Transfer stylów

Źródło: https://www.tensorflow.org/hub/tutorials/tf2_arbitrary_image_stylization

Import TF2 ze wszystkimi zależnościami

```
import functools
import os

from matplotlib import gridspec
import matplotlib.pylab as plt
import numpy as np
import tensorflow as tf
import tensorflow_hub as hub

print("TF Version: ", tf.__version__)
print("TF Hub version: ", hub.__version__)
print("Eager mode enabled: ", tf.executing_eagerly())\
```

Ustawienie ładowania obrazka oraz sposobu wyświetlenia

```python
# @title Define image loading and visualization functions  { display-mode: "form" }

def crop_center(image):
  """Returns a cropped square image."""
  shape = image.shape
  new_shape = min(shape[1], shape[2])
  offset_y = max(shape[1] - shape[2], 0) // 2
  offset_x = max(shape[2] - shape[1], 0) // 2
  image = tf.image.crop_to_bounding_box(
      image, offset_y, offset_x, new_shape, new_shape)
  return image

@functools.lru_cache(maxsize=None)
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,
  img = tf.io.decode_image(
      tf.io.read_file(image_path),
      channels=3, dtype=tf.float32)[tf.newaxis, ...]
  img = crop_center(img)
  img = tf.image.resize(img, image_size, preserve_aspect_ratio=True)
  return img

def show_n(images, titles=('',)):
  n = len(images)
  image_sizes = [image.shape[1] for image in images]
  w = (image_sizes[0] * 6) // 320
  plt.figure(figsize=(w * n, w))
  gs = gridspec.GridSpec(1, n, width_ratios=image_sizes)
  for i in range(n):
    plt.subplot(gs[i])
    plt.imshow(images[i][0], aspect='equal')
    plt.axis('off')
    plt.title(titles[i] if len(titles) > i else '')
  plt.show()
```

Wczytanie i pokazanie dwóch obrazków, gdzie content_image_url – to nasz główny obrazek, style_image_url – styl do zamiany pierwszego obrazka

```
ıle images  { display-mode: "form" }

: 'https://images.gnwcdn.com/2018/usgamer/witcher-3-cirilla.png/EG11/thumbnail/1920x1080/forma
https://makehome.pl/14575-home_default/recznie-malowany-obraz-na-plotnie-kolorowy-lew.jpg'  #
: 500  # @param {type:"integer"}

: size can be arbitrary.
(output_image_size, output_image_size)
:ion model was trained with image size 256 and it's the
: size for the style image (though, other sizes work as
ıd to different results).
!56, 256)  # Recommended to keep it at 256.

ıd_image(content_image_url, content_img_size)
_image(style_image_url, style_img_size)
ı.avg_pool(style_image, ksize=[3,3], strides=[1,1], padding='SAME')
ıge, style_image], ['Content image', 'Style image'])
```

Wczytanie modułu TF

```
# Load TF Hub module.

hub_handle = 'https://tfhub.dev/google/magenta/arbitrary-image-stylization-v1-256/2'
hub_module = hub.load(hub_handle)
```

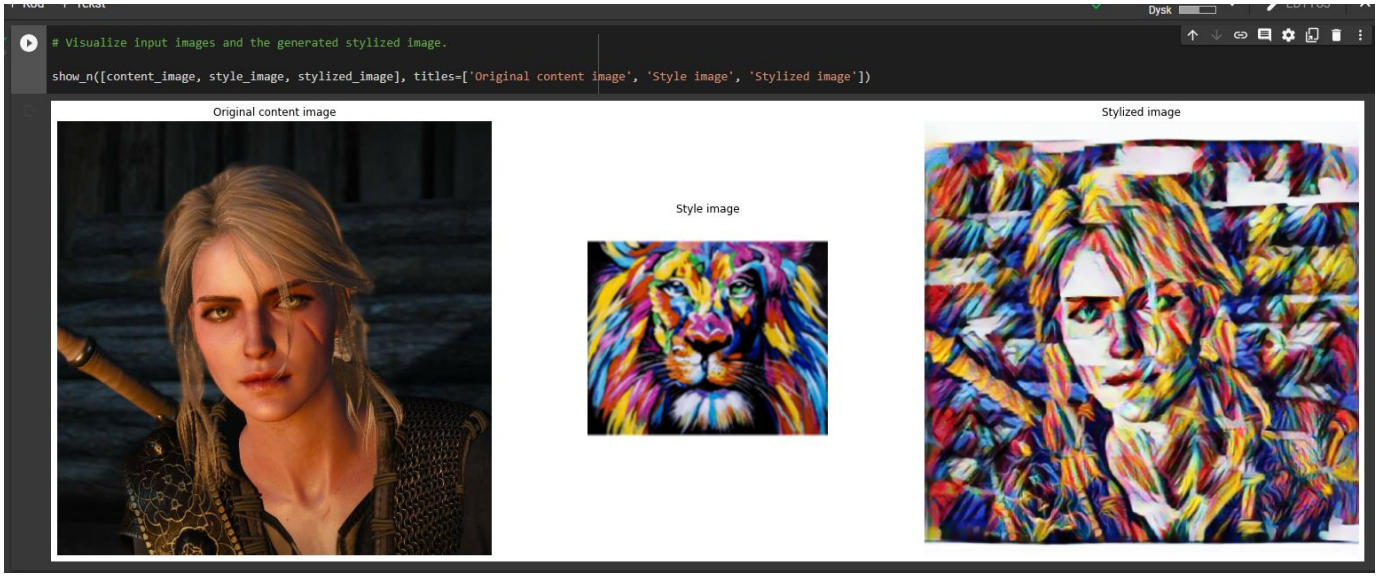
Ustawienie stylizacji obrazu

```
outputs = hub_module(content_image, style_image)
stylized_image = outputs[0]
```

Demonstracja stylizacji obrazu

```
[35] # Stylize content image with given style image.
     # This is pretty fast within a few milliseconds on a GPU.

     outputs = hub_module(tf.constant(content_image), tf.constant(style_image))
     stylized_image = outputs[0]
```

```
# Visualize input images and the generated stylized image.

show_n([content_image, style_image, stylized_image], titles=['Original content image', 'Style image', 'Stylized image'])
```



Wykrywanie obiektów

Źródło: https://www.tensorflow.org/hub/tutorials/object_detection

Wymagane importy bibliotek z funkcjami

```
# For running inference on the TF-Hub module.
import tensorflow as tf

import tensorflow_hub as hub

# For downloading the image.
import matplotlib.pyplot as plt
import tempfile
from six.moves.urllib.request import urlopen
from six import BytesIO

# For drawing onto the image.
import numpy as np
from PIL import Image
from PIL import ImageColor
from PIL import ImageDraw
from PIL import ImageFont
from PIL import ImageOps

# For measuring the inference time.
import time

# Print Tensorflow version
print(tf.__version__)

# Check available GPU devices.
print("The following GPU devices are available: %s" % tf.test.gpu_device_name())
```

Funkcje do pobierania obrazów i ich wizualizacji

```
[ ]  def display_image(image):
       fig = plt.figure(figsize=(20, 15))
       plt.grid(False)
       plt.imshow(image)


     def download_and_resize_image(url, new_width=256, new_height=256,
                                   display=False):
       _, filename = tempfile.mkstemp(suffix=".jpg")
       response = urlopen(url)
       image_data = response.read()
       image_data = BytesIO(image_data)
       pil_image = Image.open(image_data)
       pil_image = ImageOps.fit(pil_image, (new_width, new_height), Image.ANTIALIAS)
       pil_image_rgb = pil_image.convert("RGB")
       pil_image_rgb.save(filename, format="JPEG", quality=90)
       print("Image downloaded to %s." % filename)
       if display:
         display_image(pil_image)
       return filename


     def draw_bounding_box_on_image(image,
                                    ymin,
                                    xmin,
                                    ymax,
                                    xmax,
                                    color,
                                    font,
                                    thickness=4,
                                    display_str_list=()):
       """Adds a bounding box to an image."""
       draw = ImageDraw.Draw(image)
       im_width, im_height = image.size
       (left, right, top, bottom) = (xmin * im_width, xmax * im_width,
                                     ymin * im_height, ymax * im_height)
       draw.line([(left, top), (left, bottom), (right, bottom), (right, top),
                  (left, top)],
                 width=thickness,
                 fill=color)

       # If the total height of the display strings added to the top of the bounding
       # box exceeds the top of the image, stack the strings below the bounding box
       # instead of above.
       display_str_heights = [font.getsize(ds)[1] for ds in display_str_list]
       # Each display_str has a top and bottom margin of 0.05x.
       total_display_str_height = (1 + 2 * 0.05) * sum(display_str_heights)
```

```
[ ]   if top > total_display_str_height:
        text_bottom = top
      else:
        text_bottom = top + total_display_str_height
      # Reverse list and print from bottom to top.
      for display_str in display_str_list[::-1]:
        text_width, text_height = font.getsize(display_str)
        margin = np.ceil(0.05 * text_height)
        draw.rectangle([(left, text_bottom - text_height - 2 * margin),
                        (left + text_width, text_bottom)],
                       fill=color)
        draw.text((left + margin, text_bottom - text_height - margin),
                  display_str,
                  fill="black",
                  font=font)
        text_bottom -= text_height - 2 * margin


    def draw_boxes(image, boxes, class_names, scores, max_boxes=10, min_score=0.1):
      """Overlay labeled boxes on an image with formatted scores and label names."""
      colors = list(ImageColor.colormap.values())

      try:
        font = ImageFont.truetype("/usr/share/fonts/truetype/liberation/LiberationSansNarrow-Regular.ttf",
                                  25)
      except IOError:
        print("Font not found, using default font.")
        font = ImageFont.load_default()

      for i in range(min(boxes.shape[0], max_boxes)):
        if scores[i] >= min_score:
          ymin, xmin, ymax, xmax = tuple(boxes[i])
          display_str = "{}: {}%".format(class_names[i].decode("ascii"),
                                         int(100 * scores[i]))
          color = colors[hash(class_names[i]) % len(colors)]
          image_pil = Image.fromarray(np.uint8(image)).convert("RGB")
          draw_bounding_box_on_image(
              image_pil,
              ymin,
              xmin,
              ymax,
              xmax,
              color,
              font,
              display_str_list=[display_str])
          np.copyto(image, np.array(image_pil))
      return image
```

Załadowanie obrazu i jego wyświetlenie

```
[ ]  # By Heiko Gorski, Source: https://commons.wikimedia.org/wiki/File:Naxos_Taverna.jpg
     image_url = "https://upload.wikimedia.org/wikipedia/commons/6/60/Naxos_Taverna.jpg"
     downloaded_image_path = download_and_resize_image(image_url, 1280, 856, True)
```

Pobranie modułu InceptionResNet V2, który cechuje się wysoką dokładnością

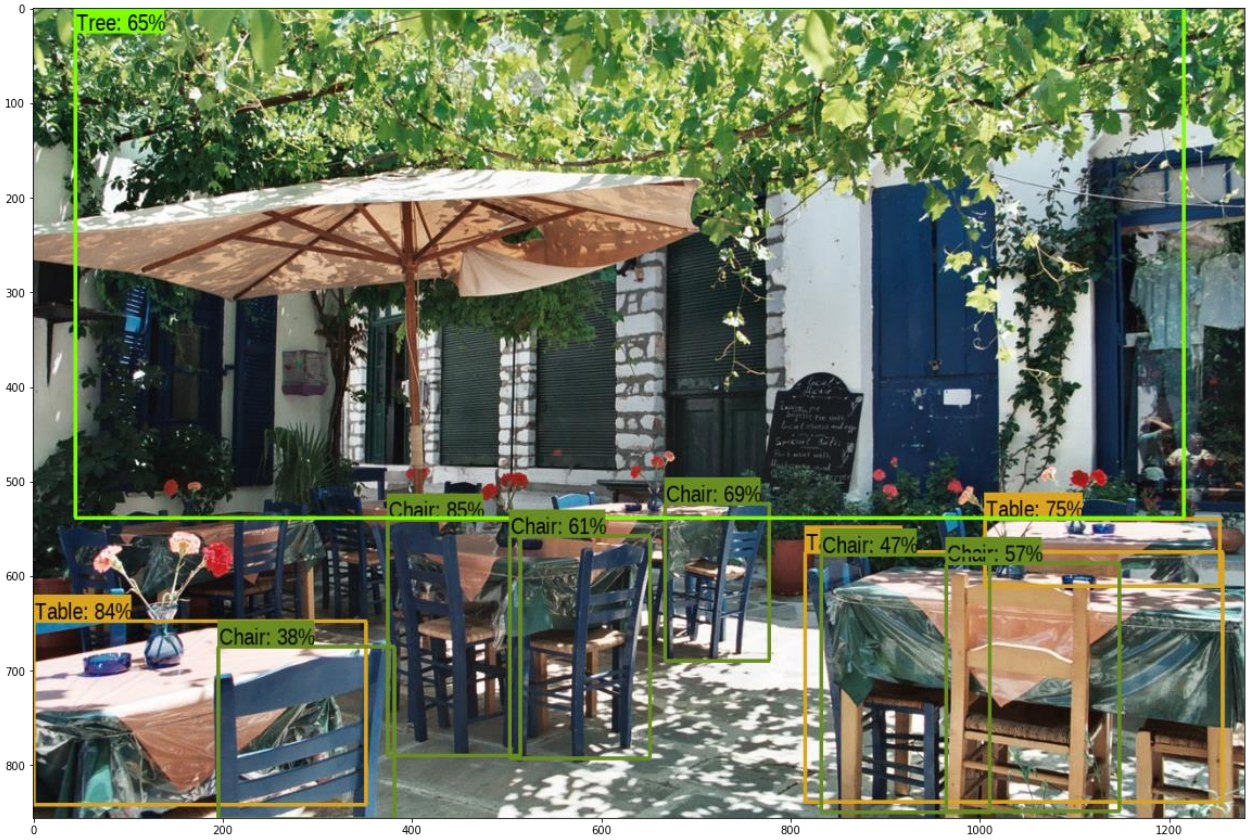
```
[ ] module_handle = "https://tfhub.dev/google/faster_rcnn/openimages_v4/inception_resnet_v2/1"

    detector = hub.load(module_handle).signatures['default']

    INFO:tensorflow:Saver not created because there are no variables in the graph to restore
    INFO:tensorflow:Saver not created because there are no variables in the graph to restore
```

```
def load_img(path):
  img = tf.io.read_file(path)
  img = tf.image.decode_jpeg(img, channels=3)
  return img
```

```
def run_detector(detector, path):
  img = load_img(path)

  converted_img  = tf.image.convert_image_dtype(img, tf.float32)[tf.newaxis, ...]
  start_time = time.time()
  result = detector(converted_img)
  end_time = time.time()

  result = {key:value.numpy() for key,value in result.items()}

  print("Found %d objects." % len(result["detection_scores"]))
  print("Inference time: ", end_time-start_time)

  image_with_boxes = draw_boxes(
      img.numpy(), result["detection_boxes"],
      result["detection_class_entities"], result["detection_scores"])

  display_image(image_with_boxes)
```

Uruchomienie programu w celu wykrycia przedmiotów widocznych na obrazku

```
run_detector(detector, downloaded_image_path)
```


Tree: 65%
Chair: 85%
Chair: 61%
Chair: 69%
Table: 75%
Chair: 47%
Chair: 57%
Table: 84%
Chair: 38%
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