CycleGANs to generate Ukiyo-e art

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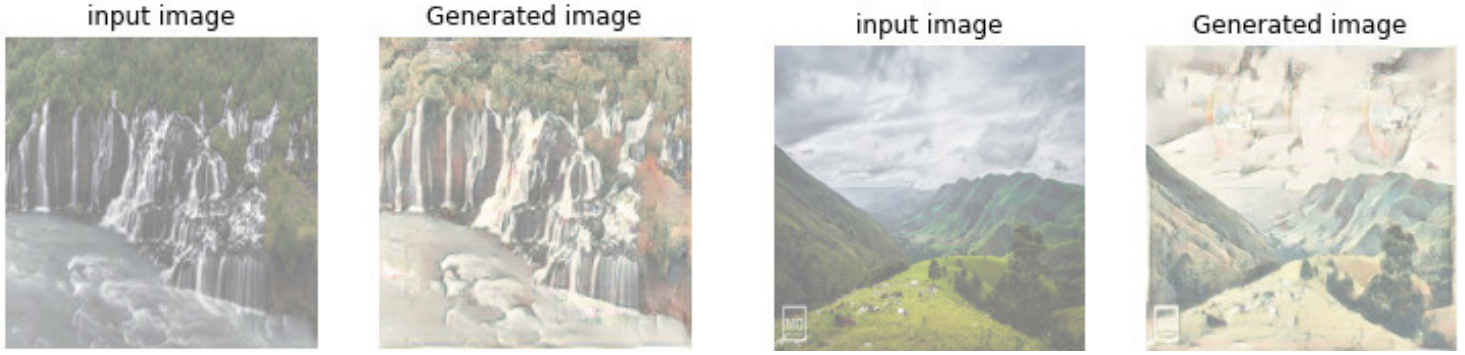
Motivation and About the Project

- The core idea is to understand and Implement the CycleGAN paper.
- **Key Motivation**: To carry out Image-to-Image Translation in the absence of paired training data.
- We take an Input Real Image to Generate Ukiyo-e art.

Model Results



Cycle GAN Paper Related Work

- **Image-to-Image Translation**: Using Pix2Pix framework.
- **Unpaired Image-to-Image Translation**: Using similarity function between Input and Output.
- **Neural Style Transfer:** Combining the content of one image with the style of another image.
- **Cycle Consistency:** Using cycle consistency loss for transitivity to supervise CNN training.

Objective Function

- An **adversarial loss** for matching the distribution of generated images to the data distribution in the target domain;
- A **cycle consistency loss** to further prevent the learned mappings G and F from contradicting each other.
- An **identity loss** for acting as an effective stabilizer at early stage of training

Our full objective $\mathcal{L}(G, F, D_X, D_Y)$ is:

$$\mathcal{L}_{\text{GAN}}(G, D_Y, X, Y) + \mathcal{L}_{\text{GAN}}(F, D_X, Y, X) + \lambda \mathcal{L}_{\text{cyc}}(G, F).$$

$$G^*, F^* = \arg\min_{G,F} \max_{D_x, D_Y} \mathcal{L}(G, F, D_X, D_Y).$$

Conclusion

- CycleGAN learns to mimic the style of an entire collection of artworks, rather than transferring the style of a single selected piece of art. It can generate different styles such as : Van Gogh, Cezanne, Monet, and Ukiyo-e
- Some other applications of CycleGAN include transforming objects from one ImageNet class to another such as: Zebra to Horses and vice-versa, Apples to Oranges and vice versa, etc
- CycleGANs are useful in performing color or texture transformation, however they do not give good results on geometrical transformation

References

- **The dataset:** https://people.eecs.berkeley.edu/~taesung_park/CycleGAN/datasets/ukiyoe2photo.zip
- **The CycleGAN paper**: https://www.cs.cmu.edu/~junyanz/projects/CycleGAN/CycleGAN.pdf