AI VIETNAM
AI Insight Course

Style Transfer

Introduction and Basic Algorithms

Quang-Vinh Dinh
Ph.D. in Computer Science

Year 2020

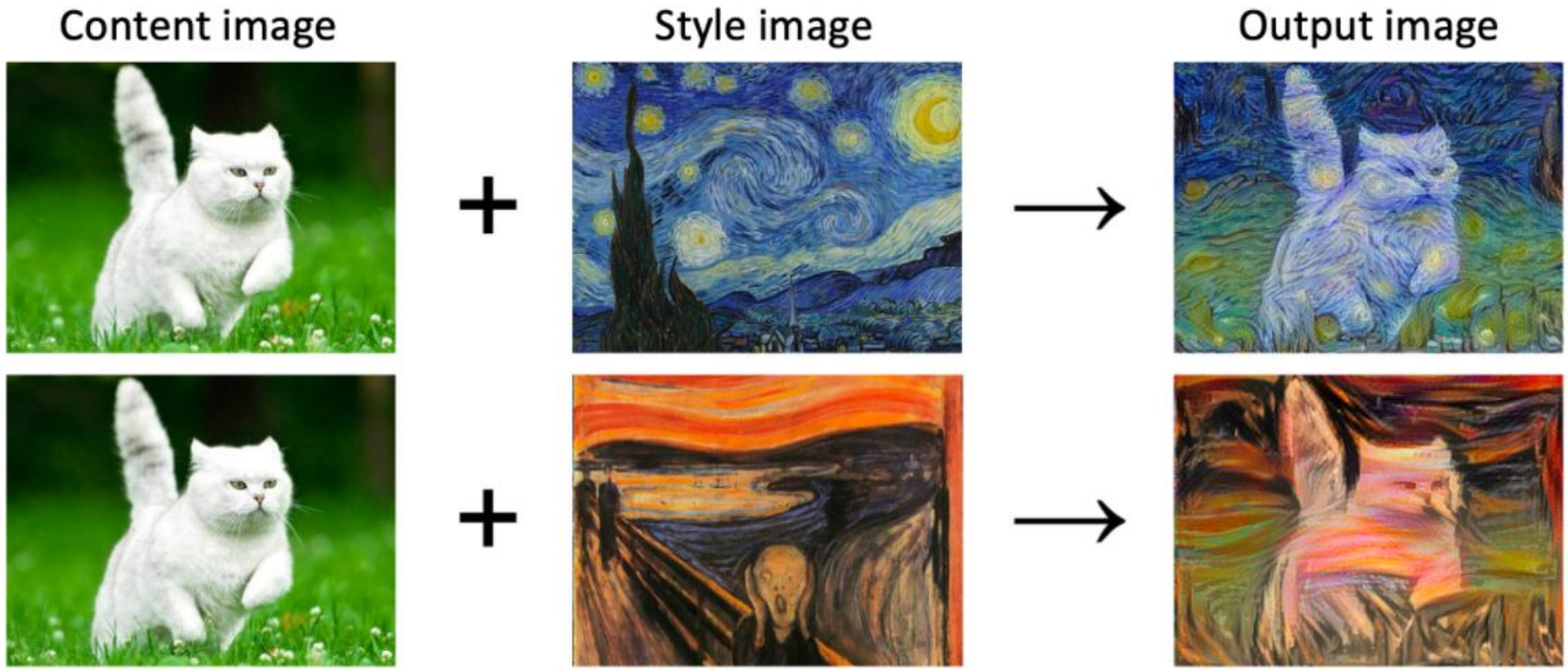
Style Transfer

❖ Introduction

https://towardsdatascience.com/light-on-math-machine-learning-intuitive-guide-to-neural-style-transfer-ef88e46697ee

Style Transfer

❖ Introduction



https://godatadriven.com/blog/how-to-style-transfer-your-own-images/

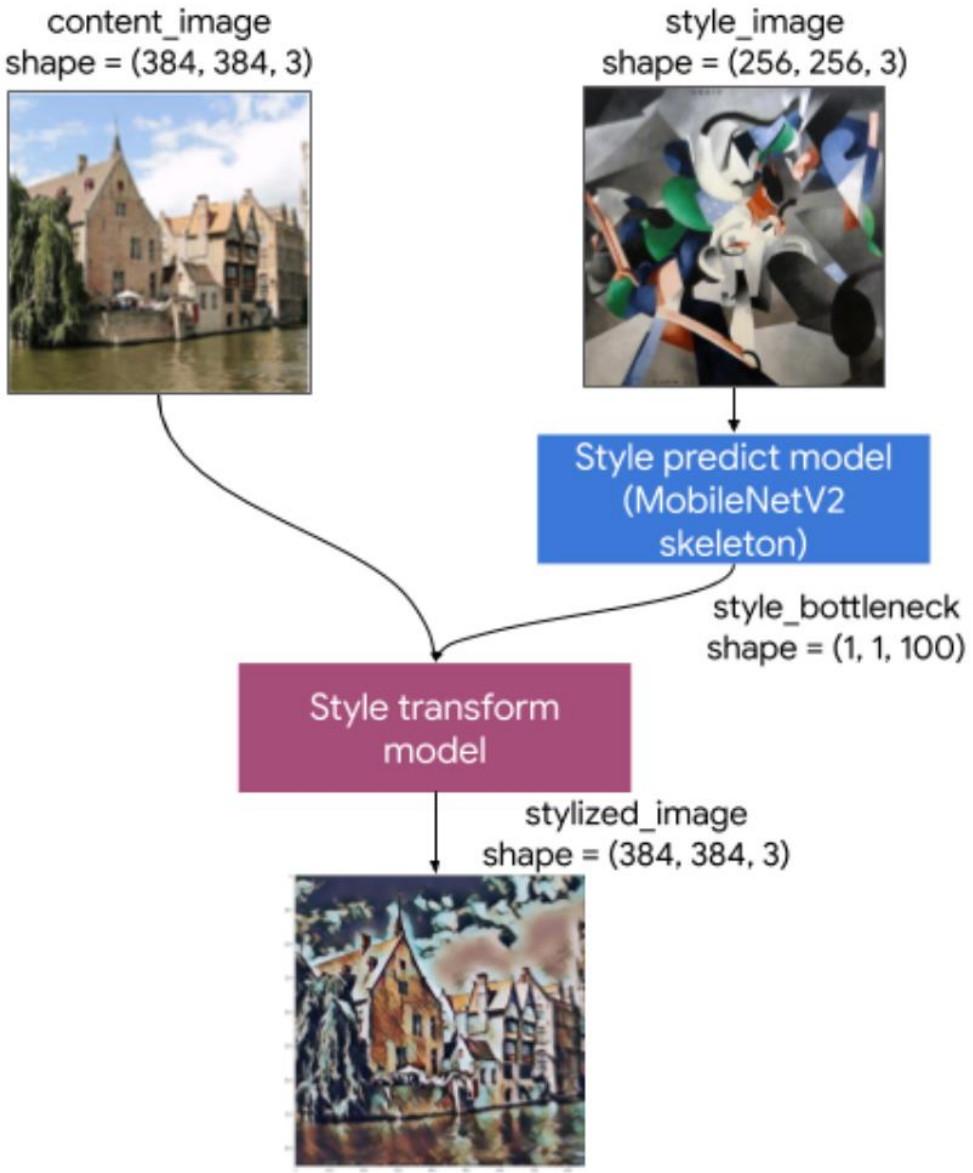
Style Transfer

❖ Introduction

https://www.tensorflow.org/lite/examples/style_transfer/overview

Style Transfer

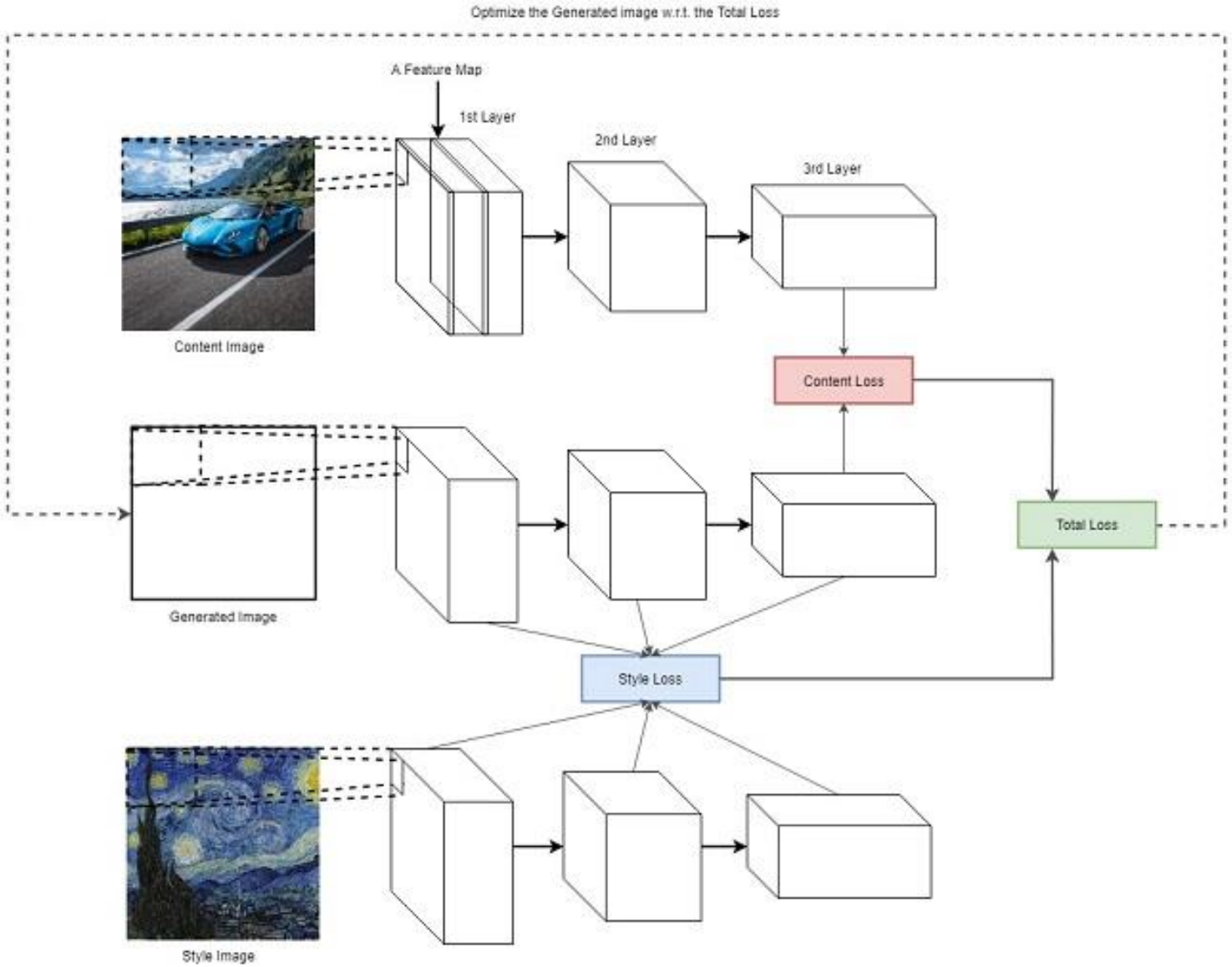
❖ Introduction



https://www.tensorflow.org/lite/examples/style_transfer/overview

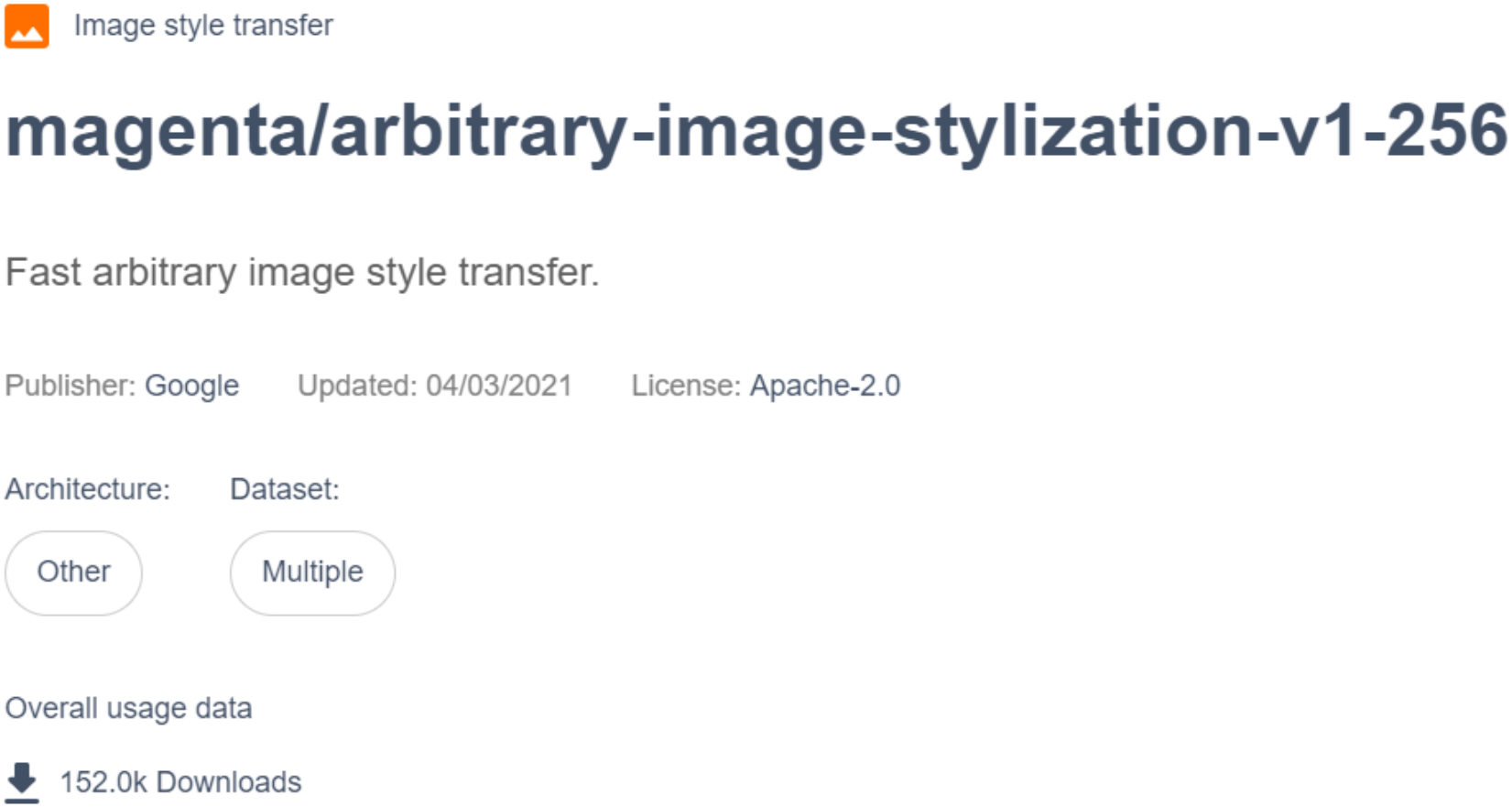
Style Transfer

❖ Introduction



Style Transfer

❖ Tensorflow Hub



https://tfhub.dev/google/magenta/arbitrary-image-stylization-v1-256/2

Style Transfer

- **Tensorflow Hub**
  - **Demo**

Style Image

Content Image

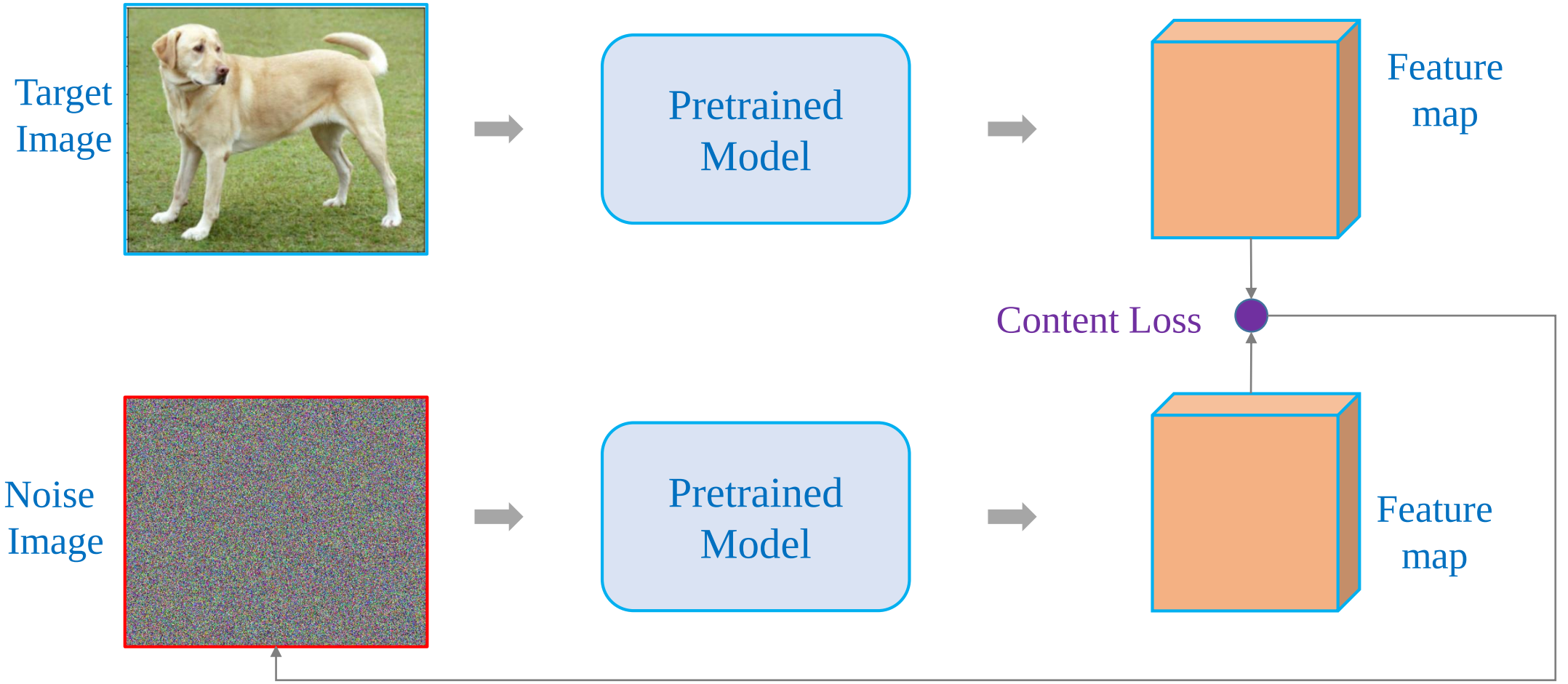
Generated Image

18.1.NeuralStyleTransfer-TFHub.ipynb

Content Loss

Style Transfer

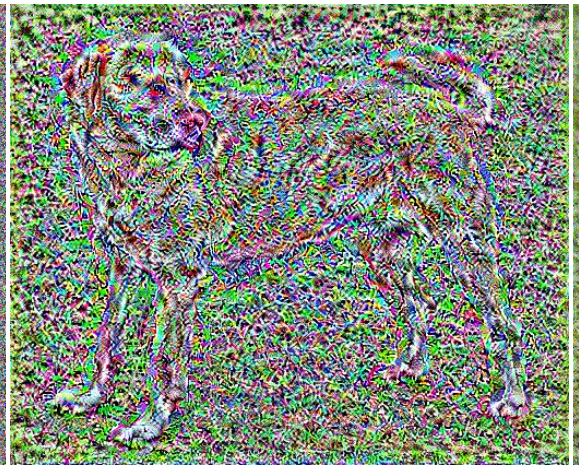
❖ Content Loss

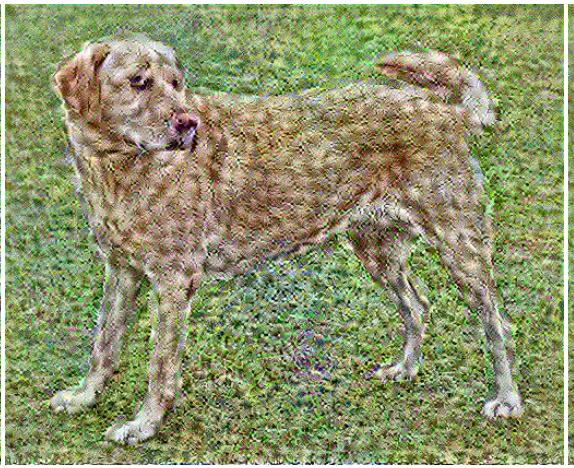


Style Transfer

❖ Content Loss


Init Image


Epoch 1


Epoch 10


Epoch 20


Epoch 40


Epoch 70

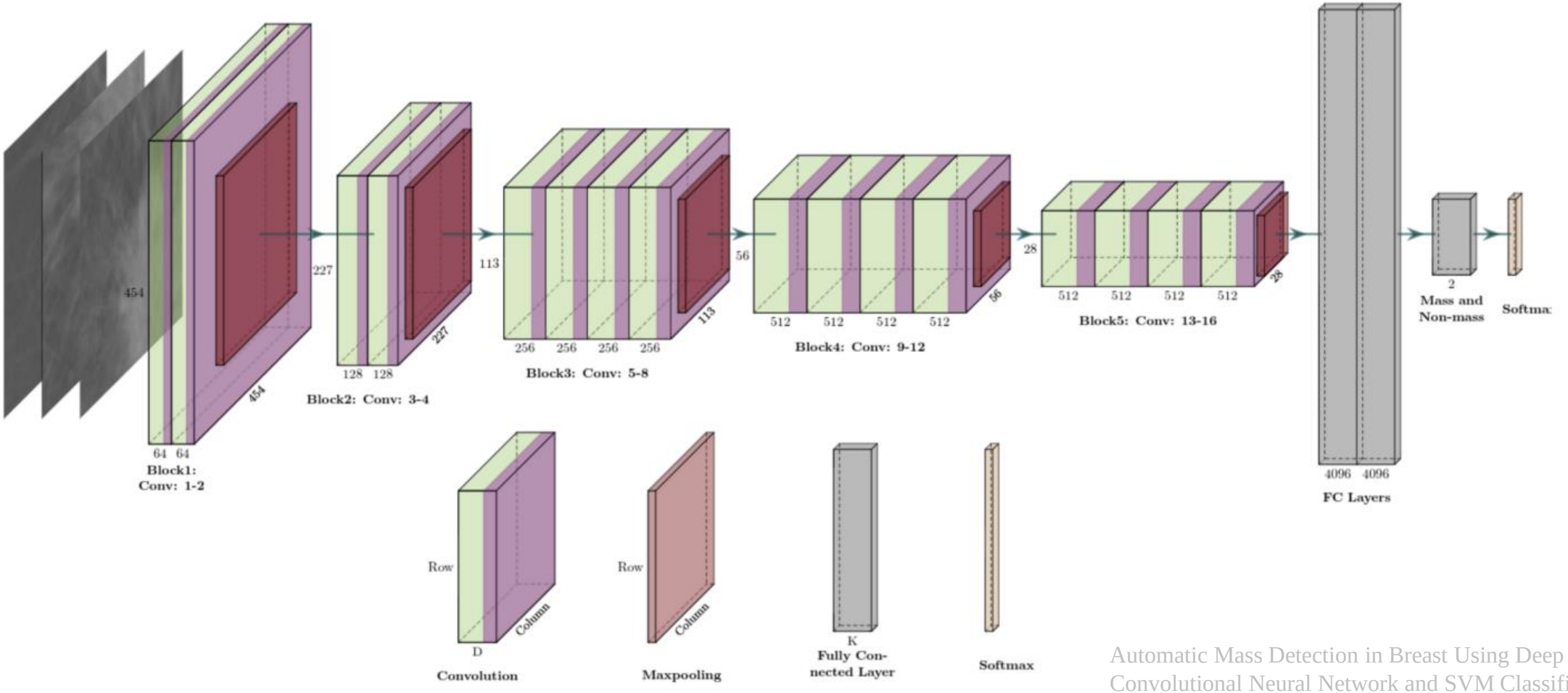

Epoch 100


Target Image

Style Transfer

❖ Content Loss

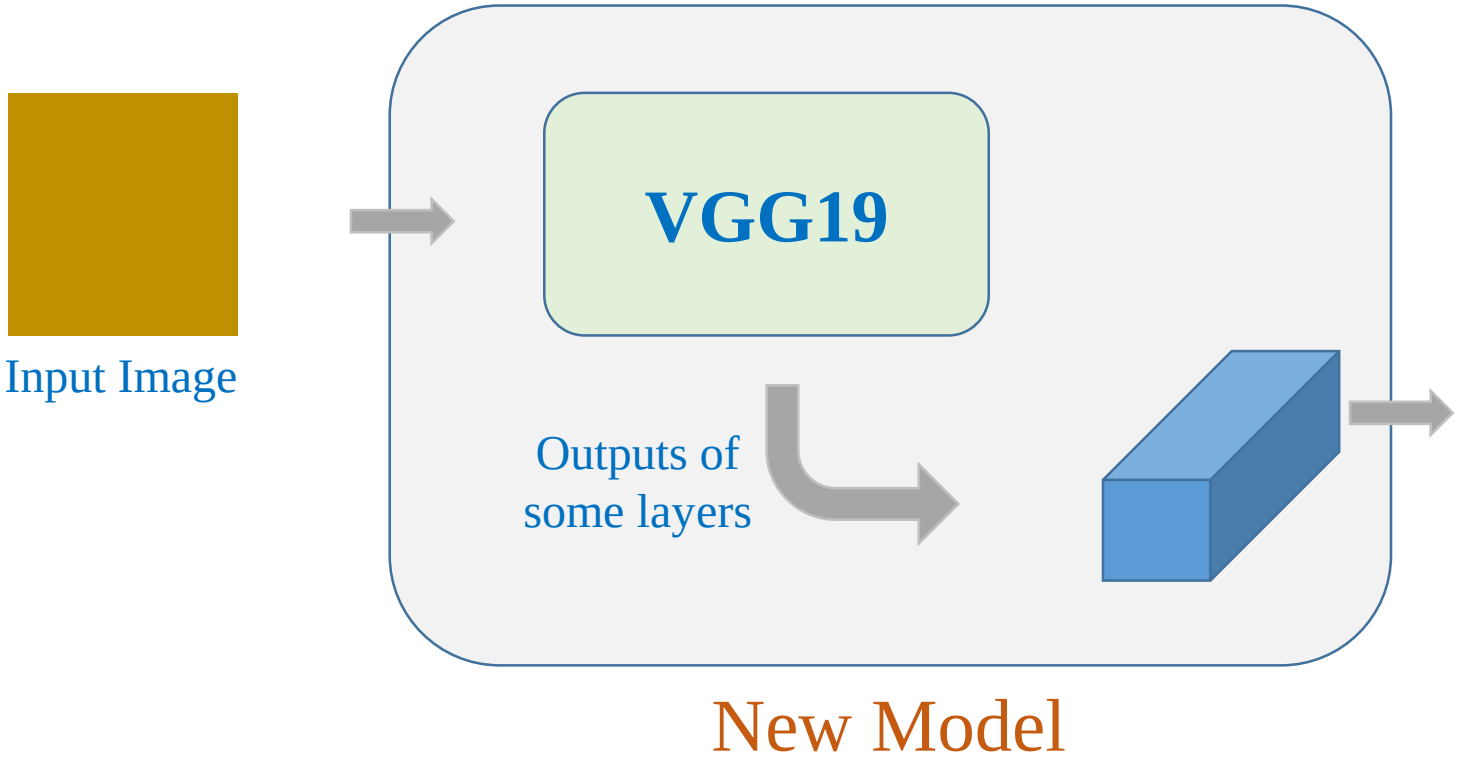
❖ Create a model from some specific layers



Style Transfer

❖ Content Loss

❖ Create a model from some specific layers



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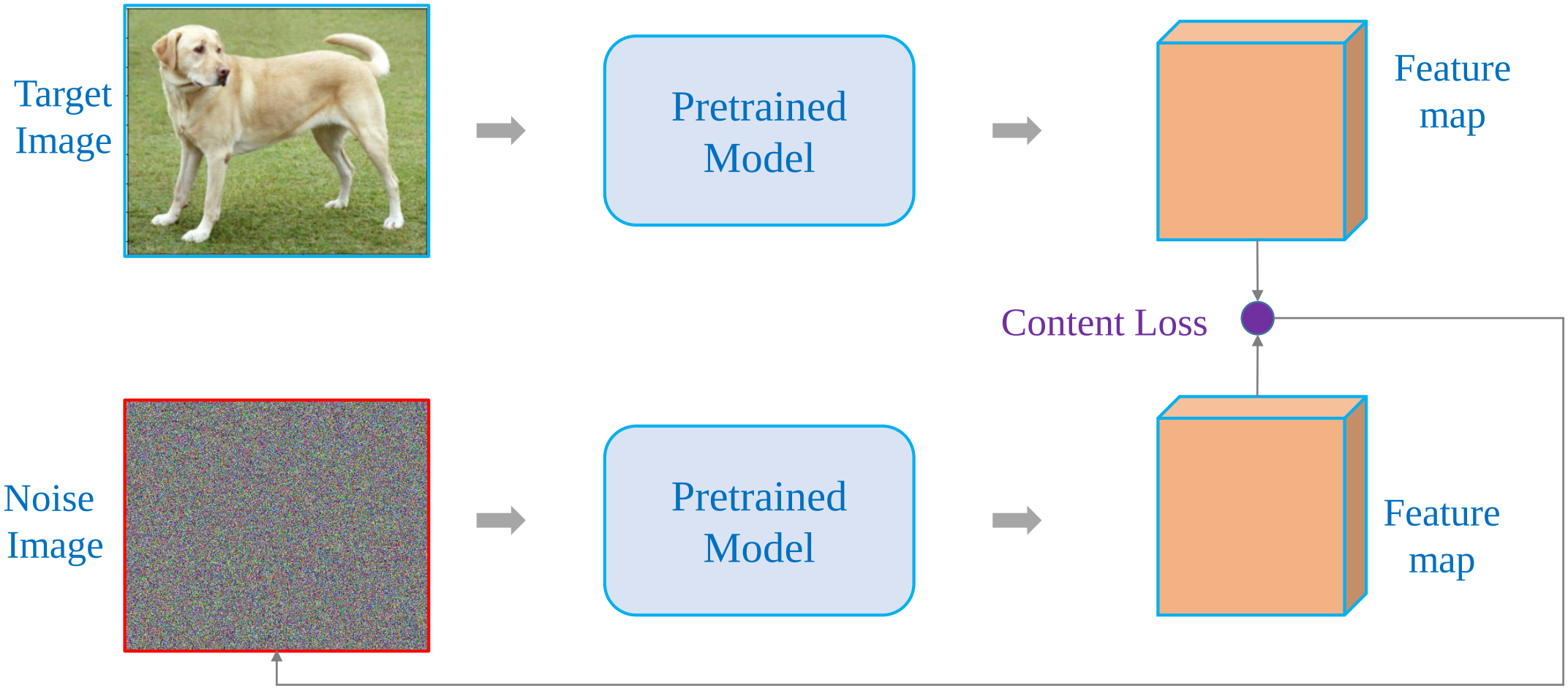
❖ Content Loss: Demo



18.3.Style_transfer_content_loss_1L.ipynb

Style Transfer

❖ Content Loss: Demo

❖ Some util function

```
1  import tensorflow as tf
2
3  url = 'https://storage.googleapis.com/download.tensorflow.org/example_images/YellowLabradorLooking_new.jpg'
4  file_name = 'YellowLabradorLooking_new.jpg'
5  path = tf.keras.utils.get_file(file_name, url)
```

```
Downloading data from https://storage.googleapis.com/download.tensorflow.org/example_images/YellowLabradorLooking_new.jpg
90112/83281 [==============================] - 0s 1us/step
```

```
1  img = tf.io.read_file(path)
2  img = tf.image.decode_image(img, channels=3)
3  print(img.shape)
4  print(type(img))
```

```
(577, 700, 3)
<class 'tensorflow.python.framework.ops.EagerTensor'>
```

```
1  print(tf.math.reduce_min(img))
2  print(tf.math.reduce_max(img))
```

```
tf.Tensor(0, shape=(), dtype=uint8)
tf.Tensor(255, shape=(), dtype=uint8)
```

```
1  img = tf.image.convert_image_dtype(img, tf.float32)
2  print(tf.math.reduce_min(img))
3  print(tf.math.reduce_max(img))
```

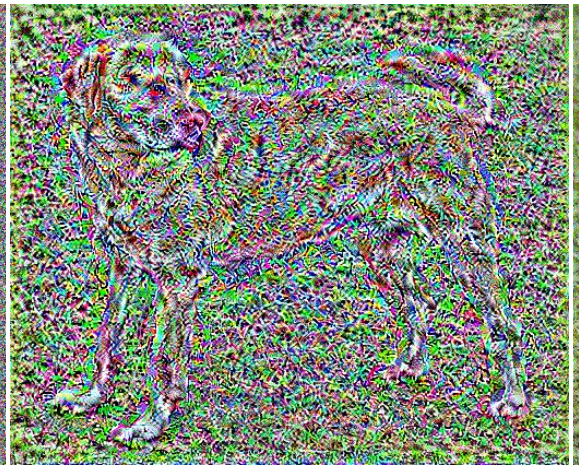
```
tf.Tensor(0.0, shape=(), dtype=float32)
tf.Tensor(1.0, shape=(), dtype=float32)
```

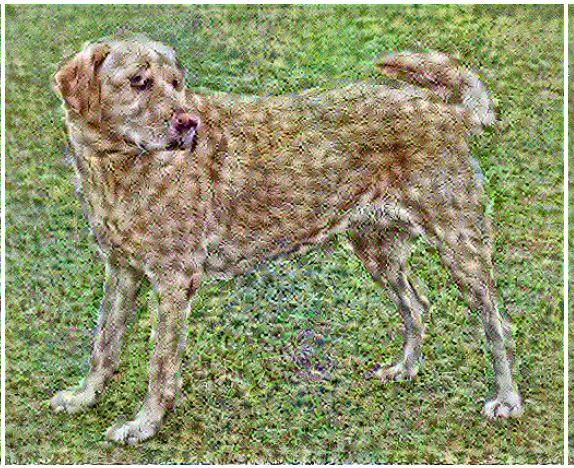
Style Transfer

❖ Content Loss: Demo

18.3.Style_transfer_content_loss_1L.ipynb


Init Image


Epoch 1


Epoch 10


Epoch 20


Epoch 40

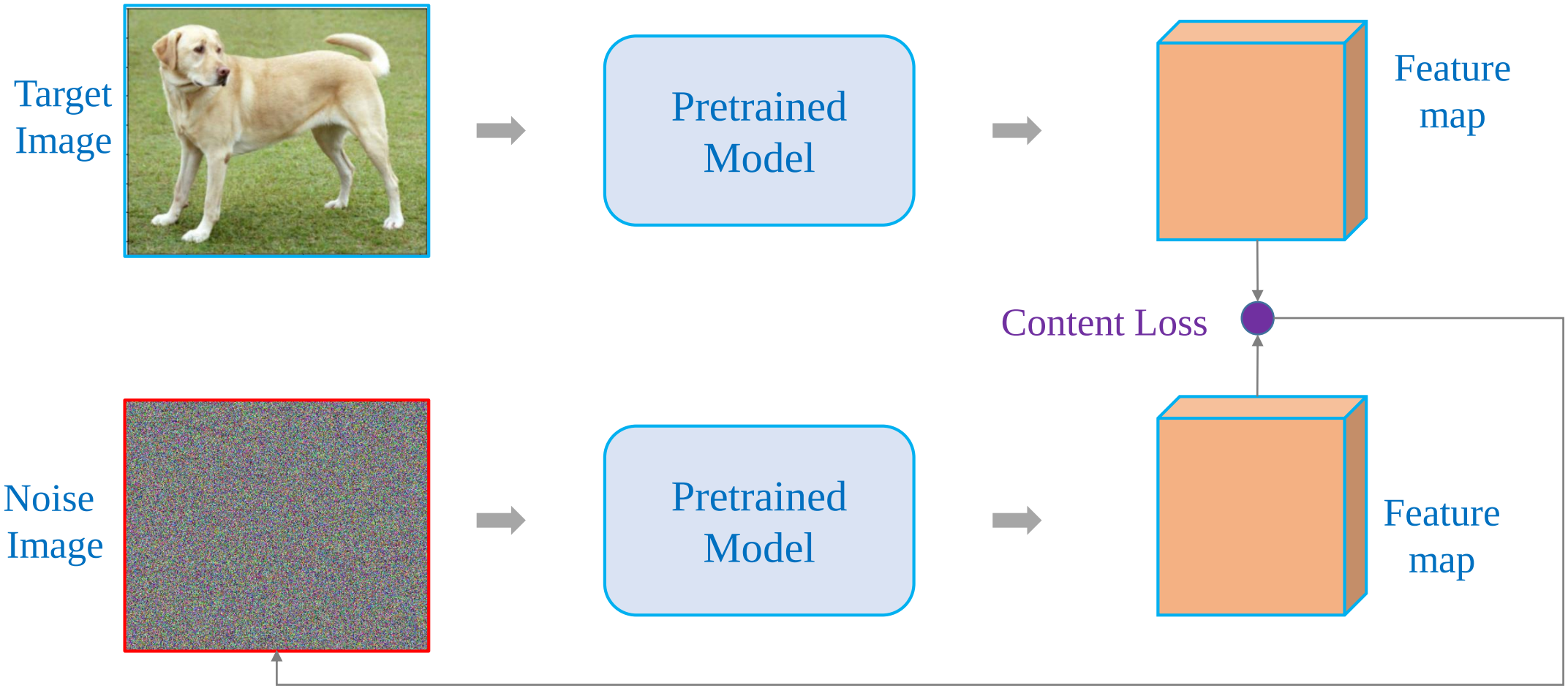

Epoch 70


Epoch 100


Target Image

Style Transfer

❖ Content Loss: Demo

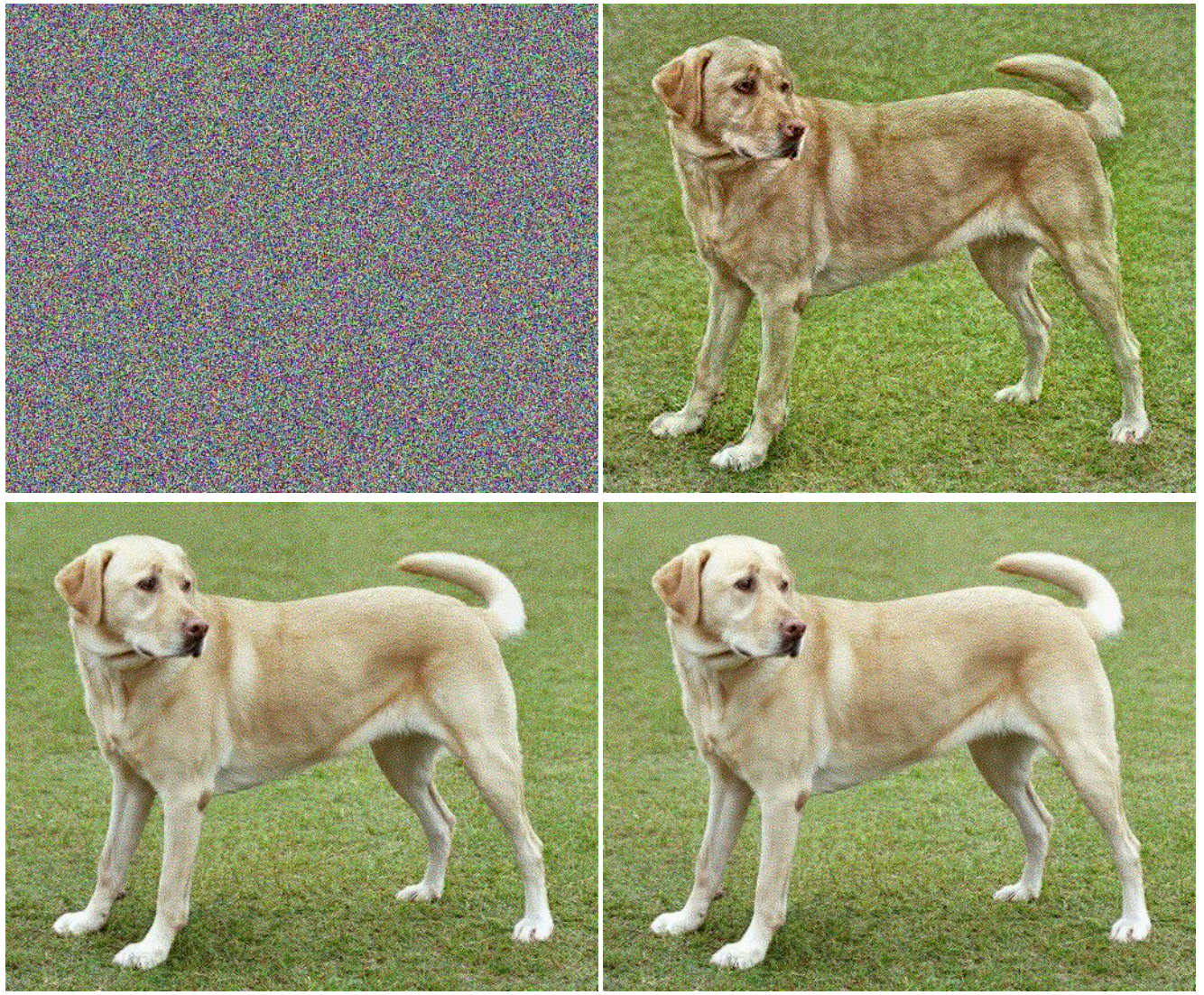


18.4.Style_transfer_content_loss_3L.ipynb

Style Transfer

❖ Content Loss: Demo

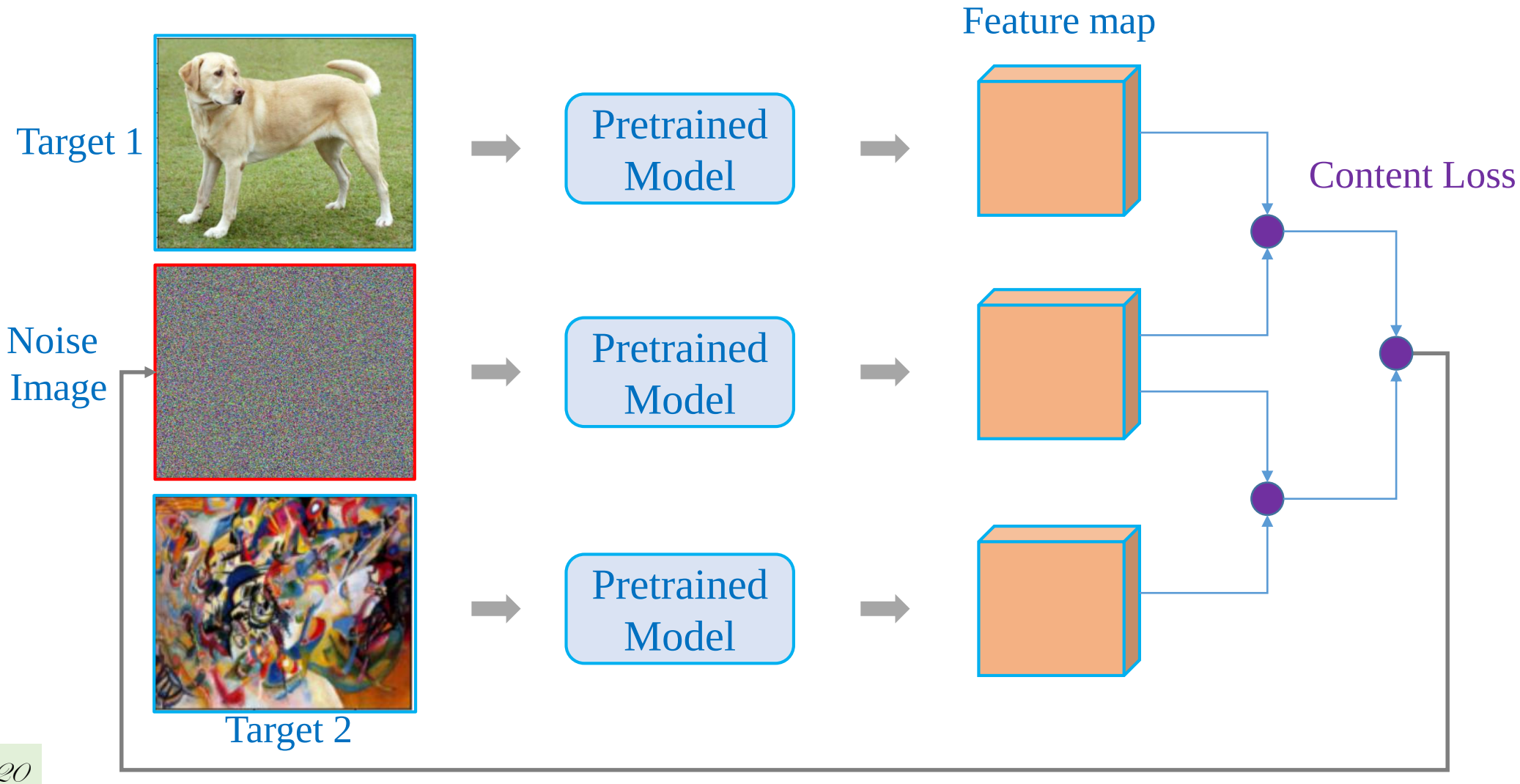
18.4.Style_transfer_content_loss_3L.ipynb



Style Transfer

8.5.Style_transfer_2content_loss.ipynb

❖ Content Loss: Demo



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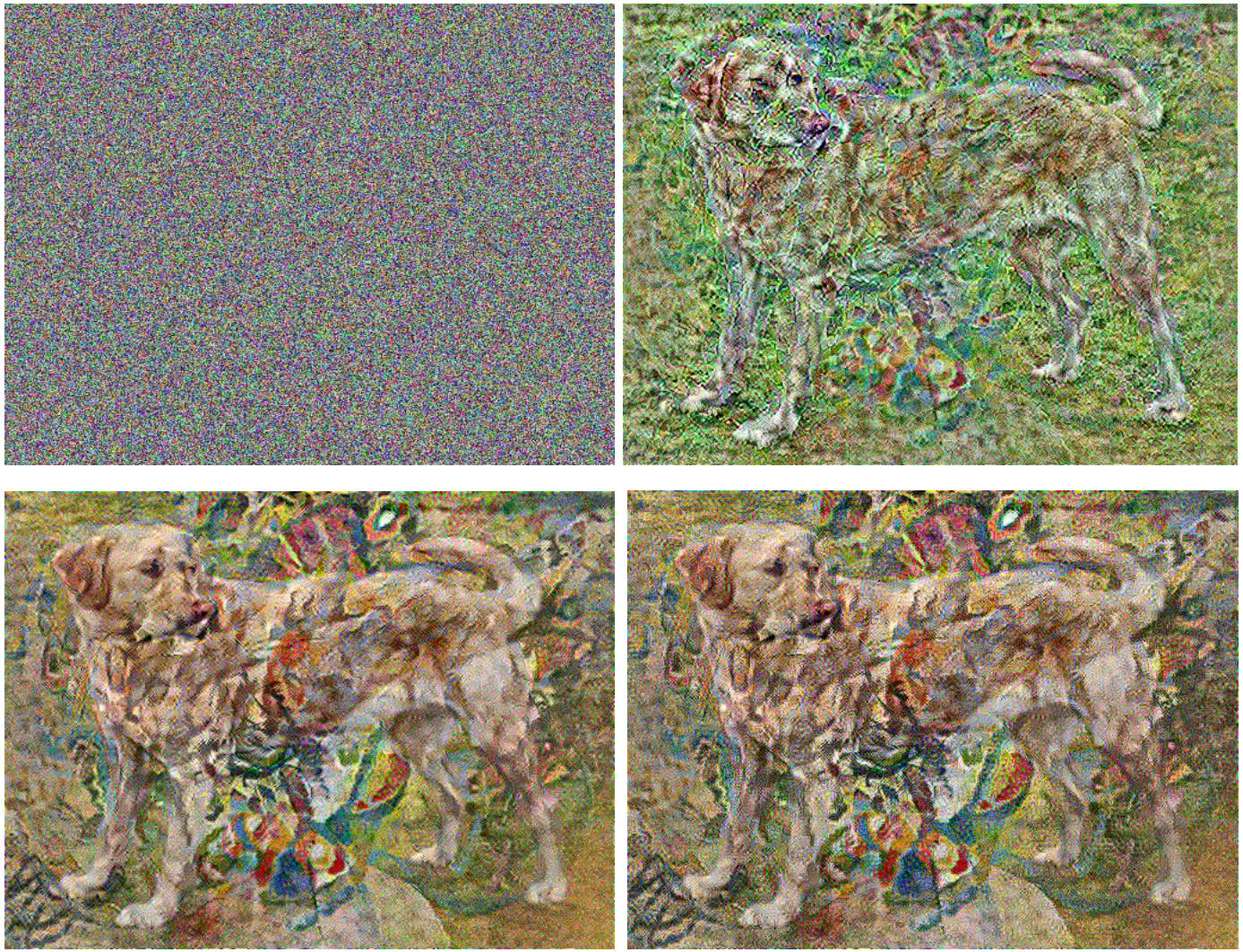
❖ Content Loss: Demo

8.5.Style_transfer_2content_loss.ipynb



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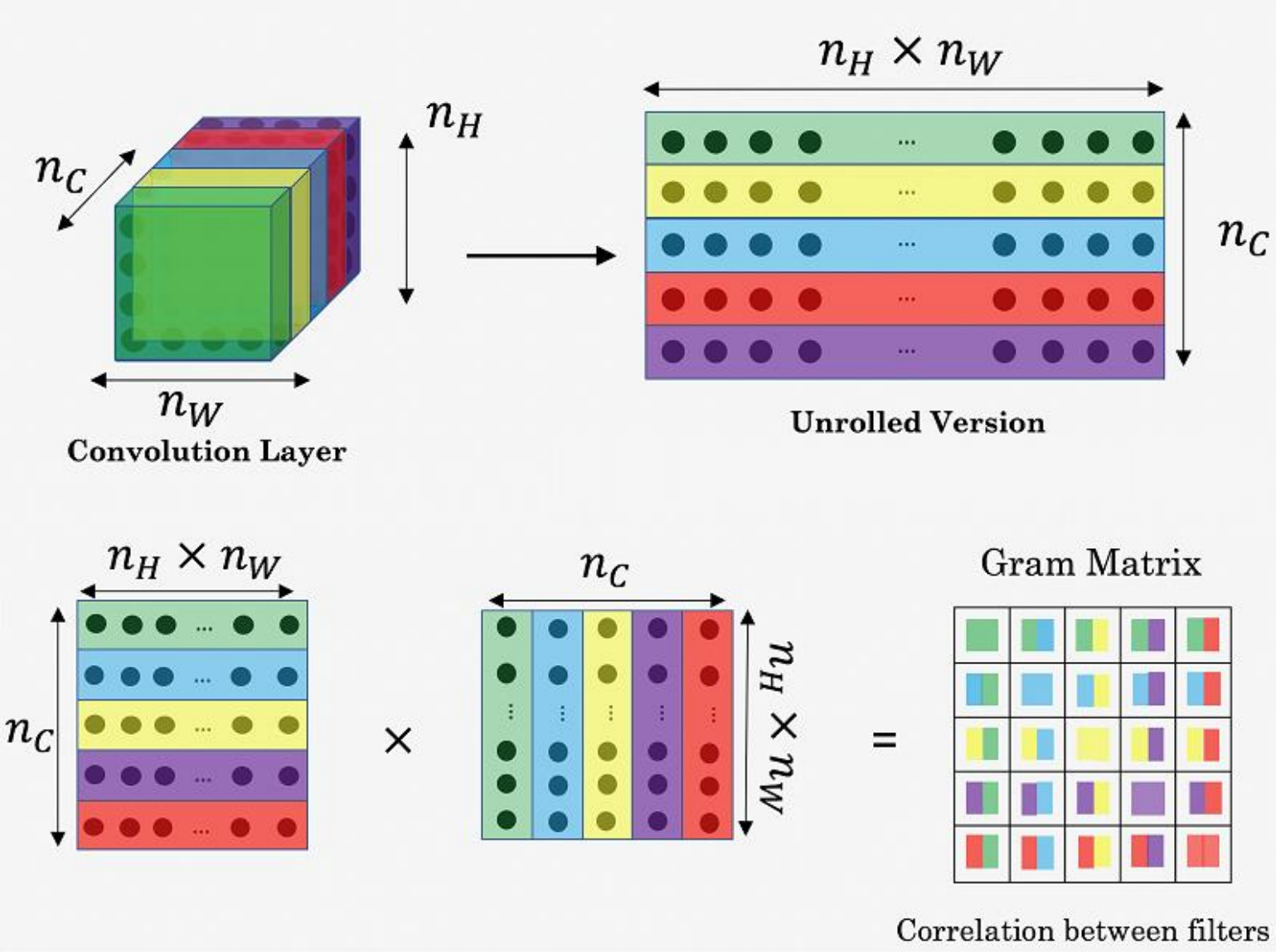
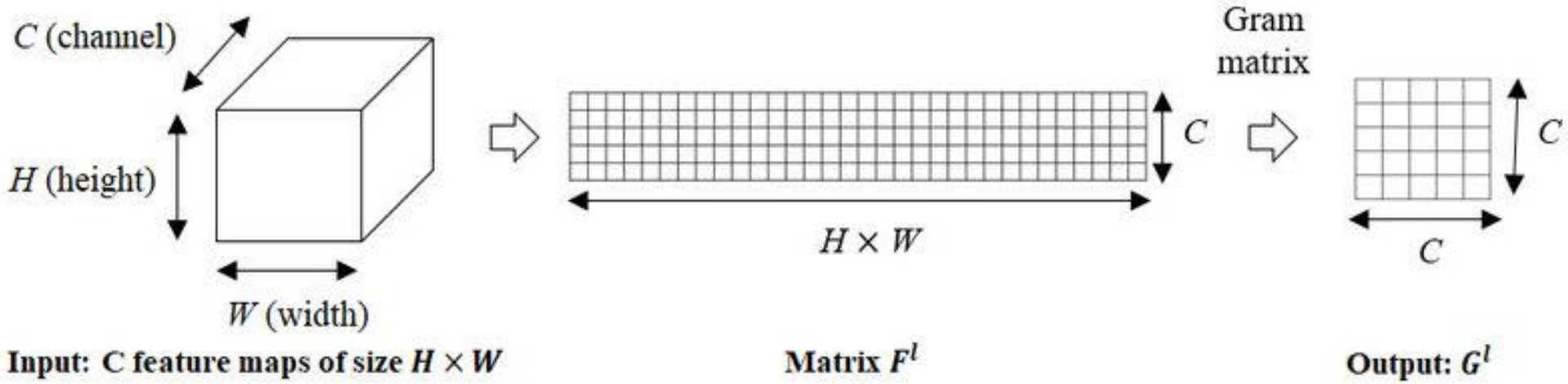
❖ Style Loss

https://pytorchtaipei.github.io/articles/PyTorchTP-Style-Transfer/



Style Transfer

❖ Images in files

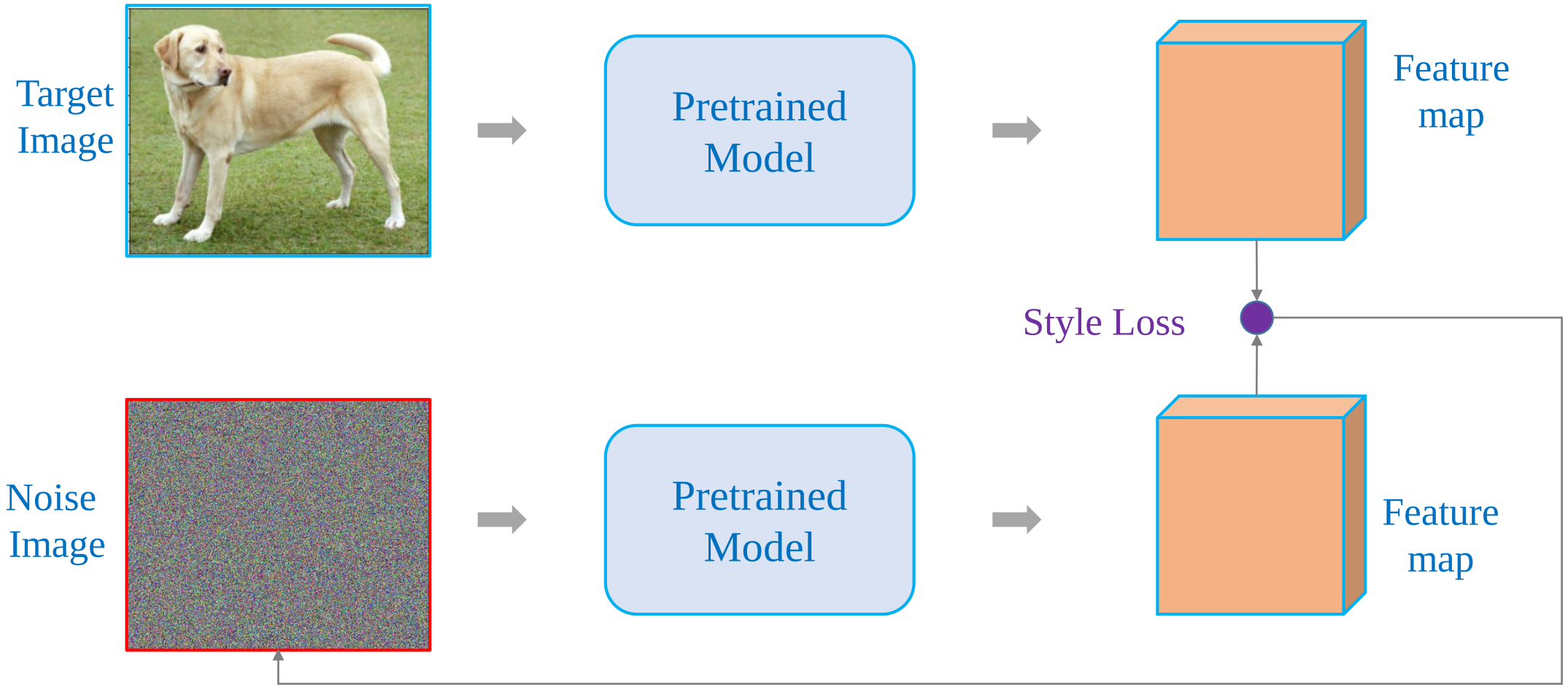


fPADnet: Small and Efficient Convolutional Neural Network for Presentation Attack Detection

Demo

Style Transfer

❖ Style Loss: Demo

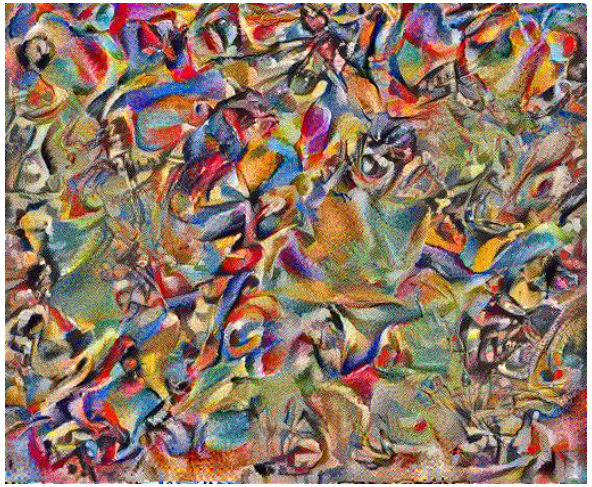


Style Transfer

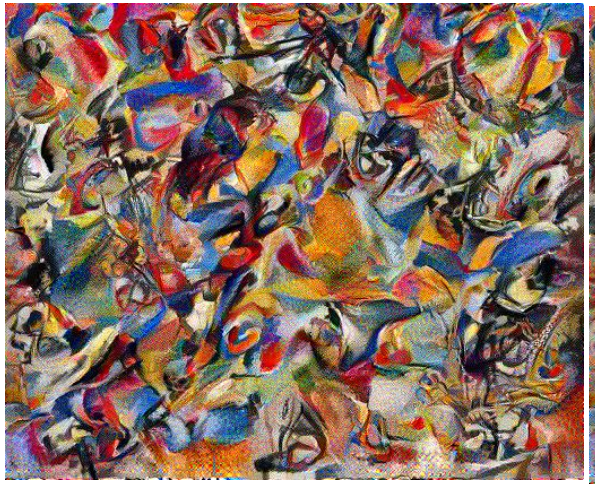
❖ Result 1

Target Image

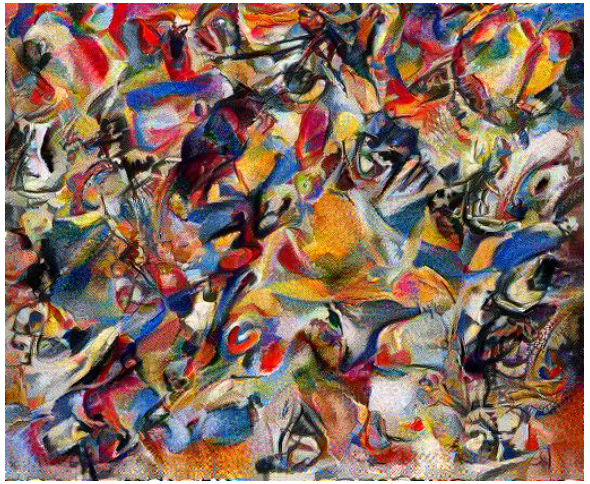
Init Image



Epoch 10



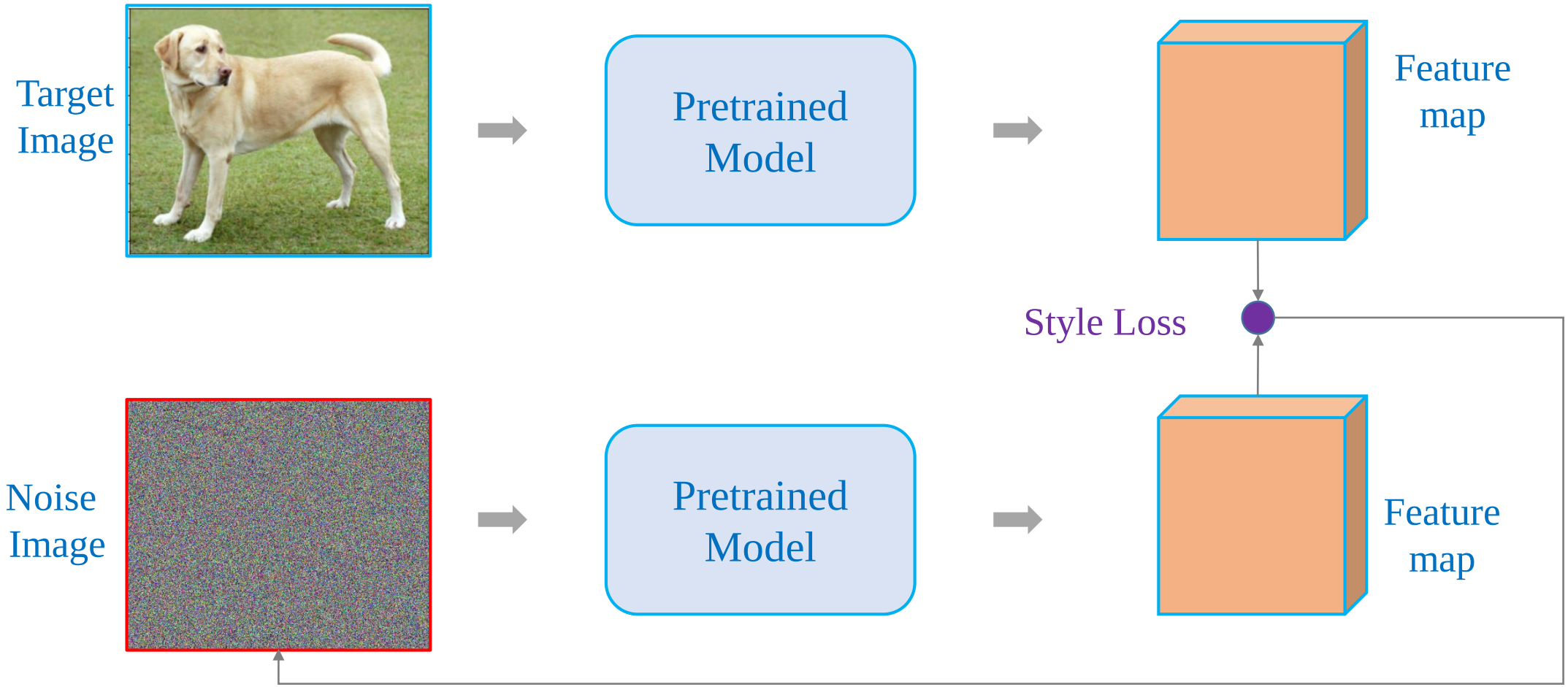
Epoch 40



Epoch 90

Style Transfer

❖ Style Loss: Demo



18.6.Style_transfer_style_loss_v2.ipynb

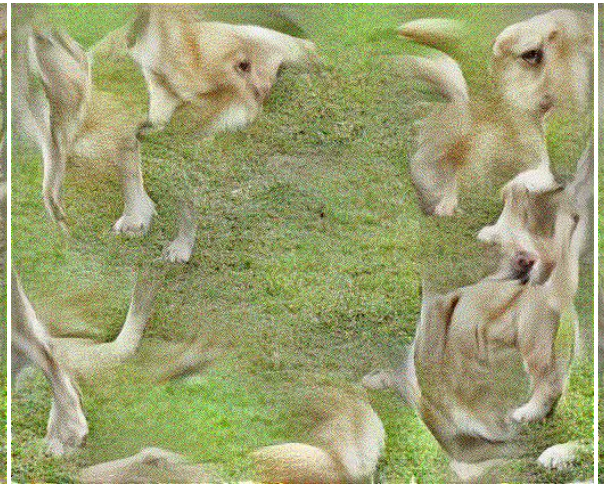
Style Transfer

❖ Result 2

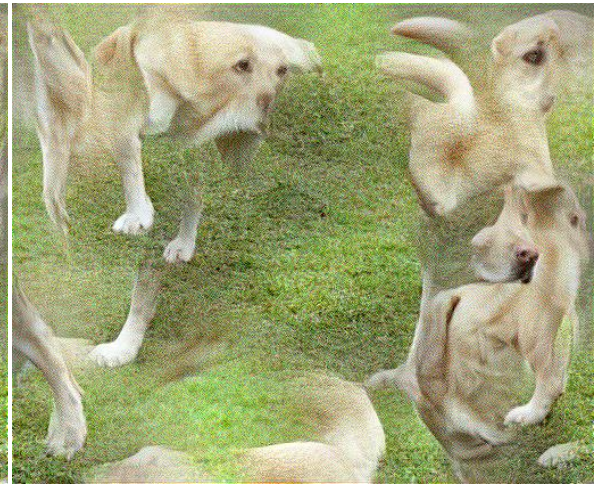
Target Image

Init Image

Epoch 10



Epoch 40

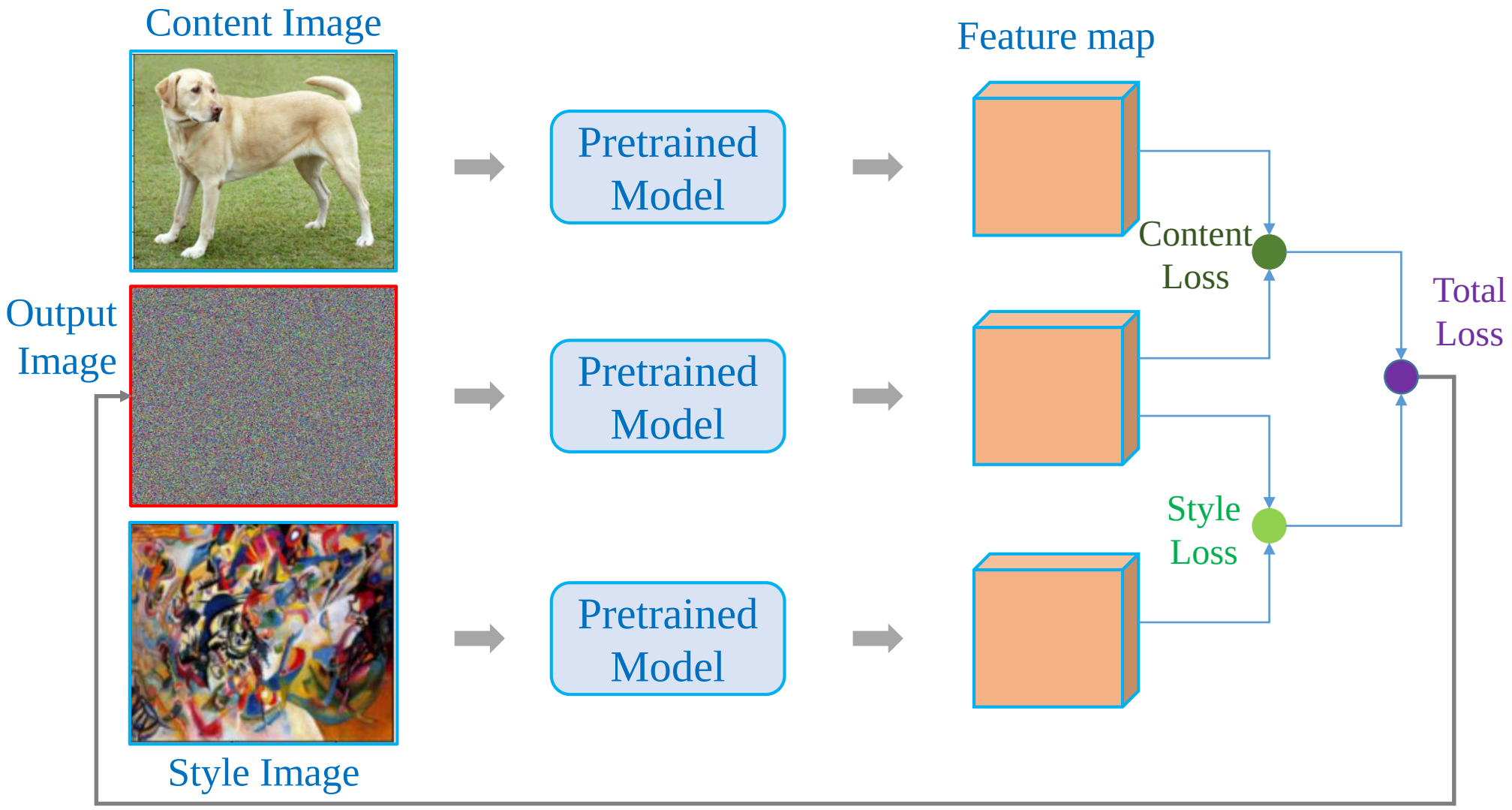


Epoch 90

Content Loss + Style Loss

Style Transfer

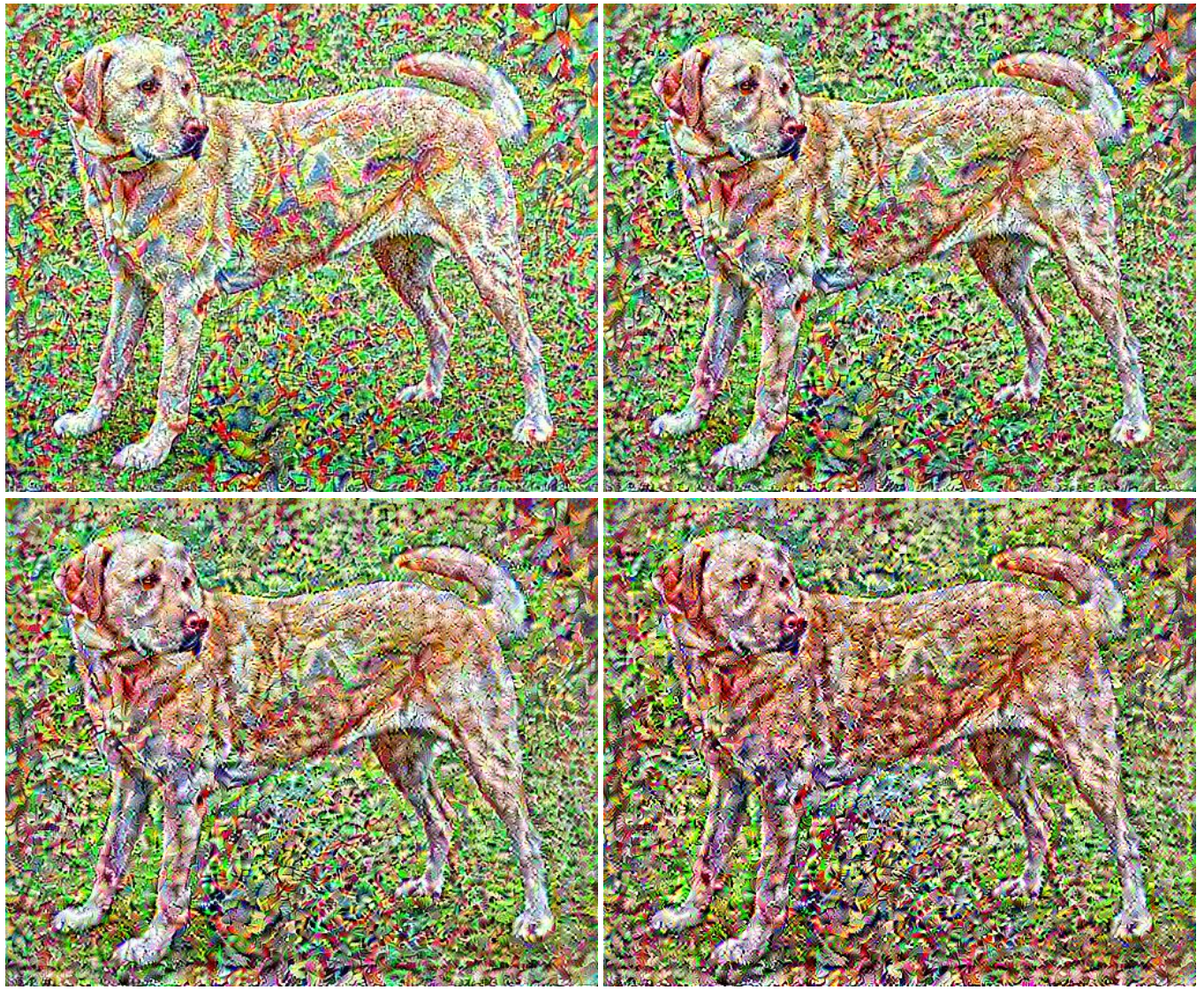
❖ Content Loss + Style Loss



Style Transfer

❖ Content Loss + Style Loss

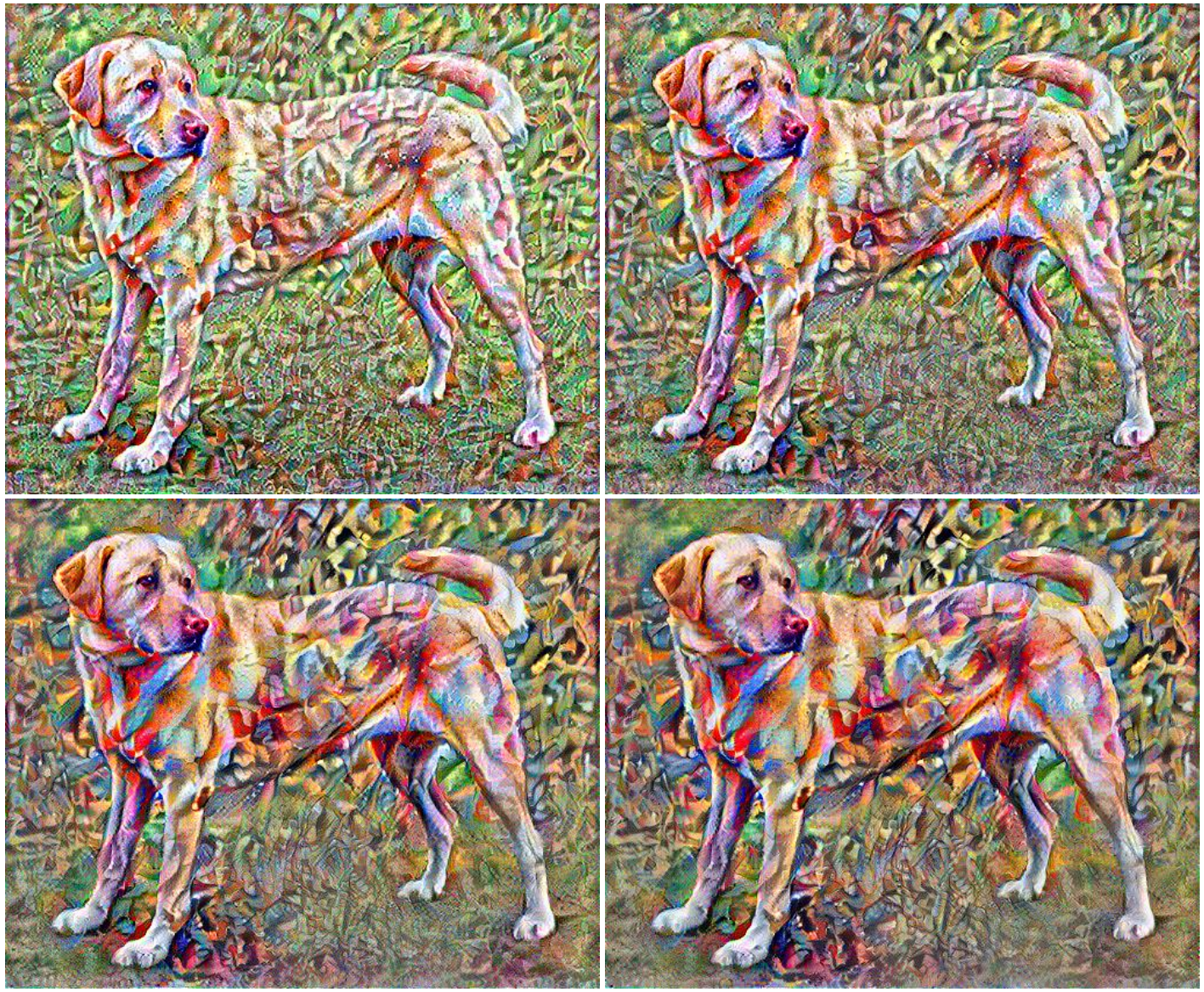
18.8.Style_transfer_1L.ipynb



Style Transfer

❖ **Content Loss + Style Loss**

18.9.Style_transfer_main.ipynb



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Multi-modal Style Transfer

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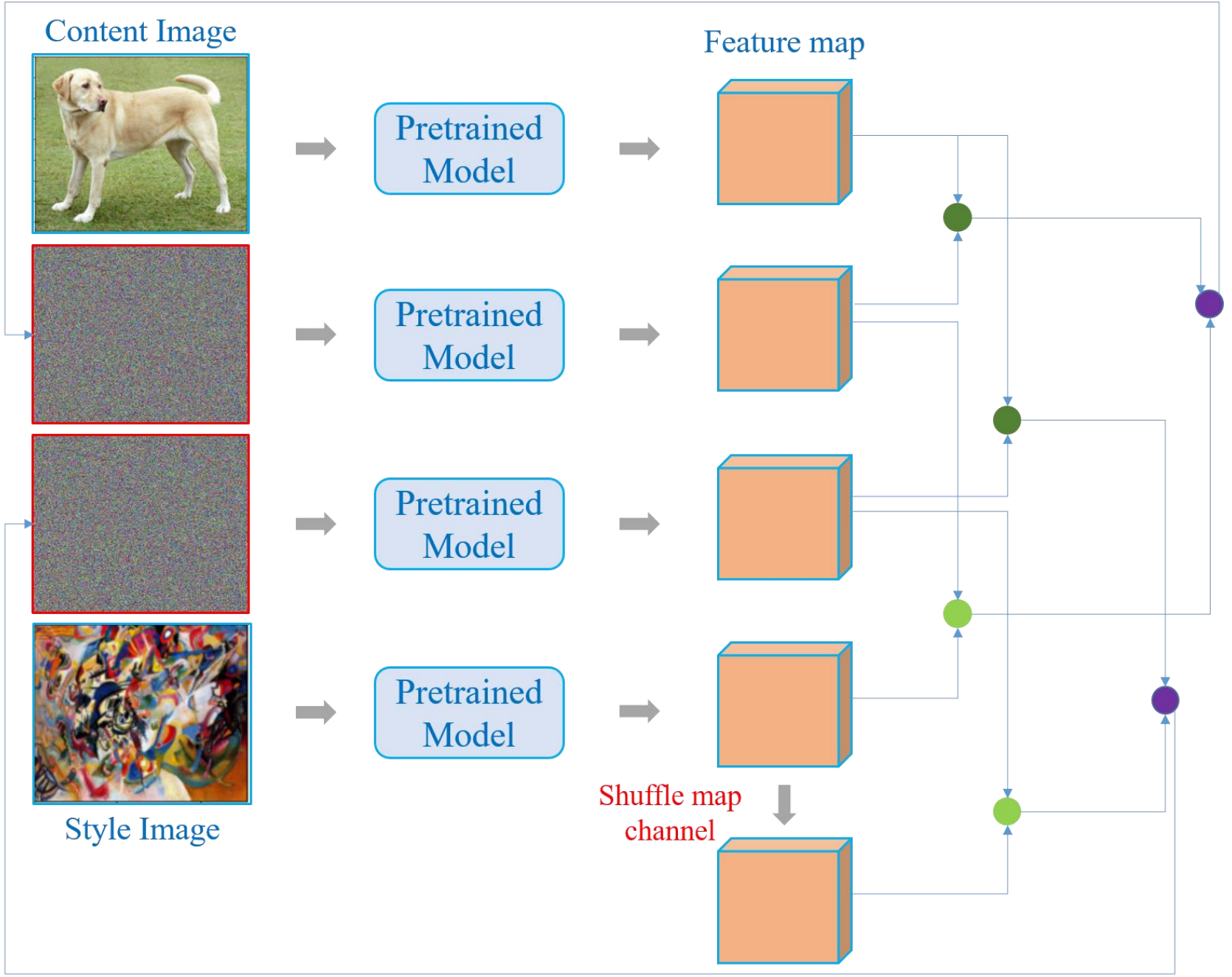
Multi-modal Style Transfer

Multi-modal
Style Transfer



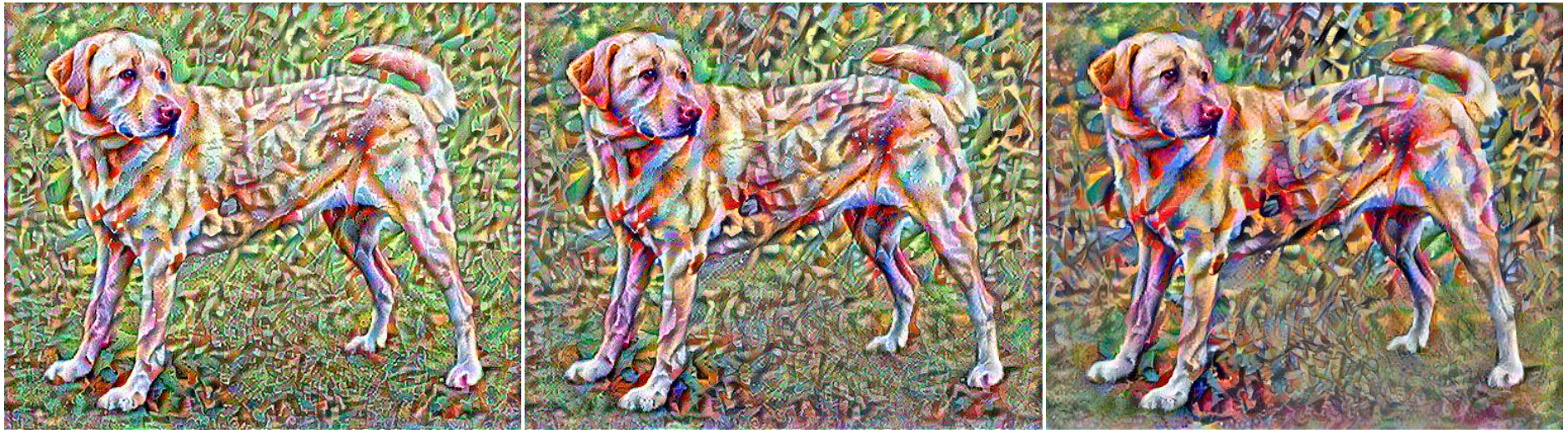
18.10.Style_transfer_rolling_2output.ipynb

Style Loss Content Loss Total Loss

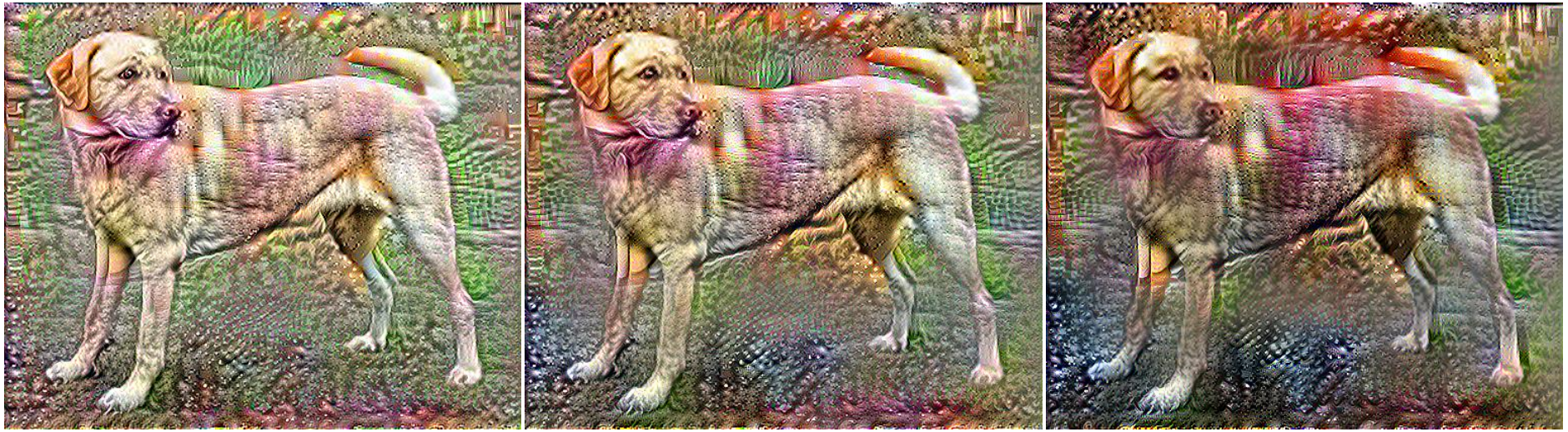
Multi-modal Style Transfer

❖ Shuffle feature maps

Output Image 1



Output Image 2




Thank you!