SciComp with Py

Computer Vision and Image Processing (CVIP)

Part 01

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OpenCV

- OpenCV (opencv.org) is a open source CV library
- Free for both commercial and academic use under a BSD license
- OpenCV has C++, Java, & Python interfaces
- Available on Linux, Mac OS, Android, iOS, Windows

Image Formats

- Image formats are different standards of storing digital images
- Broadly speaking, there are three kinds of data storage: compressed, uncompressed, and vector
- There are two types of compression: lossless and lossy
- Common formats: JPEG (compressed, lossy), BMP (uncompressed, lossless), PNG (compressed, lossless), SVG (scalable vector graphics)
- OpenCV supports all common formats

Pixels

- Pixel is the smallest addressable element in a raster image, i.e., a matrix of pixels
- Each pixel is a sample of an original image
- Pixels are typically represented as 3-tuples (red, green, blue) or (blue, green red)
- Number of representable colors is denoted by bits per pixel:

  1 bpp = 2^1 = 2; 2 bpp = 2^2 = 4; 2^3 = 8 , etc.

Switching to CV Workspace

If you want to use OpenCV on your pi within the cv workspace, do:

```
$ source ~/.profile
$ workon cv
```

Working with CV2.SO

- Another way to ensure that your Python programs run with OpenCV is to place cv2.so into your current working directory
- cv2.so is the share object file installed on your machine when you install OpenCV from scratch

Checking OpenCV Installation

```
$ python
Python 2.7.6 (default, Jun 22 2015, 17:58:13)
[GCC 4.8.2] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> import cv2
>>> cv2.__version__
'3.0.0'
>>>
```

Problem

Write a program that loads a user specified image, displays it in a window, and waits for the user to press a key before closing the window.

Sample Call

```
$ python   load_image.py  -i truck.jpg
```

Loading Images

load_image.py

```
import argparse
import cv2

ap = argparse.ArgumentParser()
ap.add_argument('-i', '--image', required = True, help = 'Path to image')
args = vars(ap.parse_args())

image = cv2.imread(args['image'])

cv2.imshow('Image', image)
cv2.waitKey(0)
```

Parse user args

Load image from user-specified file

Show Image

Wait for user to press a key

References

- www.opencv.org