In [6]:

```
import os
import pandas as pd
from skimage import io
from torchmetrics.functional import structural_similarity_index_measure as ssim
import lpips
import torch
from torchvision import transforms
from skimage import io
import numpy as np
import pandas as pd
import os
```

In [7]:

```
# Initialize the LPIPS model for CPU
lpips_model = lpips.LPIPS(net='alex').to('cpu')  # Specify .to('cpu') to ensure it's on CPU

def load_image(image_path, size=128):
    transform = transforms.Compose([
        transforms.ToTensor(),
        transforms.Resize((size, size))  # Resize images for consistency
    ])
    image = io.imread(image_path)
    if len(image.shape) == 2:  # Convert grayscale to RGB
        image = np.stack((image,)*3, axis=-1)
    image = transform(image)
    return image.unsqueeze(0)  # Add batch dimension, ensure it's on CPU

def calculate_ssim(image1, image2):
    return ssim(image1, image2, data_range=1.0).item()

def calculate_lpips(image1, image2, model):
    """Calculate LPIPS similarity between two images, ensuring computation on CPU."""
    distance = model(image1, image2)
    return distance.item()

# Directory paths
style_image_path = 'images/Vassily_Kandinsky_1913_-_Composition_7.jpg'
content_image_path = 'images/YellowLabradorLooking_new.jpg'
stylized_dir = 'TO_Test'

# Load content and style images
content_image = load_image(content_image_path)
style_image = load_image(style_image_path)

image_filenames = os.listdir(stylized_dir)

# Initialize a dataframe
df = pd.DataFrame(columns=['Image','SSIM_Content_Stylized', 'SSIM_Style_Stylized', 'LPIPS_Content_Stylized', 'LPIPS_Style_Stylized'])

for filename in image_filenames:
    stylized_image_path = os.path.join(stylized_dir, filename)

    # Load images
    stylized_image = load_image(stylized_image_path)

    # Calculate SSIM
    ssim_content_stylized = calculate_ssim(content_image, stylized_image)
    ssim_style_stylized = calculate_ssim(style_image, stylized_image)

    # Calculate LPIPS
    lpips_content_stylized = calculate_lpips(content_image, stylized_image, lpips_model)
    lpips_style_stylized = calculate_lpips(style_image, stylized_image, lpips_model)
    # Append new metrics to your DataFrame
    temp_df = pd.DataFrame({
        'Image': [filename],
        'SSIM_Content_Stylized': [ssim_content_stylized],
        'SSIM_Style_Stylized': [ssim_style_stylized],
        'LPIPS_Content_Stylized': [lpips_content_stylized],
        'LPIPS_Style_Stylized': [lpips_style_stylized]
    })

    df = pd.concat([df, temp_df], ignore_index=True)

print(df)
df.to_csv('style_transfer_evaluation_results.csv', index=False)
```

```
Setting up [LPIPS] perceptual loss: trunk [alex], v[0.1], spatial [off]
```

```
C:\Users\agish\AppData\Roaming\Python\Python311\site-packages\torchvision\models\_utils.p
y:208: UserWarning: The parameter 'pretrained' is deprecated since 0.13 and may be remove
d in the future, please use 'weights' instead.
  warnings.warn(
C:\Users\agish\AppData\Roaming\Python\Python311\site-packages\torchvision\models\_utils.p
y:223: UserWarning: Arguments other than a weight enum or `None` for 'weights' are deprec
ated since 0.13 and may be removed in the future. The current behavior is equivalent to pa
ssing `weights=AlexNet_Weights.IMAGENET1K_V1`. You can also use `weights=AlexNet_Weights.
DEFAULT` to get the most up-to-date weights.
  warnings.warn(msg)
```

```
Loading model from: C:\Users\agish\AppData\Roaming\Python\Python311\site-packages\lpips\w
eights\v0.1\alex.pth
```

```
C:\Users\agish\AppData\Roaming\Python\Python311\site-packages\torchmetrics\utilities\prin
ts.py:70: FutureWarning: Importing `spectral_angle_mapper` from `torchmetrics.functional`
was deprecated and will be removed in 2.0. Import `spectral_angle_mapper` from `torchmetr
ics.image` instead.
  _future_warning(
C:\Users\agish\AppData\Local\Temp\ipykernel_8592\3274831208.py:60: FutureWarning: The beh
avior of DataFrame concatenation with empty or all-NA entries is deprecated. In a future
version, this will no longer exclude empty or all-NA columns when determining the result
dtypes. To retain the old behavior, exclude the relevant entries before the concat operat
ion.
  df = pd.concat([df, temp_df], ignore_index=True)
```

```
                                   Image  SSIM_Content_Stylized  \
0             final_image_high_style.png               0.103495
1              final_image_low_style.png               0.248896
2           final_image_medium_style.png               0.127011
3              final_image_one_style.png               0.104304
4   optimized_texture_lambda_0.01_19.png               0.072074
5    optimized_texture_lambda_0.1_19.png               0.186903
6    optimized_texture_lambda_0.5_19.png               0.283619
7    optimized_texture_lambda_1.0_19.png               0.270222
8   optimized_texture_lambda_10.0_19.png               0.262274
9  optimized_texture_lambda_100.0_19.png               0.394982

   SSIM_Style_Stylized  LPIPS_Content_Stylized  LPIPS_Style_Stylized
0             0.021157                0.764977              0.417668
1             0.020347                0.594752              0.464101
2             0.023764                0.735808              0.409485
3             0.020578                0.764103              0.410221
4             0.035123                0.610063              0.291381
5             0.036702                0.568409              0.321124
6             0.027888                0.549586              0.353494
7             0.026421                0.530652              0.370212
8             0.023171                0.457469              0.511135
9             0.036040                0.125170              0.560232
```

In [8]:

```
df
```

Out[8]:

Image SSIM_Content_Stylized SSIM_Style_Stylized LPIPS_Content_Stylized LPIPS_Style_St

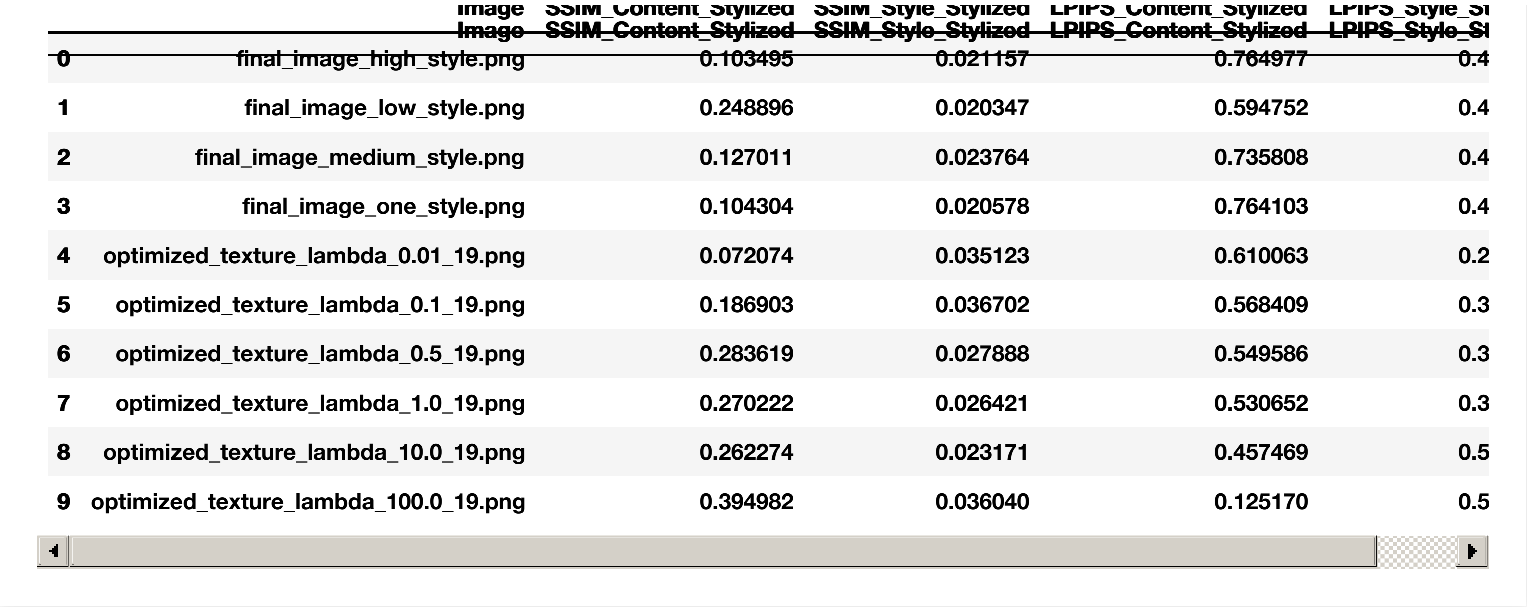

Image SSIM_Content_Stylized SSIM_Style_Stylized LPIPS_Content_Stylized LPIPS_Style_St

	Image	SSIM_Content_Stylized	SSIM_Style_Stylized	LPIPS_Content_Stylized	LPIPS_Style_St
0	final_image_high_style.png	0.103495	0.021157	0.764977	0.4
1	final_image_low_style.png	0.248896	0.020347	0.594752	0.4
2	final_image_medium_style.png	0.127011	0.023764	0.735808	0.4
3	final_image_one_style.png	0.104304	0.020578	0.764103	0.4
4	optimized_texture_lambda_0.01_19.png	0.072074	0.035123	0.610063	0.2
5	optimized_texture_lambda_0.1_19.png	0.186903	0.036702	0.568409	0.3
6	optimized_texture_lambda_0.5_19.png	0.283619	0.027888	0.549586	0.3
7	optimized_texture_lambda_1.0_19.png	0.270222	0.026421	0.530652	0.3
8	optimized_texture_lambda_10.0_19.png	0.262274	0.023171	0.457469	0.5
9	optimized_texture_lambda_100.0_19.png	0.394982	0.036040	0.125170	0.5