

```
In [1]: import matplotlib.pyplot as plt
import numpy as np
import cv2
```

```
In [2]: STYLE_IMAGE_DIR = "images/style/"
CONTENT_IMAGE_DIR = "images/content/"
OUT_DIR = "images/output/"
```

IMAGES RENDERED using coloraware on Gatys' Fig 2 image and styles

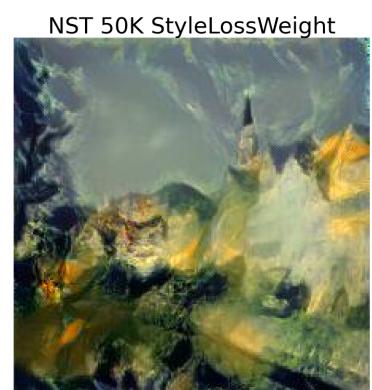
Neural Style Transfer paper: <https://arxiv.org/abs/1508.06576>

```
In [3]: STYLE_NAME1= STYLE_IMAGE_DIR + "theShipwreck.jpg"
CONTENT_NAME1 = CONTENT_IMAGE_DIR + "Gatys_NST_Paper_ImageA.jpg"
bestShip = OUT_DIR + "bestGatys/best_Shipwreck_50k-pt35.jpg"

style_img1 = cv2.imread(STYLE_NAME1)
content_img1 = cv2.imread(CONTENT_NAME1)
bestShip_img1 = cv2.imread(bestShip)

plt.figure(figsize=(30, 10))
plt.rcParams['font.size'] = 26
plt.subplot(1,3,1)
plt.axis('off')
plt.imshow(style_img1[:, :, [2,1,0]])
plt.title('STYLE: The Shipwreck')
plt.subplot(1,3,2)
plt.axis('off')
plt.imshow(content_img1[:, :, [2,1,0]])
plt.title('Content: Gatys Fig 2A')
plt.subplot(1,3,3)
plt.axis('off')
plt.imshow(bestShip_img1[:, :, [2,1,0]])
plt.title('NST 50K StyleLossWeight')
```

```
Out[3]: Text(0.5, 1.0, 'NST 50K StyleLossWeight')
```



```
In [4]: STYLE_NAME2= STYLE_IMAGE_DIR + "starryNight.jpg"
CONTENT_NAME2 = CONTENT_IMAGE_DIR + "Gatys_NST_Paper_ImageA.jpg"
```

```

bestStarry = OUT_DIR + "bestGatys/best_Starry_1kLoss-pt35.png"

style_img2 = cv2.imread(STYLE_NAME2)
content_img2 = cv2.imread(CONTENT_NAME2)
bestStarry_img = cv2.imread(bestStarry)

plt.figure(figsize=(30, 20))
plt.rcParams['font.size'] = 26 #increase font of outputs
plt.subplot(1,3,1)
plt.axis('off')
plt.imshow(style_img2[:, :, [2,1,0]])
plt.title('STYLE: Starry Night')
plt.subplot(1,3,2)
plt.axis('off')
plt.imshow(content_img2[:, :, [2,1,0]])
plt.title('Content: Gatys Fig 2A')
plt.subplot(1,3,3)
plt.axis('off')
plt.imshow(bestStarry_img[:, :, [2,1,0]])
plt.title('NST 1000 StyleLossWeight')

```

Out[4]: Text(0.5, 1.0, 'NST 1000 StyleLossWeight')



In [5]:

```

STYLE_NAME3= STYLE_IMAGE_DIR + "theScream.jpg"
CONTENT_NAME3 = CONTENT_IMAGE_DIR + "Gatys_NST_Paper_ImageA.jpg"
bestScream = OUT_DIR + "bestGatys/best_Scream_500-pt35.png"

style_img3 = cv2.imread(STYLE_NAME3)
content_img3 = cv2.imread(CONTENT_NAME3)
bestScream_img = cv2.imread(bestScream)

plt.figure(figsize=(30, 20))
plt.rcParams['font.size'] = 26
plt.subplot(1,3,1)
plt.axis('off')
plt.imshow(style_img3[:, :, [2,1,0]])
plt.title('STYLE: The Scream')
plt.subplot(1,3,2)
plt.axis('off')
plt.imshow(content_img3[:, :, [2,1,0]])
plt.title('Content: Gatys Fig 2A')
plt.subplot(1,3,3)
plt.axis('off')

```

```
plt.imshow(bestScream_img[:, :, [2, 1, 0]])
plt.title('NST 500 StyleLossWeight')
```

Out[5]: Text(0.5, 1.0, 'NST 500 StyleLossWeight')

STYLE: The Scream



Content: Gatys Fig 2A



NST 500 StyleLossWeight



```
STYLE_NAME4 = STYLE_IMAGE_DIR + "femmeNueAssise.jpg"
CONTENT_NAME4 = CONTENT_IMAGE_DIR + "Gatys_NST_Paper_ImageA.jpg"
bestFemme = OUT_DIR + "bestGatys/best_Femme_50k-pt30.png"

style_img4 = cv2.imread(STYLE_NAME4)
content_img4 = cv2.imread(CONTENT_NAME4)
bestFemme_img = cv2.imread(bestFemme)

plt.figure(figsize=(30, 20))
plt.rcParams['font.size'] = 26
plt.subplot(1, 3, 1)
plt.axis('off')
plt.imshow(style_img4[:, :, [2, 1, 0]])
plt.title('STYLE: Femme nue assise')
plt.subplot(1, 3, 2)
plt.axis('off')
plt.imshow(content_img4[:, :, [2, 1, 0]])
plt.title('Content: Gatys Fig 2A')
plt.subplot(1, 3, 3)
plt.axis('off')
plt.imshow(bestFemme_img[:, :, [2, 1, 0]])
plt.title('NST 50k StyleLossWeight')
```

Out[6]: Text(0.5, 1.0, 'NST 50k StyleLossWeight')

STYLE: Femme nue assise



Content: Gatys Fig 2A



NST 50k StyleLossWeight



```
In [7]: STYLE_NAME5= STYLE_IMAGE_DIR + "composition_VII.jpg"
CONTENT_NAME5 = CONTENT_IMAGE_DIR + "Gatys_NST_Paper_ImageA.jpg"
bestComp7 = OUT_DIR + "bestGatys/best_Comp7_500-pt35.png"

style_img5 = cv2.imread(STYLE_NAME5)
content_img5 = cv2.imread(CONTENT_NAME5)
bestComp7_img = cv2.imread(bestComp7)

plt.figure(figsize=(30, 20))
plt.rcParams['font.size'] = 26
plt.subplot(1,3,1)
plt.axis('off')
plt.imshow(style_img5[:, :, [2,1,0]])
plt.title('STYLE: Composition VII')
plt.subplot(1,3,2)
plt.axis('off')
plt.imshow(content_img5[:, :, [2,1,0]])
plt.title('Content: Gatys Fig 2A')
plt.subplot(1,3,3)
plt.axis('off')
plt.imshow(bestComp7_img[:, :, [2,1,0]])
plt.title('NST 500 StyleLossWeight')
```

Out[7]: Text(0.5, 1.0, 'NST 500 StyleLossWeight')

STYLE: Composition VII



Content: Gatys Fig 2A



NST 500 StyleLossWeight



Directory Lists for Styles Rendered for Gatys Paper Comparision and Showing Loss Progression

```
In [8]: OUT_DIR_SHIPWRECK = OUT_DIR + "gatysShipwreck/"
OUT_DIR_STARRY = OUT_DIR + "gatysStarry/"
OUT_DIR_SCREAM = OUT_DIR + "gatysScream/"
OUT_DIR_FEMME = OUT_DIR + "gatysFemme/"
OUT_DIR_COMP7 = OUT_DIR + "gatysComp7/"
directoryList = [OUT_DIR_SHIPWRECK, OUT_DIR_STARRY, OUT_DIR_SCREAM, OUT_DIR_FEMME, OUT_
```

Set of images from StyleLossWeight = 100,1000,10000,100000 similar range to Gatys' Paper Figure 3 (but on final image)

```
In [9]: #More images are available but this corresponds to the range shown in Gatys Paper F
#except that's at
#SHIPWRECK SET
images_shipwreck = ["gatysShipwreck_1hLoss_chroma_L2-sigma-pt35.jpg", "gatysShipwreck_1kLoss_chroma_L2-sigma-pt35.jpg", "gatysShipwreck_10kLoss_chroma_L2-sigma-pt35.jpg", "gatysShipwreck_100kLoss_chroma_L2-sigma-pt35.jpg"]

#STARRY NIGHT SET
images_starry = ["gatysStarry_1hLoss_chroma_L2-sigma-pt30.png", "gatysStarry_1kLoss_chroma_L2-sigma-pt30.png", "gatysStarry_10kLoss_chroma_L2-sigma-pt30.png", "gatysStarry_100kLoss_chroma_L2-sigma-pt30.png"]

#SCREAM SET
images_scream = ["gatysScream_1hLoss_chroma_L2-sigma-pt35.png", "gatysScream_1kLoss_chroma_L2-sigma-pt35.png", "gatysScream_10kLoss_chroma_L2-sigma-pt35.png", "gatysScream_100kLoss_chroma_L2-sigma-pt35.png"]

#FEMME SET
images_femme = ["gatysFemme_1hLoss_L2-sigma-pt25.png", "gatysFemme_1kLoss_L2-sigma-pt25.png", "gatysFemme_10kLoss_chroma_L2-sigma-pt30.png", "gatysFemme_100kLoss_chroma_L2-sigma-pt30.png"]

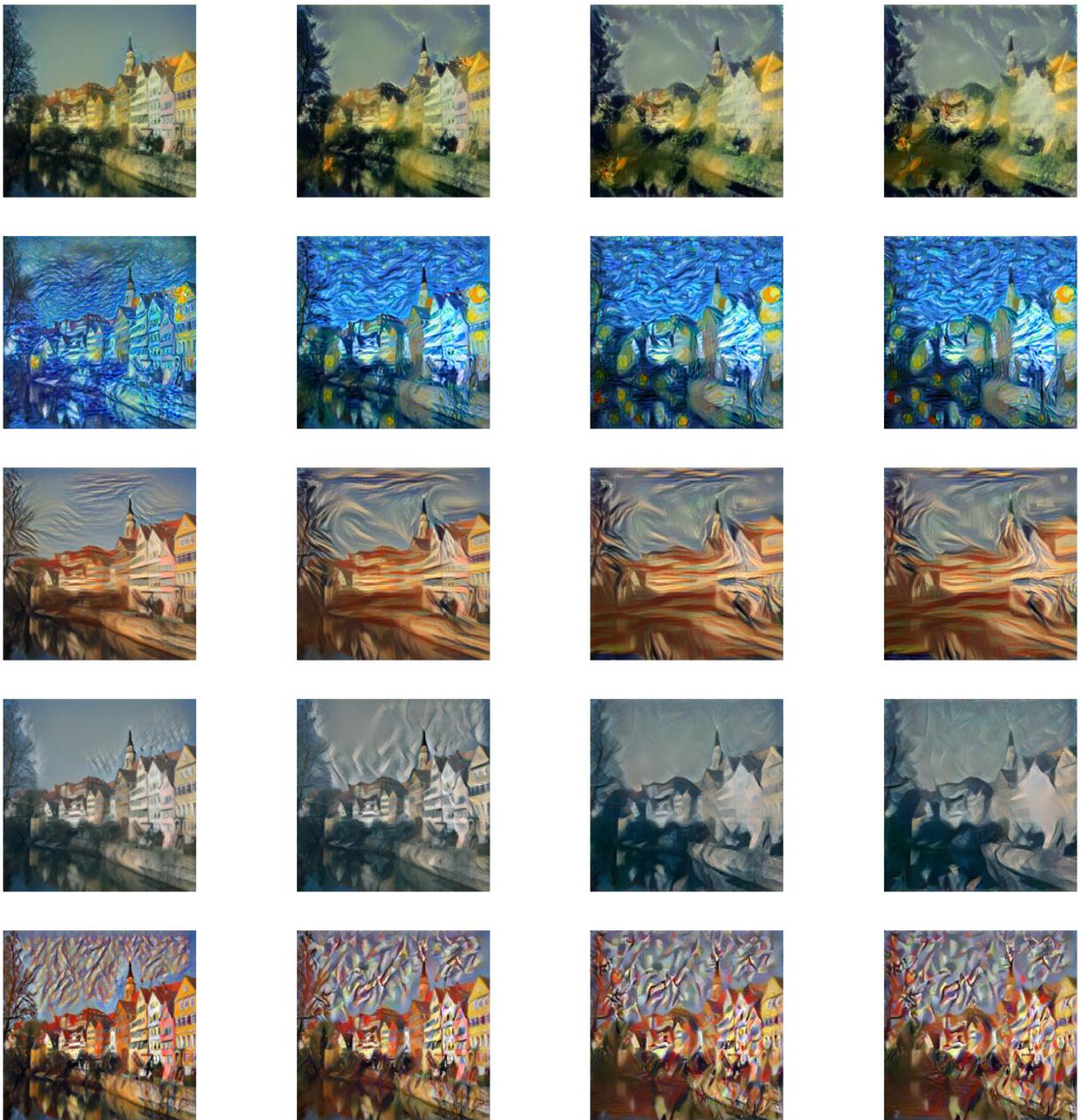
#COMPOSITION_VII SET
images_comp7 = ["gatysComp7_1hLoss_chroma_L2-sigma-pt35.png", "gatysComp7_1kLoss_chroma_L2-sigma-pt35.png", "gatysComp7_10kLoss_chroma_L2-sigma-pt35.jpg", "gatysComp7_100kLoss_chroma_L2-sigma-pt35.jpg"]

nFiles = 4
styleLoss = [1e-2, 1e-3, 1e-4, 1e-5] # content / style is style loss factor
images = [images_shipwreck, images_starry, images_scream, images_femme, images_comp7]
```

Displaying Images similar to Gatys Figure 3: Content Loss with Increased Style Weight

```
In [10]: nSet = len(images)
nImg = nFiles
nSet = len(images)
plt.figure(figsize=(30, 30))
plt.suptitle('Style Loss Weights 100,1000,10000,100000')
for i in range(nSet):
    for j in range(nFiles):
        fn = directoryList[i] + images[i][j]
        img = cv2.imread(fn)
        idx = i*nFiles+j+1
        plt.subplot(nSet, nImg, idx)
        plt.axis('off')
        plt.imshow(img[:, :, [2, 1, 0]])
```

Style Loss Weights 100,1000,10000,100000



Preparing Rendered Images for 9 Styles of the Golden Gate Bridge

```
In [11]: #PREPARING ORDER LIST FOR DISPLAY OF GoldenGate Bridge rendered with styles / conte  
  
listOfStyles = ["Picture", "The Shipwreck", "Starry Night", "The Scream", "Femme nue  
"Candy", "Mosaic", "Rain Princess", "Udnie"]  
  
imDIR = OUT_DIR + "bestGoldenGate/"  
imagesGoldenGate = ["golden_gate.jpg", "ggShipwreck_5kLoss_chroma_L2-sigma-pt35.jpg"  
"ggScream_1kLoss_chroma_L2-sigma-pt20.png", "ggFemme_10kLoss_chr  
"gg7_100kLoss_chroma_L2-sigma-pt40.png", "ggCandy_1kLoss_chroma_  
"ggMo_1kLoss_chroma_L2-sigma-pt30.png", "ggRP_100kLoss_chroma_L2
```

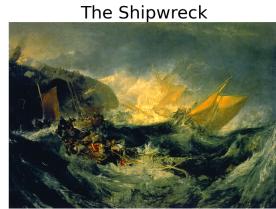
```
"ggUdnie_1kLoss_chroma_L2-pt40.png"]  
  
sDIR = STYLE_IMAGE_DIR  
styleImages = ["noStyle.png", "theShipwreck.jpg", "starryNight.jpg", "theScream.jpg", "  
    "candy.jpg", "mosaic.jpg", "rain-princess.jpg", "udnie.jpg"]
```

In [12]: #Displaying Images

```
nImg2 = len(listOfStyles)  
totalImg = 2*nImg  
  
plt.figure(figsize=(40, 40))  
#plt.suptitle(None)  
plt.rcParams['font.size'] = 26  
idx = 0  
for i in range(nImg2):  
    idx= 2*i+1  
    fnStyle = sDIR + styleImages[i]  
    fnImg = imDIR + imagesGoldenGate[i]  
    imgS = cv2.imread(fnStyle)  
    imgGG = cv2.imread(fnImg)  
    plt.subplot(nImg2//2,4,idx)  
    plt.axis('off')  
    plt.title(listOfStyles[i])  
    plt.imshow(imgS[:, :, [2,1,0]])  
    idx +=1  
    plt.subplot(nImg2//2,4,idx)  
    plt.axis('off')  
    plt.imshow(imgGG[:, :, [2,1,0]])
```

Picture

NO STYLE



Starry Night



The Scream



Femme nue assise



Composition VII



Candy



Mosaic



Rain Princess



Udnie



Failure of Color Method

```
In [19]: nFail = OUT_DIR + "gg_udnie_runs/ggUt_1kLoss_chroma_L2-pt40.png"
nNonFail = OUT_DIR + "gg_udnie_runs/ggUt_1kLoss_L2-pt40.png"
failImg = cv2.imread(nFail)
nonFailImg = cv2.imread(nNonFail)
plt.rcParams['font.size'] = 16
plt.figure(figsize=(10, 5))
plt.suptitle('Image Render Failure Example')

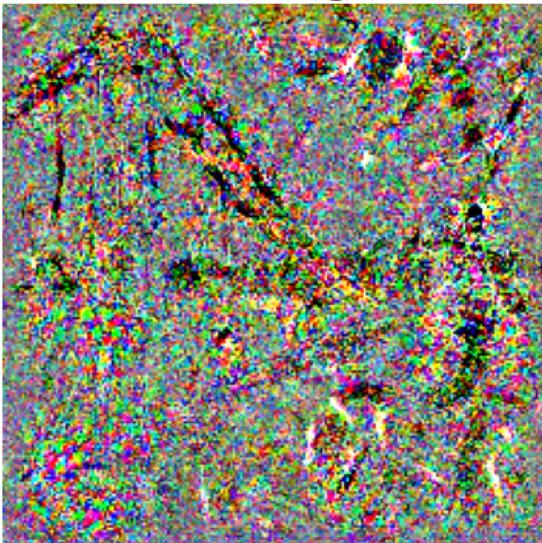
plt.subplot(1,2,1)
plt.axis('off')
plt.imshow(failImg[:, :, [2,1,0]])
plt.title('Udnie Fail using chroma')
plt.subplot(1,2,2)
plt.axis('off')
```

```
plt.imshow(nonFailImg[:, :, [2, 1, 0]])
plt.title('Not Fail using RGB')
```

Out[19]: Text(0.5, 1.0, 'Not Fail using RGB')

Image Render Failure Example

Udnie Fail using chroma



Not Fail using RGB



In []: