

CS584 Project Proposal

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- **Paper**: Image Style Transfer Using Convolutional Neural Networks
- **Author**: Leon A. Gatys, Alexander S. Ecker, Matthias Bethge
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1 Problem Statement

Implement and compare different neural style transfer methods, such as Gatys et al.'s Neural Style Transfer (NST), Huang et al.'s Arbitrary Style Transfer, and Li et al.'s Improved Texture Networks.

2 Approach

Style transfer is a computer vision task that aims to transfer the style of one image onto the content of another image. Here we propose to train our own models on different datasets (e.g., COCO, WikiArt, etc.) and compare their performance in terms of style transfer quality and computational efficiency.

We will explore the use of different loss functions in neural style transfer. For example, original style loss and content loss in NST vs alternative losses, such as adversarial losses, perceptual losses, or feature-matching losses.

We will check the impact of different optimization algorithms for style transfer, such as gradient descent, L-BFGS, or ADAM comparing their convergence rates, memory usage, and quality of the final results.

We will understand the effect of different hyperparameters on style transfer performance, such as the number of iterations, learning rate, style/content weight ratios, or feature layer selections by using grid search or Bayesian optimization to tune these hyperparameters and find the optimal settings for the task.

3 Data

<https://www.kaggle.com/datasets/vbookshelf/art-by-ai-neural-style-transfer>

4 References

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