iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** VI **Month of publication:** June 2022

DOI: https://doi.org/10.22214/ijraset.2022.43990

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

Image Style Transfer Using Machine Learning

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Abstract: ***The principle of Image style transfer is to define two distance functions, one that describes the content image and the other that describes the style Image. By using these content and Style Images[5][6] as inputs we will begetting the desired output which has the content image merged with style image. The output will be in the graphical model of the content image.***
In summary, we'll take the base input image, a content image that we want to match, the style image that we want to match by undergoing the process of convolutional neural network [7] firstly the content image is undergoing the process of content loss and style image as style loss after content loss and style loss it will undergo the process of gram matrix and the final image will be formed.
Keywords: Content Image, Style Image, Content Loss, Style Loss, Convolutional Neural Networks, Gram Matrix Deep Lab Semantic Segmentation.

I. INTRODUCTION

Dealing With the Image Formation, The Image style transfer is an approach to convert one image form into another image form by using convolutional neural network. In this we have to take two images 1) content- image, 2)style-image. The content-image is nothing but it is a main basic image like a dog or human being etc, which exist in real world. The style image is a graphical image like tree graphical image and etc..which is in 3d fromat. By using Some machine learning functionalities and modules like we need to make content loss and style loss. After these we will be getting the desired output image.

II. LITERATURE SURVEY

In this project, we have taken a content image and the style image we will save the content image[6] and the style images[5] from any website and we need to use them by their location in the system. Here we use many machine learning modules, Algorithms. Convolutional neural network algorithm[7] is used here for formation of the images. OpenCv[8] ,TensorFlow [9] are the functionalities used to process the images. By using these we can get output image in the merged form of both content image and the style image. We need to calculate content loss and the style loss Then undergoes some modules in machine learning like deep lab semantic segmentation[10],open cv[8],tensor flow[9] making the images forming the output desired image. Content loss[11] is nothing but the difference of content of the content image to the content of the output image is the content loss and the content loss is calculated by Euclidean distance and the content loss can be calculated with the content image only.

The content loss is: content of content image –content of output image.
The Euclidean distance is:
The Style loss[12] is defined as the difference between the output image and the style image. Whichinturn gives the style loss. Here

$$d(x,\ y)\ = \sqrt{\sum_{i=1}^{n}(y_i - x_i)^2}$$

we cannot compare aintermediate features of style loss and content loss so, that is why we introduce gram matrix
In the gram matrix[13] we have to equal the both pixel sizes. Let us consider a content image pixel size is [3280*4250] and the style image pixel size is [4290*5690] so the both pixel sizes is different by using the gram matrix we have to equal the both pixel sizes of content image and style image, and we have to calculate style image by using gram matrix. Ingram matrix we have to calculate each layer style information the formulae is:

$$L_{style}(a, x) = \sum_{l \in L} w_l E_l$$

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III.PROPOSED SYSTEM

We have proposed Image style transfer using machine learning in this there are two images 1) content-image 2) style-image so, we have to take these two images as an input image to training modelHere in proposed system we will create a data sets ofimages for target Image. We give an input as any image and using this data sets the image is converted to our target image. Firstly the content image is given and then it undergoes deeplab semantic segmentation which makes the content image as the mask of the content image then the formed mask of the content image and the style image goes image style transfer which in undergoes machine learning modules like opencv and tensorflow. And finally the desired merged form of the image is formed.The below Image shows the Architecture of the image style transfer using machine learning.

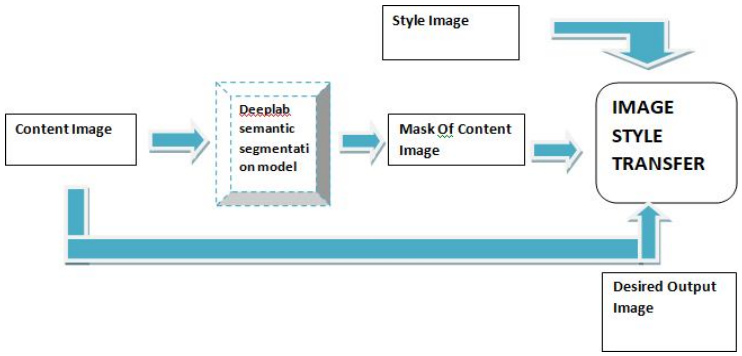
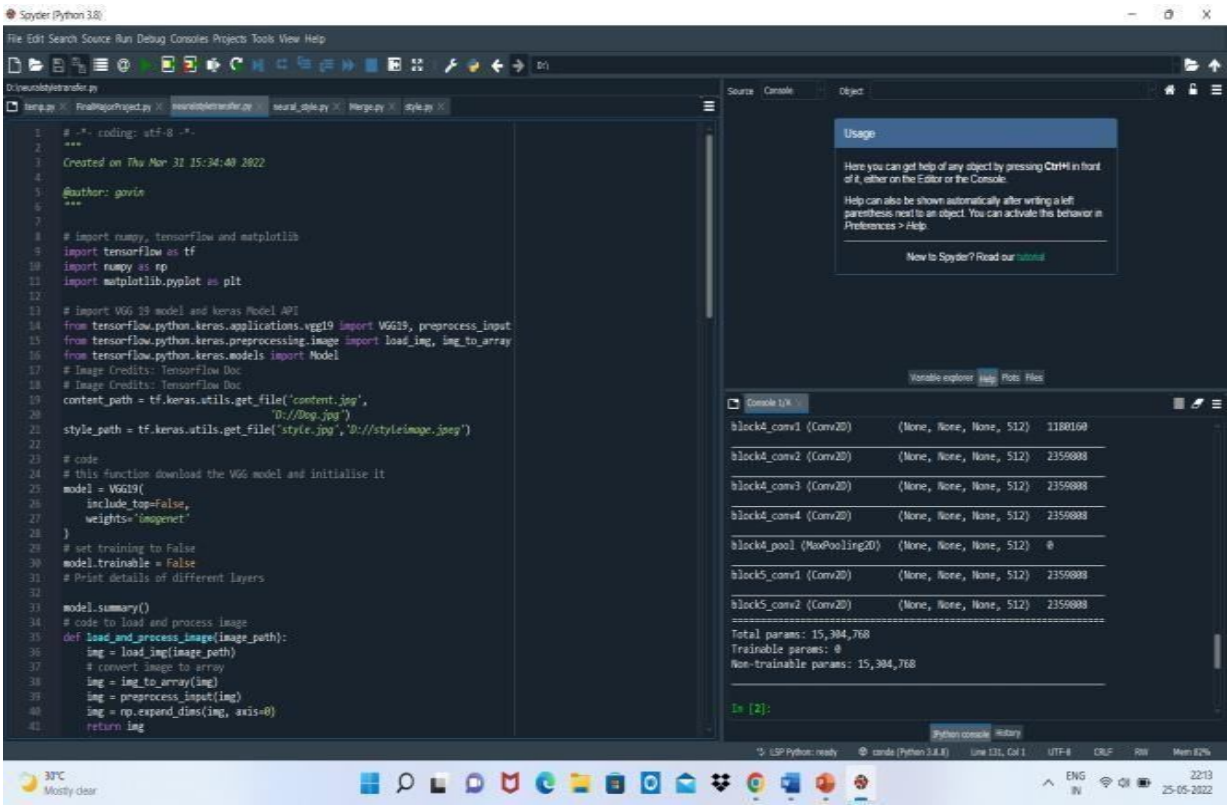


Figure 3.1: Architecture of the Model.

IV.RESULT

Here for a sample we took a dog as a content image and the graphical image as the Input. We need to give input as the location name in the code i.e,where the image is saved in the system. So before the process we need to save the input images which are content image and the style image in the files on the system. While giving input we need togive the location of the image.



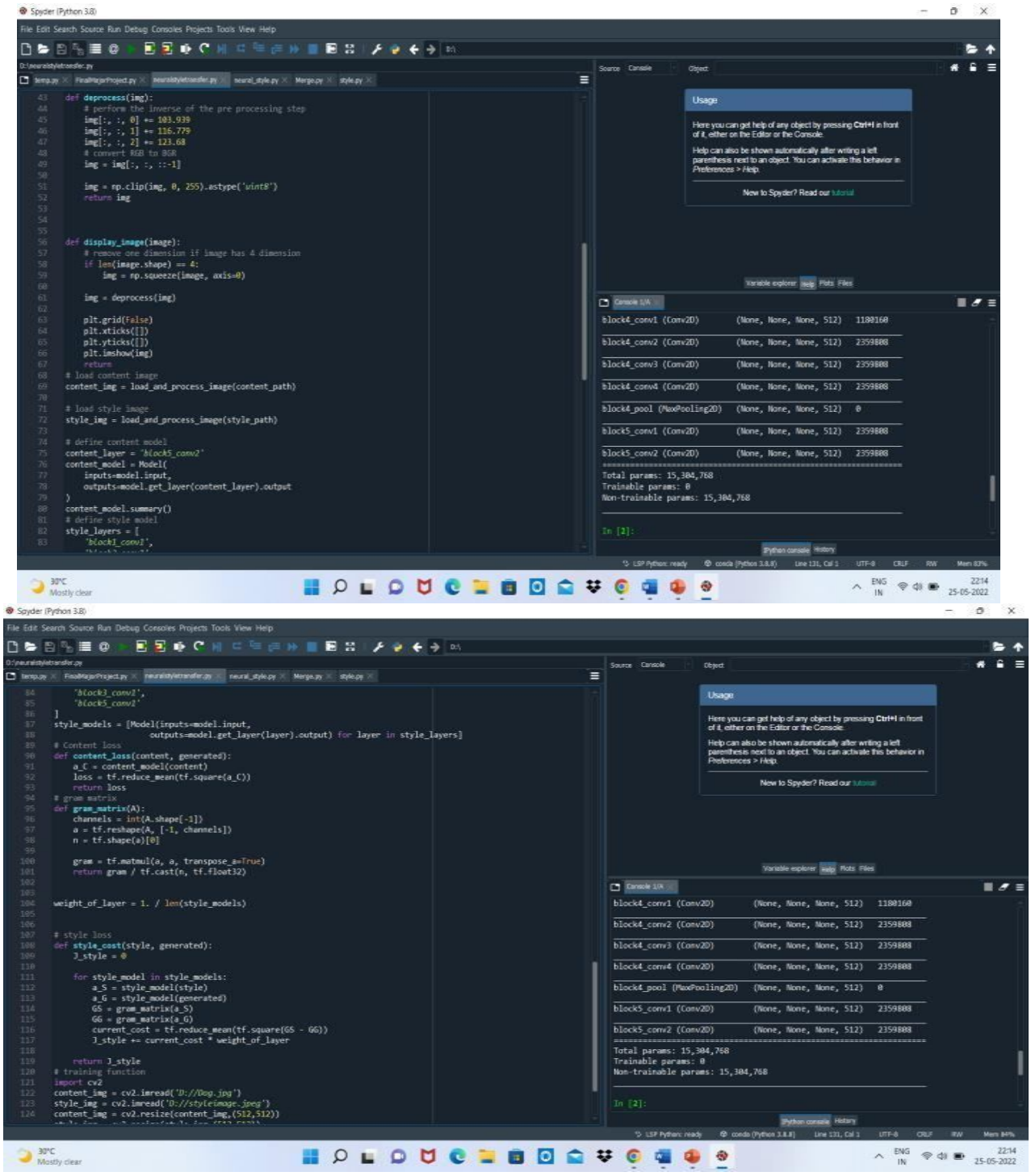


Fig 4.1-4.3: Code Execution

Then the images undergo processing firstly the content image undergo DeepLab Semantic Segmentation and we will be getting mask of the content image and then we will be giving style image this style image and the mask of the content image undergoes opencv and tensorflow functions. Tensorflow is used for mathematical computations and opencv is used for image processing. Finally we will get the output image as follows

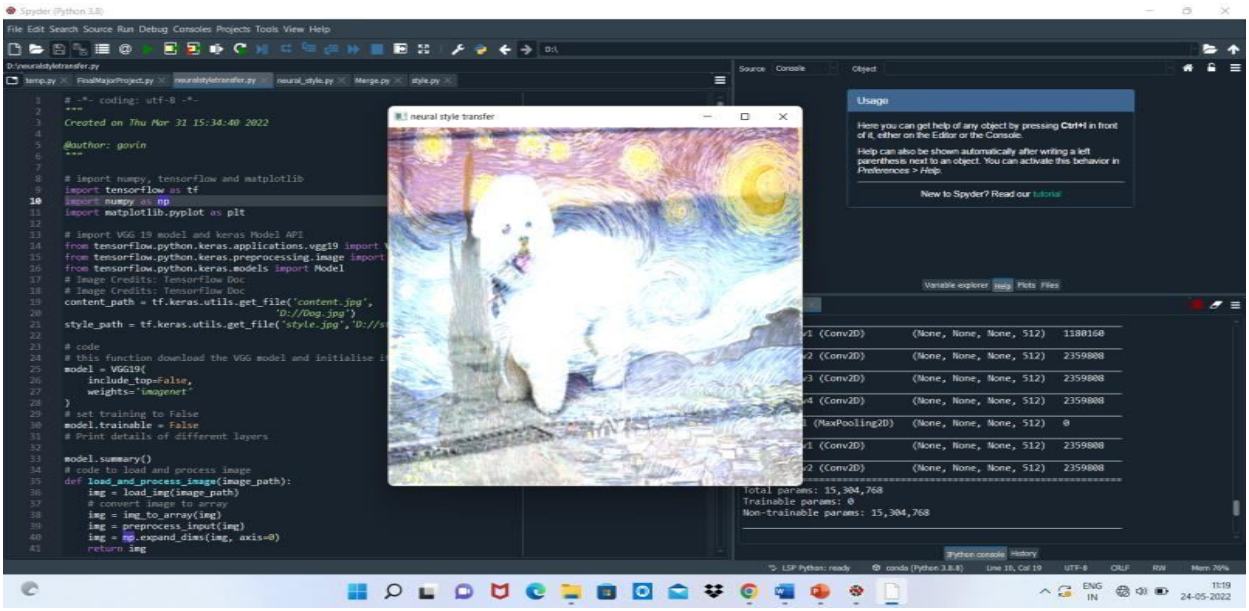


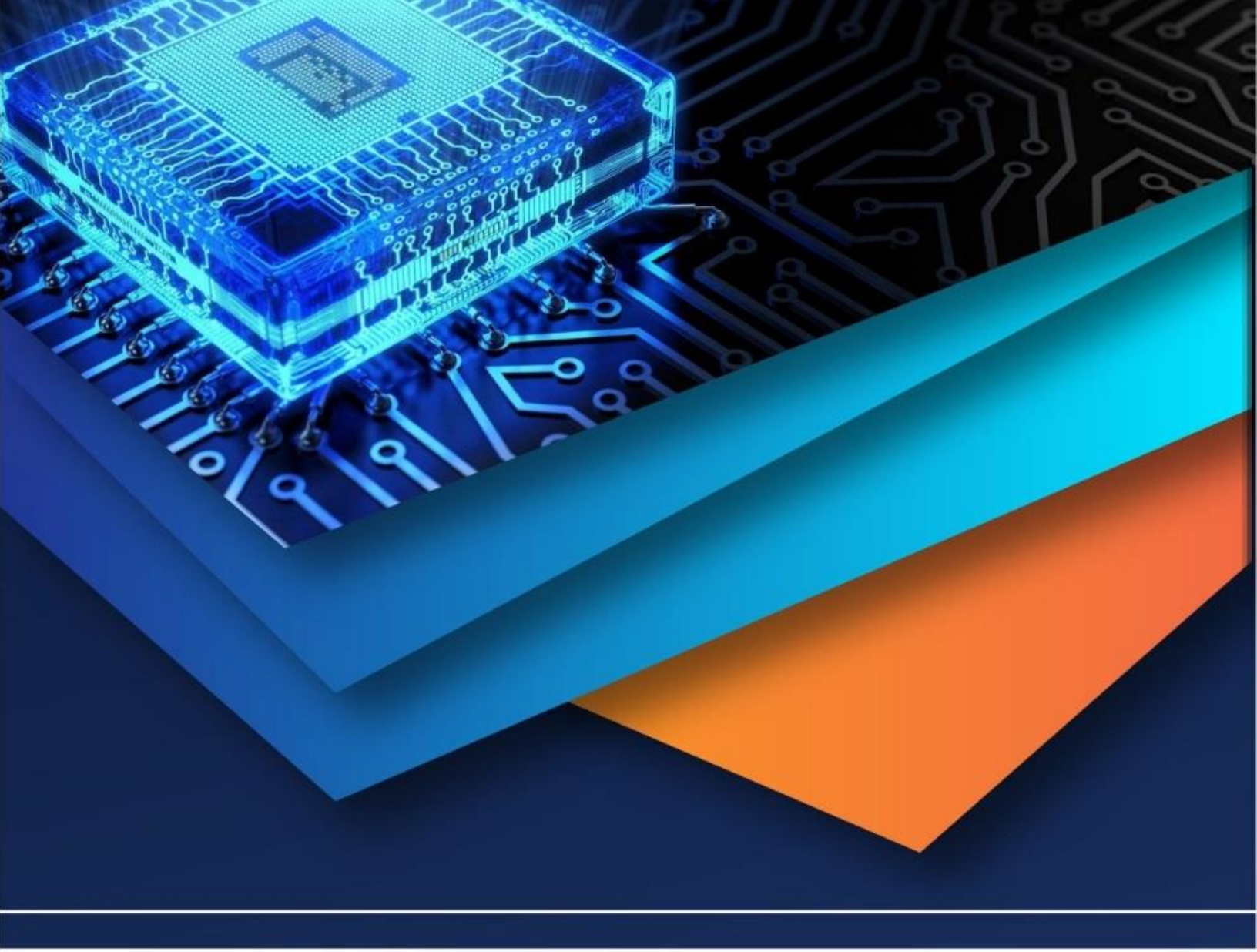
Figure 4.4-Result of the final image

VI. CONCLUSION

By using this principle of Image Style Transfer using Machine Learning we can get our desired image without recreation by using an algorithm called CNN, We use some of the modules of machine learning like opencv and tensorflow and we will get the image with high Accuracy and it takes less time because there is no recreation of the images, only conversion of images directly.

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