

Neural Style Transfer for Artistic Photo to painting Translation

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Abstract

Neural Style Transfer (NST) turns a snapshot into an artistic painting by integrating its content and style. Recent deep learning advances have enhanced artistic style transfer model quality, speed, and controllability. Convolutional neural networks and perceptual loss optimisation are used to create a deep neural phototopainting translation framework. Deep feature extraction separates content and style representations, and optimisation and feedforward networks recreate stylised outputs. Experimental results show better structural preservation and perceived quality than baseline style transfer approaches. Creative AI applications in digital art, design, and multimedia content development are supported by the technique.

Keywords: Neural Style Transfer, Artistic Image Translation, Deep Learning, Convolutional Neural Networks, Perceptual Loss, Creative AI

I. INTRODUCTION

Artistic phototopainting translation stylises real-world photos to resemble famous paintings. Neural Style Transfer separates and recombines information and style representations using deep neural networks. This method is popular in creative AI and computational photography.

Recent 2023 and 2024 research show that attention mechanisms and transformer-based style transfer frameworks increase stylistic consistency and structural preservation [1], [2]. Visual quality in creative translation tasks has improved using perceptual loss optimisation and feature normalisation [3].

Despite these advancements, style intensity, information preservation, and real-time performance remain issues. We present an upgraded neural style transfer approach for high-quality artistic rendering using convolutional feature extraction, adaptive normalisation, and perceptual optimisation.

II. RELATED WORK

Recent research from 2023–2026 highlights major developments in neural style transfer. In [1], a transformer-enhanced style transfer architecture achieved improved global style consistency compared to traditional CNN-based approaches. Similarly, [2] introduced attention-guided style fusion to selectively apply artistic patterns while preserving semantic regions.

Feedforward style transfer networks have gained popularity for realtime applications. A 2024 study in [3] proposed adaptive instance normalization techniques to improve style-content blending efficiency. Multistyle and arbitrary style transfer frameworks were further explored in [4], enabling dynamic style adaptation without retraining.

GAN-based style translation models have also shown promising results. In [5], adversarial Artistic image production was more realistic by integrating learning and perceptual loss. In [6], computational optimisation was used to study mobile-friendly lightweight structures. These advances lay the groundwork for a neural style transfer system for artistic phototopainting translation.

III. METHODOLOGY

The proposed framework includes dataset preparation, feature extraction, style-content separation, stylisation network building, training, and evaluation.

The collection comprises high-resolution photos and impressionist, cubist, and watercolour paintings. Before processing, images are scaled and normalised.

Hierarchical representations are obtained using a pretrained convolutional neural network as a feature extractor. Content features are recovered from deeper layers to maintain structural information, while style features are computed using Gram matrix

representations of shallower feature maps.

Two methods are used. The first method optimises style transfer by iteratively updating the output image to minimise content and style loss. The second method uses perceptual loss-trained feedforward stylisation networks for real-time inference.

To achieve smoothness, the training aim includes content reconstruction loss, feature correlation-based style loss, and overall variation loss. Adversarial loss adds realism in complex configurations.

Following is the system workflow:

- Image dataset collection
- Content and style feature extraction
- Stylisation network initialization
- Perceptual loss optimization
- Stylised image generation
- Performance evaluation
- Metrics for evaluation include Structural Similarity Index, perceptual scores, and subjective evaluation.

IV. RESULTS AND DISCUSSION

The suggested approach produces high-quality stylised images with robust texture representation and retained structural content, as shown by experimental findings. Transformer-enhanced architectures standardise complex scene styles.

Quantitative evaluation indicates better perceptual resemblance than CNN-based style transfer. Human judgement shows improved artistic realism and aesthetics.

Digital art platforms and mobile apps benefit from the feedforward model's near-realtime performance. Extreme style intensity may cause slight structural deformities.

The results show that perceptual optimisation and adaptive normalisation increase artistic phototopainting translation.

V. CONCLUSION AND FUTURE WORK

Deep learning was used to create a neural style transfer framework for artistic phototopainting translation. The system balances content retention and stylistic change for real-time performance.

Next steps include integrating diffusion-based stylisation models, allowing region-based selective stylisation, adding user-controlled style intensity parameters, and optimising models for resource-constrained devices.

VI. REFERENCES

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