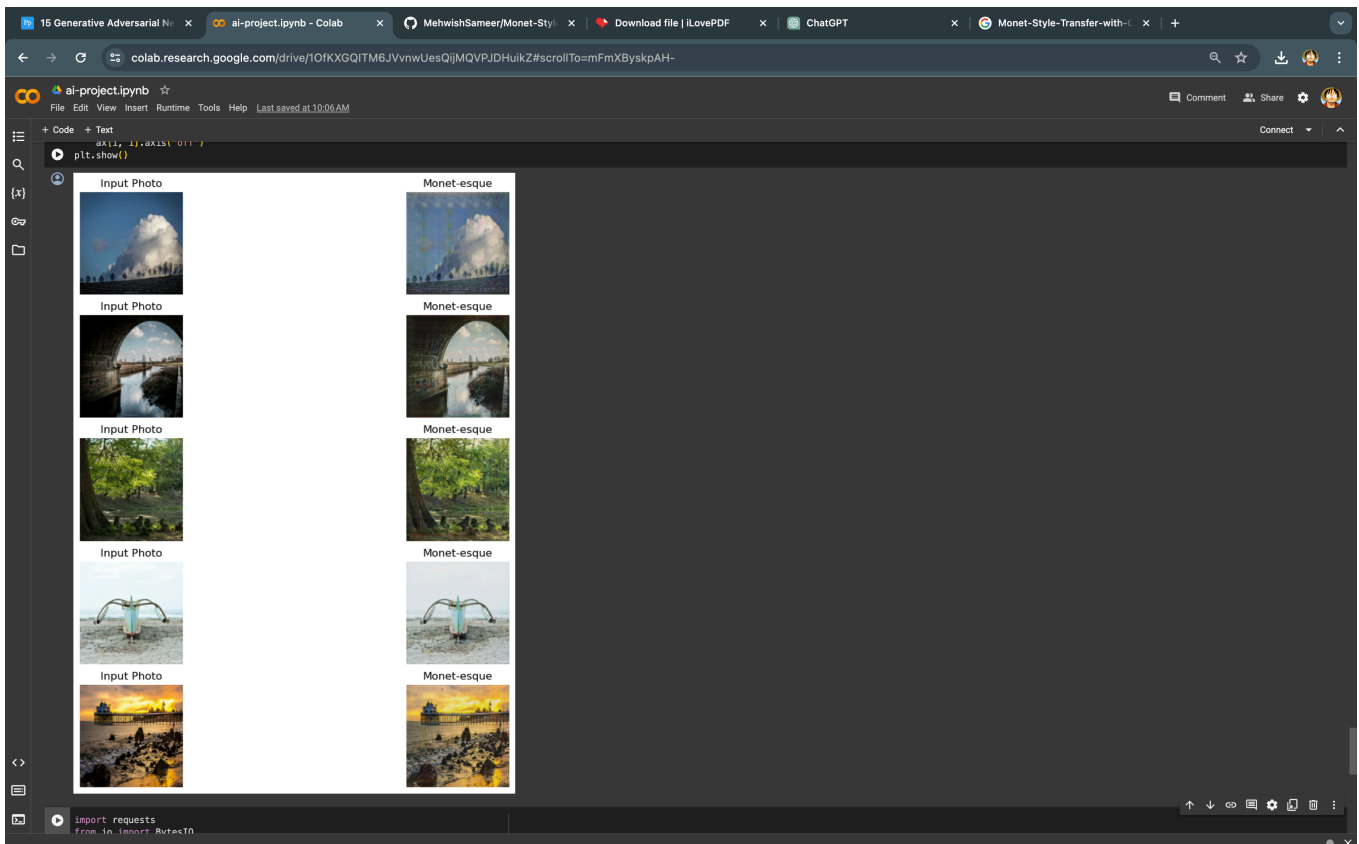
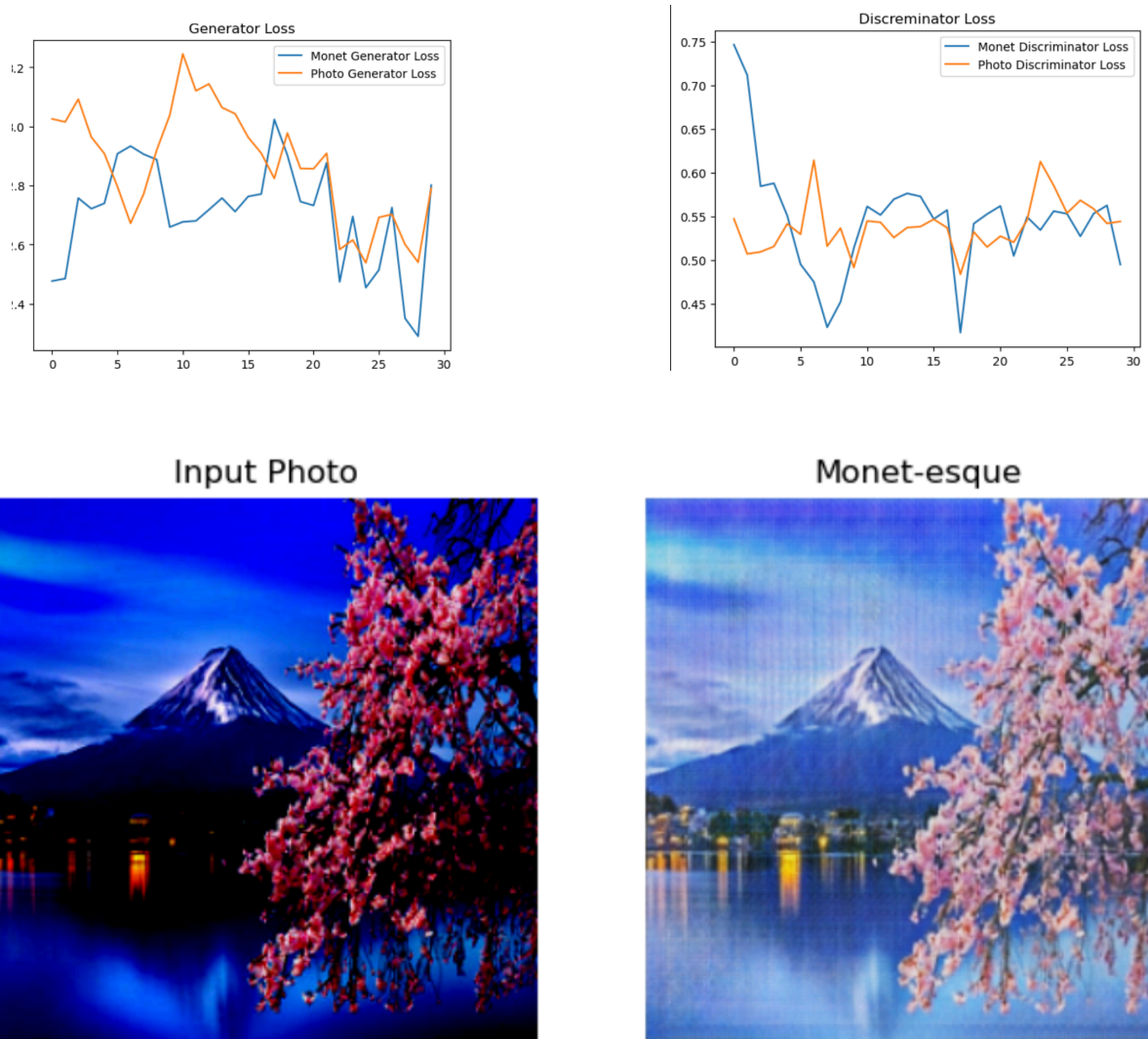## 2. Architecture/ Framework/Block diagram
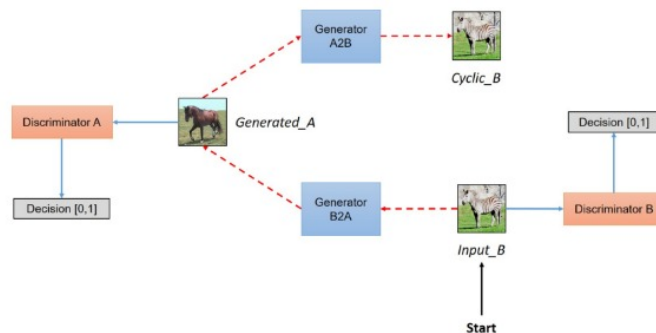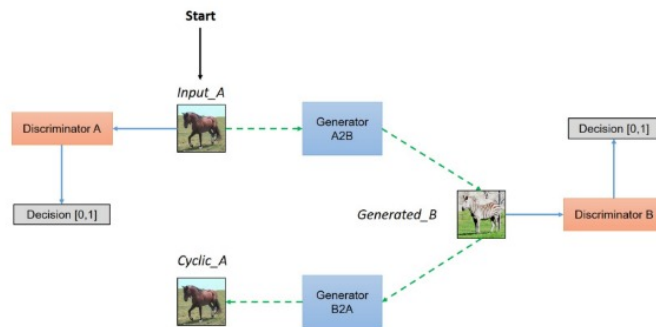
3. Algorithm and Process Design
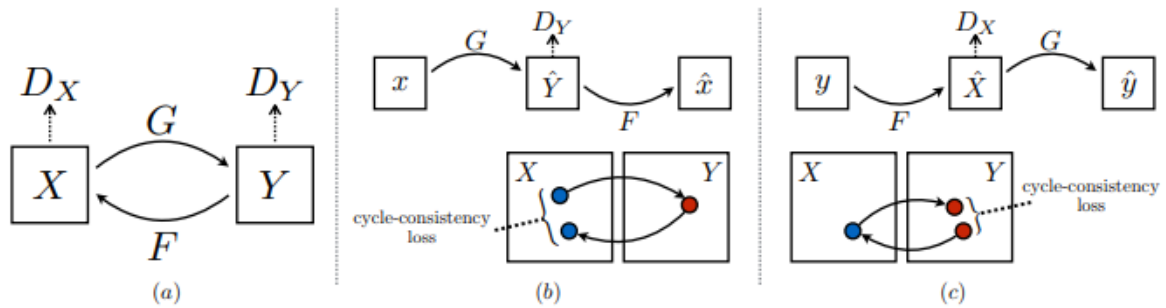
4. Details of Hardware & Software

- Python 3.8
- Keras
- Python Image Library
- PyTorch
- Tensorflow

5. Experiment and Results for Validation and Verification

Fig 2. Results and Output

2.6 Conclusion

The CycleGAN Monet project successfully demonstrates the capability of CycleGAN in generating realistic images resembling Claude Monet's paintings. It showcases the technique's effectiveness in transferring style across domains without paired training data, promising broad applicability in image-to-image translation tasks. Despite impressive results, there's scope for enhancing image quality and consistency. Nevertheless, the project underscores CycleGAN's potential in fostering creative applications like artistic style transfer, opening avenues for new forms of digital art and assisting artists in exploring diverse styles and techniques..

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References

1. Isola, P.; Zhu, J.-Y.; Zhou, T.; Efros, A.A. Image-to-Image Translation with Conditional Adversarial Networks. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2017. Available online: https://arxiv.org/abs/1611.07004.

2. Gatys, L.A.; Ecker, A.S.; Bethge, M. Image Style Transfer Using Convolutional Neural Networks. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016. Available online: https://arxiv.org/abs/1508.06576.

3. Johnson, J.; Alahi, A.; Fei-Fei, L. Perceptual Losses for Real-Time Style Transfer and Super-Resolution. In Proceedings of the European Conference on Computer Vision (ECCV), 2016. Available online: https://arxiv.org/abs/1603.08155.

4. Liu, M.Y.; Breuel, T.; Kautz, J. Unsupervised Image-to-Image Translation Networks. In Advances in Neural Information Processing Systems (NeurIPS), 2017. Available online: https://arxiv.org/abs/1703.00848.

5. Chen, Y.; Tai, C.-L.; Liu, X.; Shen, X.; Yang, J. FUNIT: Few-Shot Unsupervised Image-to-Image Translation. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2019. Available online: https://arxiv.org/abs/1905.01723