



Manga Neural Style Transfer

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Motivation

Gatys et al neural style transfer is the standard for style transfer using neural network. But it does not preserve edges especially on the foreground well.

Problem Statement

The goal of our project is to attempt neural style approach and GAN approach that preserves edges.

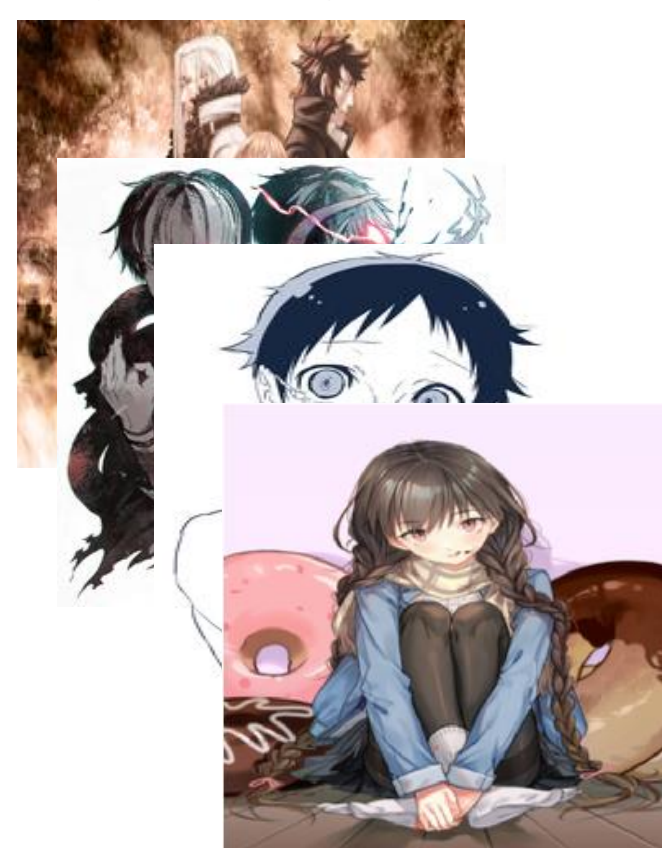
1. Improve on neural style transfer.
2. Create a manga style database with about 5000 images for CartoonGAN.

Datasets

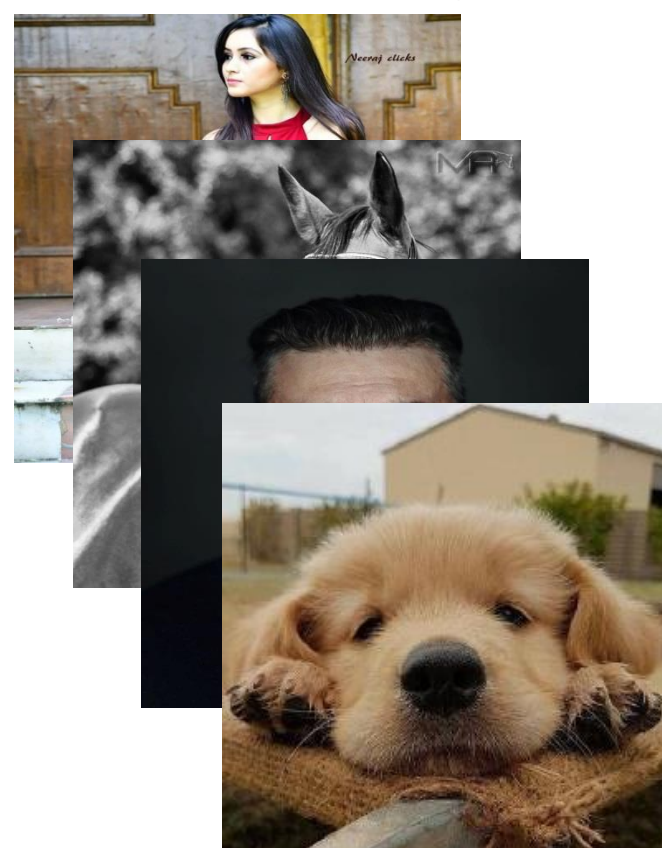
Dataset consists 256x256 images scrapped by us.

- 4200 style images are scrapped from anime-pictures.net
- 4200 content images are scrapped from Instagram.

Style Images



Content Images

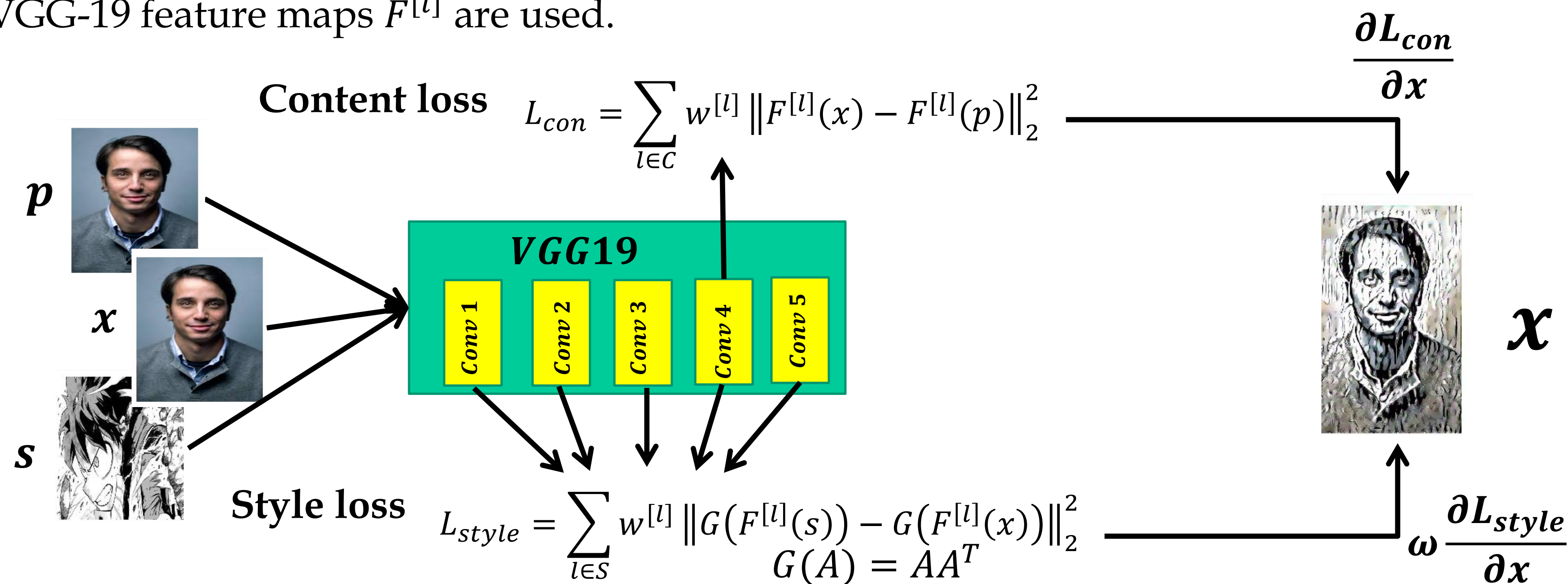


References

1. Gatys et al. **A Neural Algorithm of Artistic Style** arxiv:1508.06576
2. Chen et al, **CartoonGAN** arxiv:1904.13268
3. He et al **Mask R-CNN** arxiv:1703.06870

Neural Style Transfer

Generate image x that merges the features of image p with the style of image s . VGG-19 feature maps $F^{[l]}$ are used.



Discussion

1. Sparse regularization is useful when image has lots of micro features that are not essential to reproduce content or style.
2. Naïve foreground-background segmentation is unstable for certain images.
3. Neural style trained with style-to-content weight ratio of 10^6 , with 300 iterations.
4. Training CartoonGAN with the new dataset met with difficulty. GAN not learning style.

Proposed Modification To Neural Style Transfer

1. Content loss with L1 loss

$$L_{con} = \sum_{l \in \mathcal{C}} w^{[l]} \|F^{[l]}(x) - F^{[l]}(p)\|_1$$

2. Style loss with L1 loss

$$L_{style} = \sum_{l \in \mathcal{S}} w^{[l]} \|G(F^{[l]}(s)) - G(F^{[l]}(x))\|_1$$

3. Use Mask-RCNN for targeted style transfer



Future Plans

1. Add multi-scale segmentation style transfer.
2. Implement high-resolution style transfer.
3. Train CartoonGAN with the new dataset (not working at the moment)

Result

