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Neural Style Transfer Using ResNet50V2

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Abstract: *The test of taking a content picture and a style picture as info and taking a picture with the content of the content picture and the style of the style picture is known as Neural Style Transfer (NST). The most often used approach for Neural Style Transfer is an Artificial Neural Networks (ANN) that utilizes ResNet50V2 and TensorFlow. Our investigation sheds intelligence on how Artificial Neural Networks (ANNs) figure out how to address filmland and how they may be utilized to make and alter elevated place pictures.*

Keywords: NST, Content Image, Style Image, ANN, Resnet50V2, TensorFlow

I. Introduction

Neural Style Transfer (NST) is a group of software algorithms that change the look or visual style of digital photographs or movies. The use of deep neural networks for image alteration is a distinguishing feature of NST algorithms. The production of false artwork from images, such as translating the appearance of renowned paintings to user-supplied photographs, is a common use for NST. Deep Art and Prisma are two well-known smartphone applications that leverage NST methods for this purpose. Artists and designers all around the world have utilised this strategy to create new artwork based on existing styles (s).

Style transfer is the process of creating an output picture from two images: a content image and a style image. The new picture incorporates the content image's structural features as well as the texture of the style image. It's a technique for recomposing photographs to look like other images. It is an image stylization approach that has been researched in the context of non-photorealistic rendering.

II. Literature Survey

NST is a subset of IB-AR strategies that use examples. In this part, we first categorise NST algorithms before delving into the details of the primary 2D image-based non-photorealistic NST algorithms. More precisely, we begin by outlining the core idea for each algorithm before discussing its flaws and merits. We try to analyse these algorithms in a somewhat more standardised manner by only concentrating on details, semantic and syntactic, depth, and variabilities in brush strokes because it is difficult to define the concept of style and thus very subject to interpretation to describe what criteria are crucial to make a productive style transfer algorithm.

The taxonomy of NST approaches that we propose. The categorization of IB-AR available techniques by Kyprianidis et al. is unaffected, and NST algorithms are used to extend it. Image-Optimization-Based Online Neural Methodologies and Model-Optimization-Based Offline Neural Methods are indeed the two types of NST methods now in use. The first group of algorithms conveys the style by iteratively improving an image, i.e., these algorithms are based on image optimization-based image reconstruction approaches. The second category uses model-optimization-based image reconstruction algorithms to optimise a generative model offline and output the stylized picture in a single forward pass.

An artificial neural network called a residual neural network (ResNet) is a type of artificial neural network (ANN). Skip connections, or shortcuts, are being used by residual neural networks to hop past some layers. The majority of ResNet models use double- or triple-layer skips with nonlinearities (ReLU) and batch normalisation in between. To learn the skip weights, an extra weight matrix can be utilised; the above models are classified as HighwayNets. DenseNets are models that have several parallel skips. A non-residual network is referred to as a plain network in the context of residual neural networks.

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III. Existing System

Author	Arbitrary style	Efficient	Learning free	Loss	Image Quality
Gatys et.al.	Yes	No	Yes	Gram Loss	Good and usually regarded as best quality.
Johnson et. al.	No	Yes	No	Perceptual Loss	Results are close to but generated within real-time
Ulyanov et. al.	No	Yes	No	Perceptual Loss	Results are close to along with improved instance normalization
Chen et. al.	No	Yes	No	Disparity Loss	Results are good but model size increases

IV. Proposed System

To create a real-time neural style transfer system that produces a styled picture from content and style image. The goal of this project is to create an algorithm that allows for the creation of new high-quality photographs that blend the content of any photograph with the appearance of a variety of well-known artworks. The information and style pictures can be transmitted in real-time based on the style implementation.

The approach encourages feed-forward. To transmit aesthetic style from one image to the another, artificial networks are being used to generate multiple samples of the same texture. The networks employed are small and light, although they are hundreds of times quicker.

Artificial neural networks are the fundamental technique that enables neural style transfer. We're using ResNet50V2 Algorithm with TensorFlow and Keras, which enables everyone to run the service speedier than it used to be.

V. Implementation Details of Module

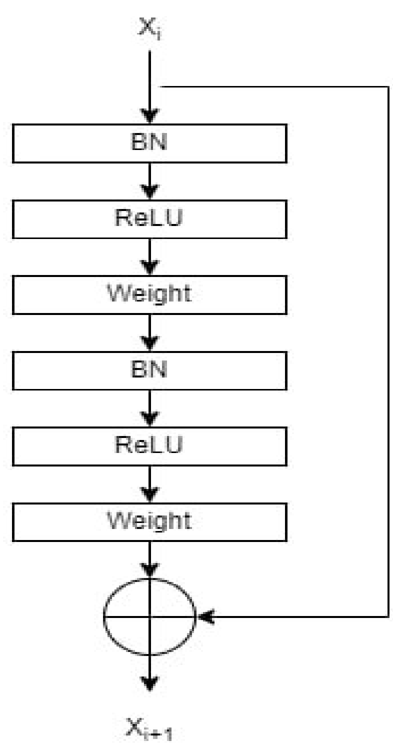

Figure: System Architecture of ResNet50V2

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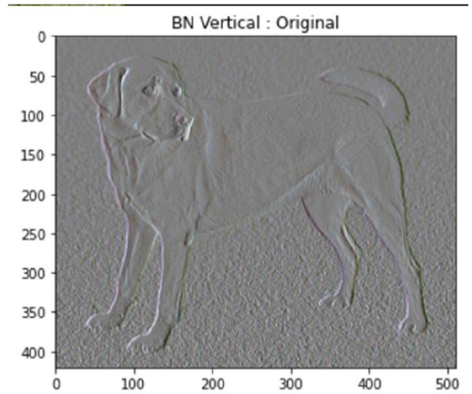
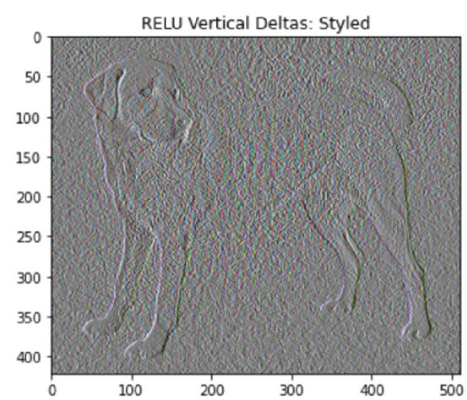
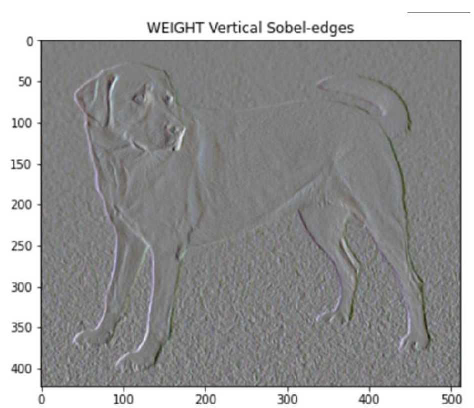
Batch Normalization: Normalization is a data pre-processing technique for converting numerical data to a common scale while changing the form of the data. When we feed data into a machine learning or deep learning system, we usually modify the numbers to a balanced scale. Normalization is performed in part to guarantee that our model can generalise appropriately.



Rectifier (neural networks): Every negative value in the filtered picture is removed and replaced with zero in this layer. Whenever the node inputs exceed a certain threshold, this function is activated. As a result, whenever the input is less than zero, the output is also zero. When the input exceeds a particular threshold, however, the dependent variable and the input have a linear relationship. This implies it can accelerate the speed of a training data in a deep neural network quicker than other perceptron, avoiding summing with zero.



Weight : one of None (random initialization), 'Imagenet' (pre-training on ImageNet), or the path to the weights file to be loaded.



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VI. Results

Input:

+

Content Image

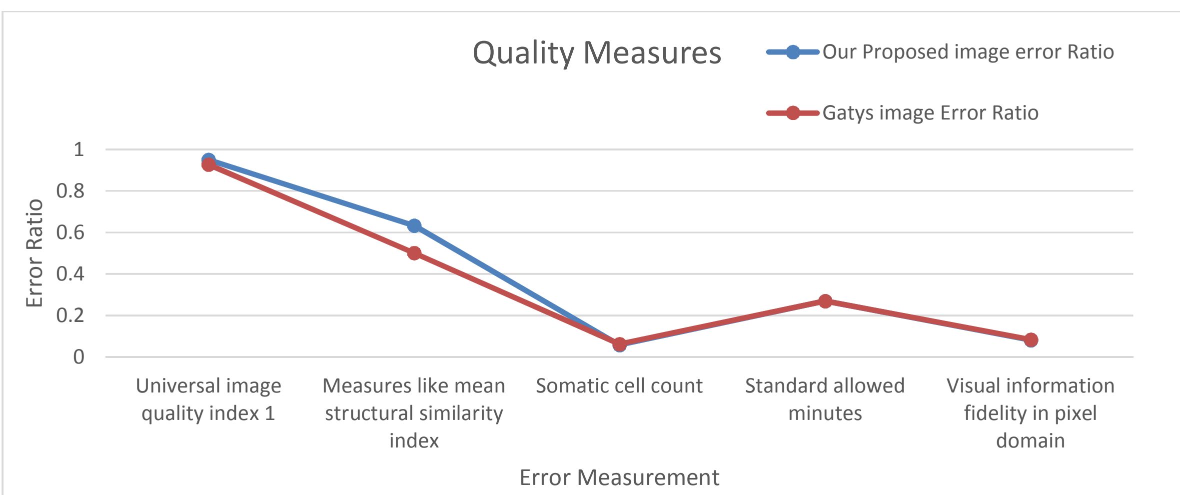
Style Image

Output:

Gatys et. al. (2016) output

Proposed output

Error Compression of two Outputs



VII. Conclusion

This proposed system provides the utilization of the ResNet50V2 to combine the input picture (Content image + Style image). The project's main goal is to increase image performance while reducing time consumption. Companies like Instagram, Snap Chat, and others can utilize this project to filter their photographs to give them a fresh appearance. Running additional epochs and introducing fresh content and style images can enhance the precision of a given model.

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References

[1]. Gatys, Leon A., et al. “Image Style Transfer Using Convolutional Neural Networks.” 2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016, doi:10.1109/cvpr.2016.265
[2]. Vamshik Shetty: Theory of Neural Style Transfer- Published in Towards Data Science
[3]. A Neural Algorithm of Artistic Style Leon A. Gatys,1,2,3∗ Alexander S. Ecker,1,2,4,5 Matthias Bethge1,2,4
[4]. What Neural Networks See -May 2017 by Gene Kogan
[5]. Introduction and Implementation to Neural Style Transfer – Deep Learning Anany Sharma — October 22, 2020
[6]. Art Style Transfer using different Neural Networks - Javier Nogueira - Jul 12, 2020
[7]. Neural Style Transfer & Neural Doodles - titu1994
[8]. Gatys, L., Ecker, A. and Bethge, M. (2016). A Neural Algorithm of Artistic Style. Journal of Vision, 16(12), p.326.
[9]. Li, Wang, Liu and Hou, “Demystifying Neural Style Transfer.” Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence, 2017, doi:10.24963/ijcai.2017/310
[10]. https://arxiv.org/abs/2104.05623v1
[11]. TensorFlow - https://www.tensorflow.org/api_docs/python/tf/keras/applications/resnet_v2/ResNet50V2
[12]. Alex J Champandard, (2016), Semantic Style Transfer and Turning Two-Bit Doodles into Fine Artwork
[13]. Luan, Fujun, et al. “Deep Photo Style Transfer.” 2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2017, doi:10.1109/cvpr.2017.740