HW1_CycleGAN

October 18, 2019

Part 3: CycleGAN
Setting up the environment and helper functions

[1]:
```
import os
import tensorflow as tf
import tensorflow_hub as hub
import IPython.display
import numpy as np
import PIL.Image
from scipy.stats import truncnorm
import matplotlib.pyplot as plt
from ipywidgets import interact, interactive, fixed, interact_manual
import ipywidgets as widgets
```

[2]:
```
def interpolate(A, B, num_interps):
    alphas = np.linspace(0, 1, num_interps)
    return np.array([(1-a)*A + a*B for a in alphas])

def imgrid(imarray, cols=5, pad=1):
    if isinstance(imarray, np.ndarray):
        N, H, W, C = imarray.shape
    if isinstance(imarray, list):
        N = len(imarray)
    rows = N // cols + int(N % cols != 0)
    for i in range(N):
        plt.subplot(rows, cols, i+1)
        plt.title("%d"%i)
        plt.imshow(imarray[i])
        plt.axis('off')

def load_image(image_url, image_size=(256, 256), preserve_aspect_ratio=True):
    """Loads and preprocesses images."""
    # Cache image file locally.
    image_path = tf.keras.utils.get_file(os.path.basename(image_url)[-128:],␣
 ↪image_url)
    # Load and convert to float32 numpy array, add batch dimension, and␣
 ↪normalize to range [0, 1].
    img = plt.imread(image_path).astype(np.float32)[np.newaxis, ...] / 255.
```

```
    if img.shape[-1] == 4:
        img = img[..., :3] / tf.expand_dims(img[..., 3], -1) # pre multiply␣
↪alpha

    if image_size[0] != -1:
        img = tf.image.resize(img, image_size, preserve_aspect_ratio=True)
    return img
```

Downloading the model and hacking at the Protobuf (frozen graph)

[ ]:
```
# Download the pretrained horse2zebra model
!wget https://github.com/vanhuyz/CycleGAN-TensorFlow/releases/download/v0.
↪1-alpha/horse2zebra.pb --no-check-certificate
```

[3]:
```
tf.reset_default_graph()
```

[4]:
```
graph = tf.Graph()
with graph.as_default():
    with tf.gfile.GFile('horse2zebra.pb', 'rb') as model_file:
        graph_def = tf.GraphDef()
        graph_def.ParseFromString(model_file.read())
        tf.import_graph_def(graph_def)
```

[5]:
```
# look at the first few and last few oprations
graph.get_operations()[:5],graph.get_operations()[-5:]
```

[5]:
```
([<tf.Operation 'import/input_image' type=Placeholder>,
  <tf.Operation 'import/G/c7s1_32/weights' type=Const>,
  <tf.Operation 'import/G/c7s1_32/weights/read' type=Identity>,
  <tf.Operation 'import/G/c7s1_32/instance_norm/scale' type=Const>,
  <tf.Operation 'import/G/c7s1_32/instance_norm/scale/read' type=Identity>],
 [<tf.Operation 'import/map_4/TensorArrayStack/range' type=Range>,
  <tf.Operation 'import/map_4/TensorArrayStack/TensorArrayGatherV3'
type=TensorArrayGatherV3>,
  <tf.Operation 'import/Squeeze' type=Squeeze>,
  <tf.Operation 'import/EncodeJpeg' type=EncodeJpeg>,
  <tf.Operation 'import/output_image' type=Identity>])
```

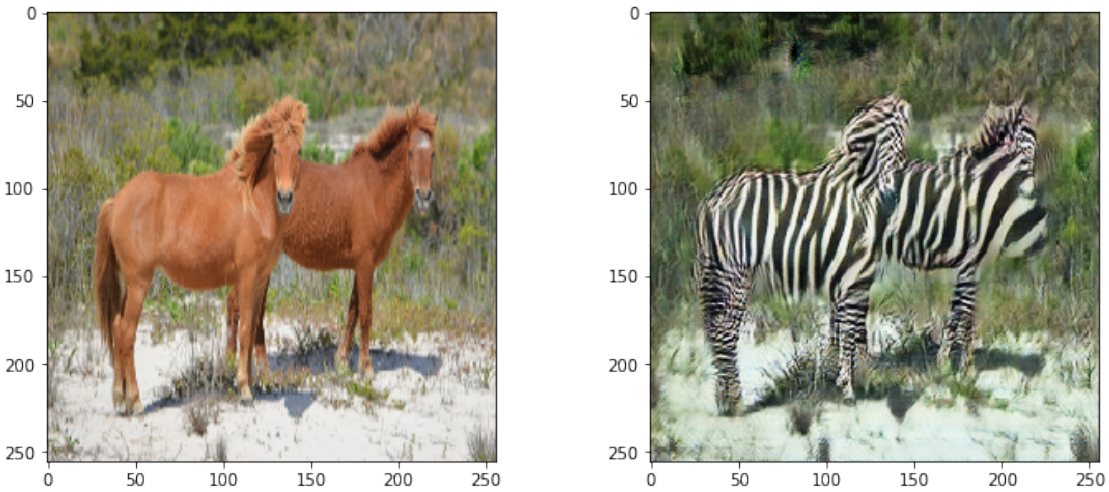
[5]:
```
def inference(image_url):
    with tf.Session(graph=graph) as sess:
        # load the image
        image = load_image(image_url)
        image = tf.image.resize_images(image, size=(256, 256))
        image = tf.squeeze(tf.cast(image, tf.float32))
        image_array = sess.run(image)

        # run the graph between the 'input_image' and 'Squeeze' operations.
        generated = sess.run('import/Squeeze:0', feed_dict={'import/input_image:
↪0': image_array})
```

```
        plt.figure(figsize=(12,5))
        plt.subplot(121),plt.imshow(image_array)
        plt.subplot(122),plt.imshow(generated)
```

[7]:
```
inference('https://www.nps.gov/asis/learn/news/images/horses.png')
```

```
Downloading data from https://www.nps.gov/asis/learn/news/images/horses.png
```

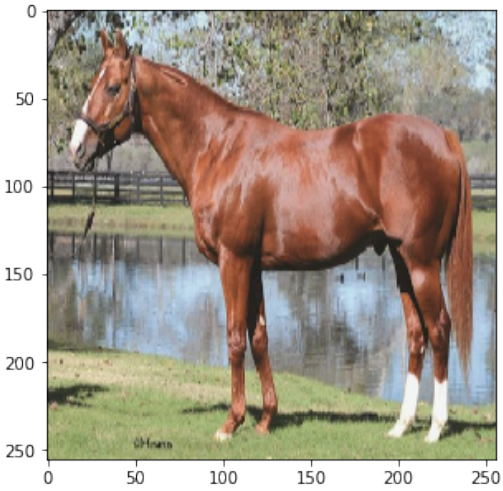


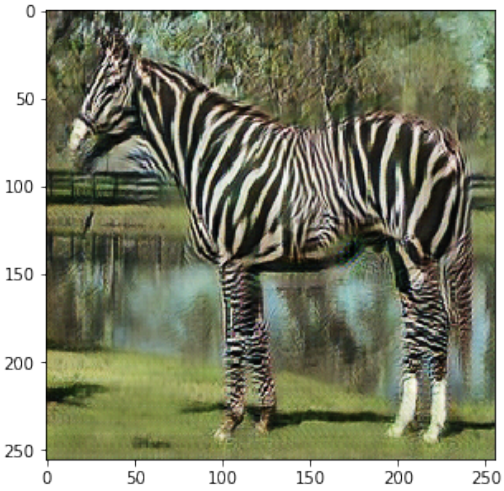
1 Task1:

1.0.1 Bring a horse image of your own and run the horse2zebra model

[6]:
```
inference('https://cdn.bloodhorse.com/sroimages//medium/0000135487_1.jpg')
```

```
Downloading data from
https://cdn.bloodhorse.com/sroimages//medium/0000135487_1.jpg
73728/71069 [==============================] - 0s 1us/step
```

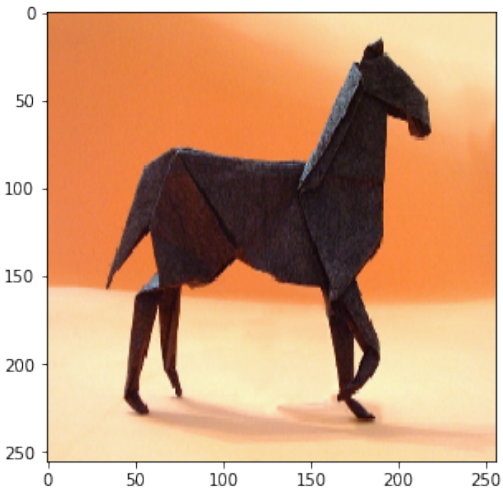


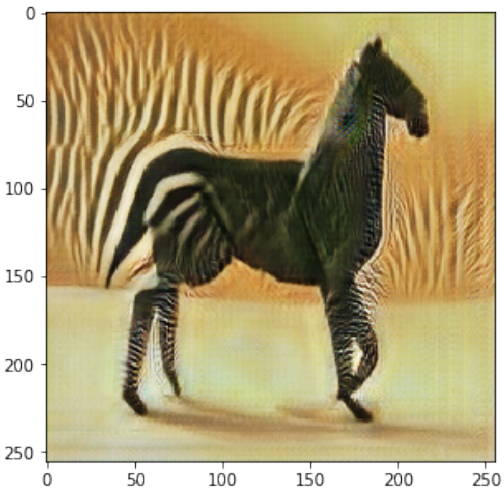


1.1 Experimenting with Origami images of Horse

[6]:
```
inference('https://www.giladorigami.com/P_Horse_Yoshizawa.JPG')
```

```
Downloading data from https://www.giladorigami.com/P_Horse_Yoshizawa.JPG
237568/230904 [==============================] - 0s 1us/step
```





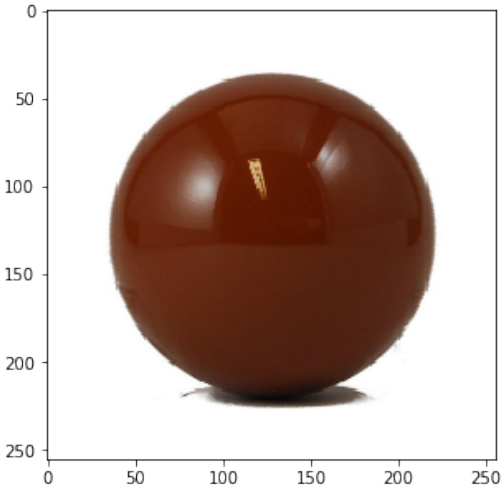
2 Task2:

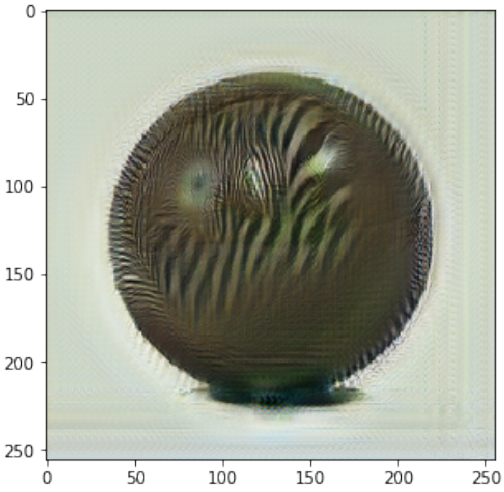
2.0.1 Bring another image, not of a horse and see what happens

2.1 a) On a uniform ball (capturing texture)

[6]:
```
inference('https://images-na.ssl-images-amazon.com/images/I/51ZEx8zSASL.
↪_SL1209_.jpg')
```

```
Downloading data from https://images-na.ssl-images-
amazon.com/images/I/51ZEx8zSASL._SL1209_.jpg
57344/55344 [==============================] - 0s 0us/step
```

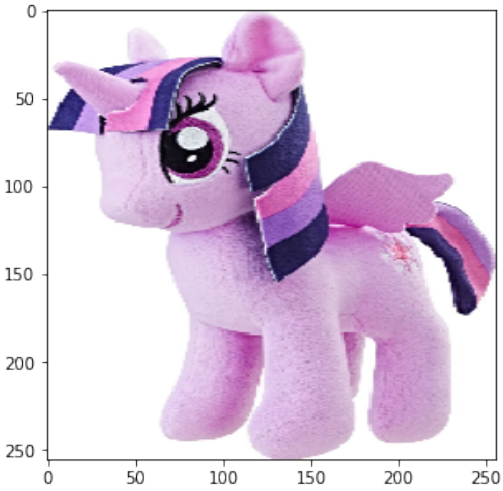


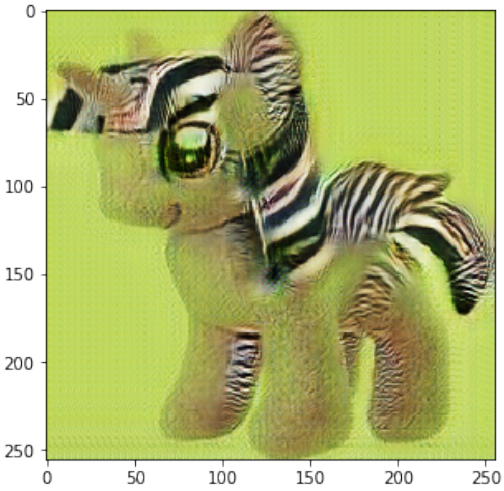


2.2 b) On a 'my little pony'

[6]:
```
inference('https://pisces.bbystatic.com/image2/BestBuy_US/images/products/6257/
↪6257832_sd.jpg')
```

```
Downloading data from https://pisces.bbystatic.com/image2/BestBuy_US/images/prod
ucts/6257/6257832_sd.jpg
262144/259862 [==============================] - 0s 0us/step
```

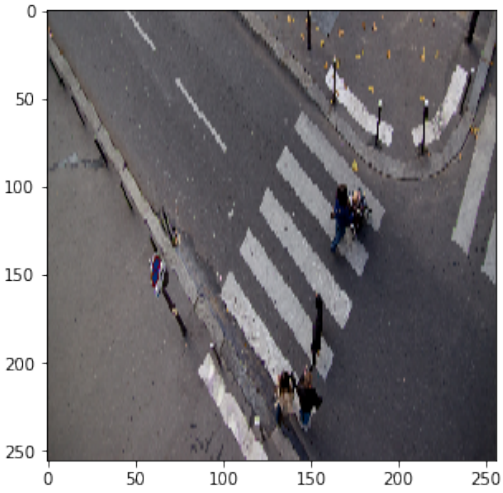


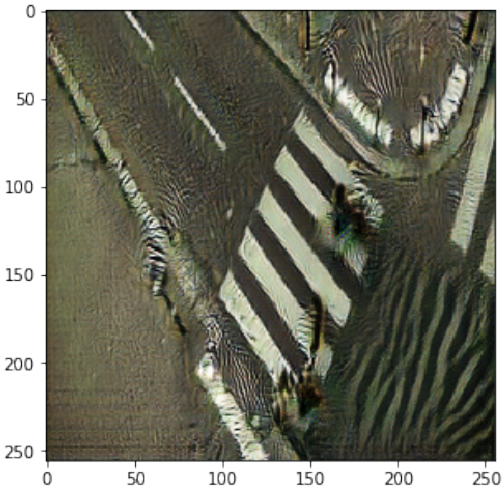


2.3 c) Adding zebra style to zebra crossings

[6]:
```
inference('https://upload.wikimedia.org/wikipedia/commons/4/49/
 ↪Paris_street_corner%2C_from_the_promenade_plantee.jpg')
```

```
Downloading data from https://upload.wikimedia.org/wikipedia/commons/4/49/Paris_
street_corner%2C_from_the_promenade_plantee.jpg
3301376/3294193 [==============================] - 1s 0us/step
```





[ ]:
```

```