test_environment

August 21, 2023

1 ELE510 Image Processing with robot vision: LAB - Test the environment

Purpose: This jupyter notebook is just for you to test that the environment is set and ready for the various assignments.

The following package are necessary for the assignments: - opencv "OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library" - Documentation - numpy "The fundamental package for scientific computing with Python" - Documentation - matplotlib "A comprehensive library for creating static, animated, and interactive visualizations in Python" - Documentation

1.1 Numpy

NumPy is the fundamental package for scientific computing in Python. It provides routines for fast operations on arrays.

If the following cell returns you an error:

`ModuleNotFoundError: No module named 'np'`

Open the Anaconda Prompt and run the following:

`pip install numpy`

[ ]:
```
import numpy as np # It is common to import **numpy** under the briefer name
 ↪**np**
```

[ ]:
```
m = np.matrix('3 2; 3 4') # create a matrix
```

[ ]:
```
# print the matrix
print(m)
```

```
[[3 2]
 [3 4]]
```

[ ]:
```
# print the shape of the matrix
print(...)
```

```
Ellipsis
```

The shape of the matrix should be: (2,2)

```
[ ]: # print the following values: m(0,0), m(0,1), m(1,0)

     print(m[0,0])
     print(m[0,1])
     print(m[1,0])
```

```
3
2
3
```

The answer should be: 3, 2, 3

1.2 OpenCV

OpenCV-Python is a library of Python bindings designed to solve computer vision problems.

If the following cell returns you an error:

```
ModuleNotFoundError: No module named 'cv2'
```

Open the Anaconda Prompt and run the following:

```
pip install opencv-python
```

```
[ ]: # import the opencv-python module
     import cv2
```

Import an image

```
[ ]: flag = cv2.COLOR_BGR2RGB

     # Read the image 'preikestolen.jpg' located in the 'images/' folder with cv2.
     # Example:
     # img = cv2.imread(image_path, flag)

     img = cv2.imread('images/preikestolen.jpg', flag)

     # OpenCV uses BGR as its default colour order for images, matplotlib uses RGB.
     # When you display an image loaded with OpenCV in matplotlib the channels will␣
      ↪be back to front.

     img = cv2.cvtColor(img, flag)
```

Print the dimension and other information of the image

```
[ ]: # Display the height, width, number of channels of the image
     height = img.shape[0]
     width = img.shape[1]
     channels = img.shape[2]
```

```
print('Image Dimension    : ', img.shape)
print('Image Height       : ', height)
print('Image Width        : ', width)
print('Number of Channels : ', channels)

# The answer shoud be like this:

# Image Dimension    :  (1064, 1600, 3)
# Image Height       :  1064
# Image Width        :  1600
# Number of Channels :  3
```

```
Image Dimension    :  (1064, 1600, 3)
Image Height       :  1064
Image Width        :  1600
Number of Channels :  3
```

1.3 Matplotlib

Matplotlib is a Python 2D plotting library.

If the following cell returns you an error:

`ModuleNotFoundError: No module named 'plt'`

Open the Anaconda Prompt and run the following:

`pip install matplotlib`

```
[ ]: # We use the matplotlib submodule **pyplot**. Following a widely used␣
     ↪convention, we use the `plt` alias
     import matplotlib.pyplot as plt
```

Dislay the imported image

```
[ ]: plt.imshow(img)
     plt.xticks([]), plt.yticks([])  # Hides the graph ticks and x / y axis
     plt.show()
```

Display the image in greyscale

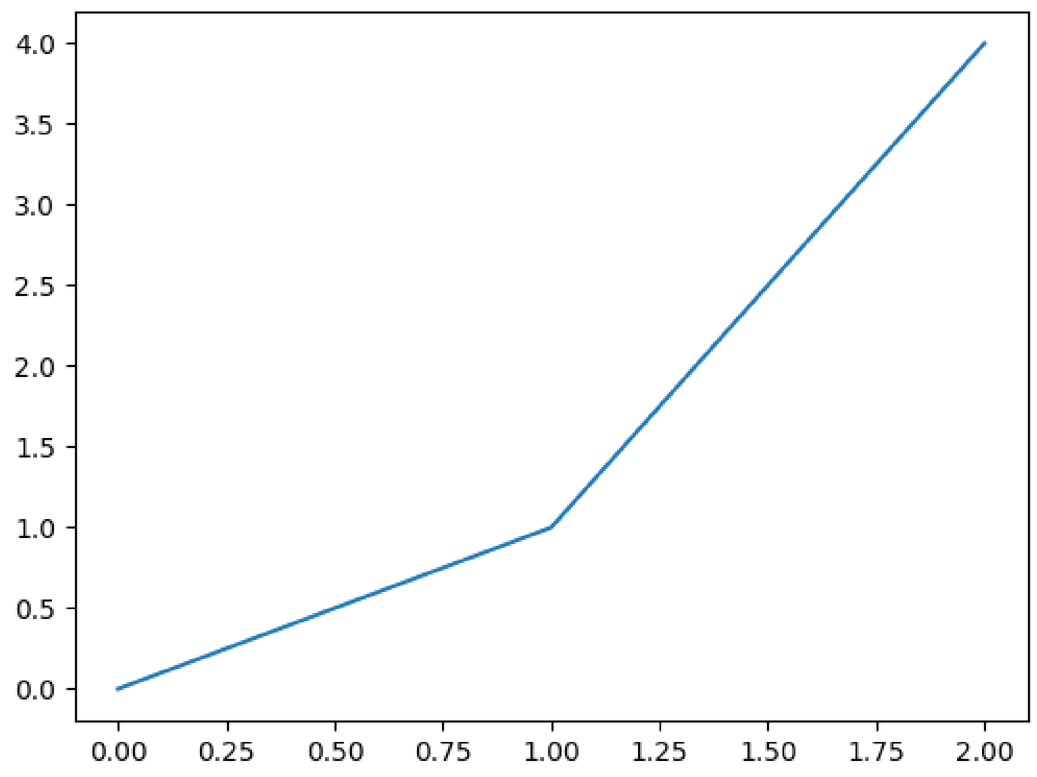
[ ]:
```
flag = cv2.IMREAD_GRAYSCALE

grey_img = cv2.imread('images/preikestolen.jpg', flag)

plt.imshow(grey_img, cmap='gray', vmin=0, vmax=255)
plt.xticks([]), plt.yticks([])  # Hides the graph ticks and x / y axis
plt.show()
```

[ ]:
```
xs = np.array([0, 1, 2]) # Set x-axis values
f = xs**2 # Set the corresponding y values

plt.plot(xs, f) # Create a plot
plt.show() # Display the plot
```



Display the array and the images together

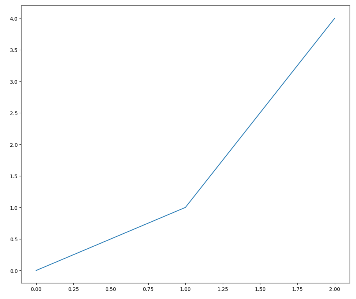
```
[ ]: # Display the previous plot and the preikestolen images (color and grayscale)␣
      ↪together in the same row.
     # Hint: use plt.subplot function to show them together

     plt.figure(figsize=(40, 10))

     plt.subplot(1, 3, 1)
     plt.imshow(img)
     plt.xticks([]), plt.yticks([])  # Hides the graph ticks and x / y axis

     plt.subplot(1, 3, 2)
     plt.imshow(grey_img, cmap='gray', vmin=0, vmax=255)
     plt.xticks([]), plt.yticks([])  # Hides the graph ticks and x / y axis

     plt.subplot(1, 3, 3)
     plt.plot(xs, f) # Create a plot
     plt.show() # Display the plot
```


4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00