H02A5a - Computer Vision
Project 1: introduction

1. Installation of Python & OpenCV (0,5h)

Python is a dynamically typed and object oriented programming language. Although it is fairly recent, it is embraced by large organizations such as Google, Yahoo, NASA, … Some of the reasons of its popularity are: the open source implementation, the elegant syntax and the immense amount of libraries available.

Enthought Canopy includes a Python distribution, an analysis environment with tools like a modern texteditor, an IPython console, a graphical package manager, file management, online documentation and integrated training.

Numpy and Scipy are two widely used libraries for Python, respectively for numerical computing and scientific computing. The combination of the two is the replacement par excellence for Matlab.

OpenCV is an open source computer vision library with >2500 optimized algorithms. It is used around the world, has >2.5M downloads and >40K people in the user group. An interface for Python is available.

Installation on Windows:

1. Download the Enthought Python Canopy from the official Enthought website
   http://www.enthought.com/products/epd_free.php and execute the setup file to install it. Leave all settings as default. In that case, Canopy will be installed in default folder
   C:\Users\...\Enthought\Canopy
   Request an academic license for Enthought Python Canopy and get more pre-installed libraries: go to http://www.enthought.com/products/edudownload.php

   When installing additional Python packages first use the Package Manager: look for new packages in Available Packages and proceed with their installation.

2. Install openCV: go to Package Manager → Available Packages: type opencv and install the latest version
3. (Optional) Install Pydev, a Python IDE. You can also use the pre-installed IDLE environment.

Installation on Mac:

Download the Enthought Python Canopy from http://www.enthought.com/products/epd_free.php

Be sure of having MacPorts installed (http://www.macports.org/install.php) before installing Canopy (Note: you should have XCode installed).

Follow the Mac Installation instructions on the official Enthought Canopy webiste: http://docs.enthought.com/canopy/quick-start/install_macos.html

As well as for the Windows installation, you can download the Canopy version For Academics at https://store.enthought.com/#canopy-academic and ask for a license to get more pre-built packages.

To install openCV follow the same commands used for Windows installation (i.e., go to Package Manager → Available Packages: type opencv and install the latest version).
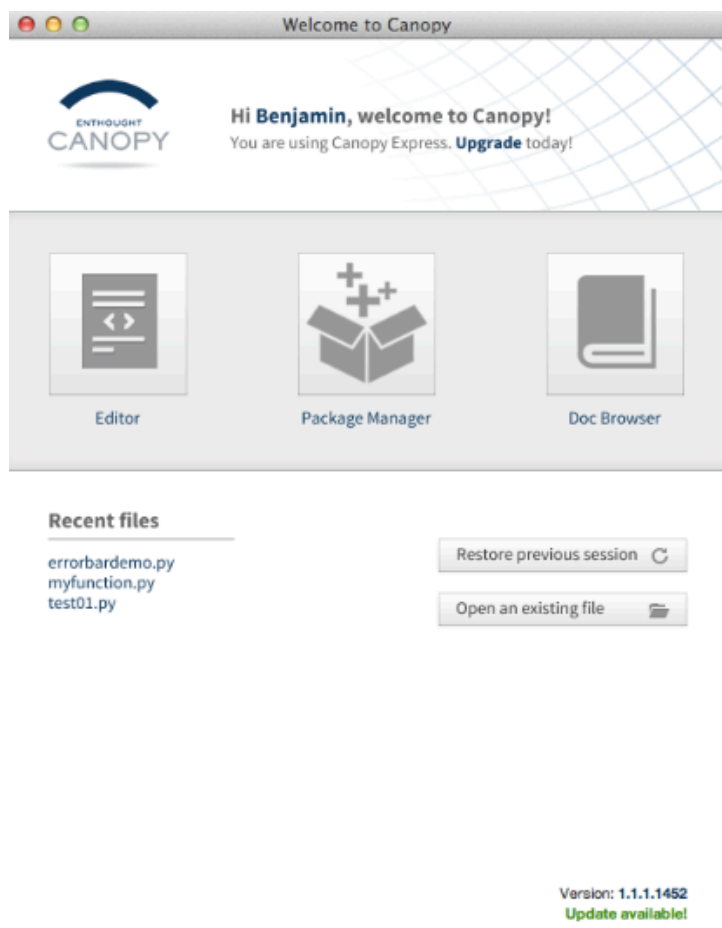

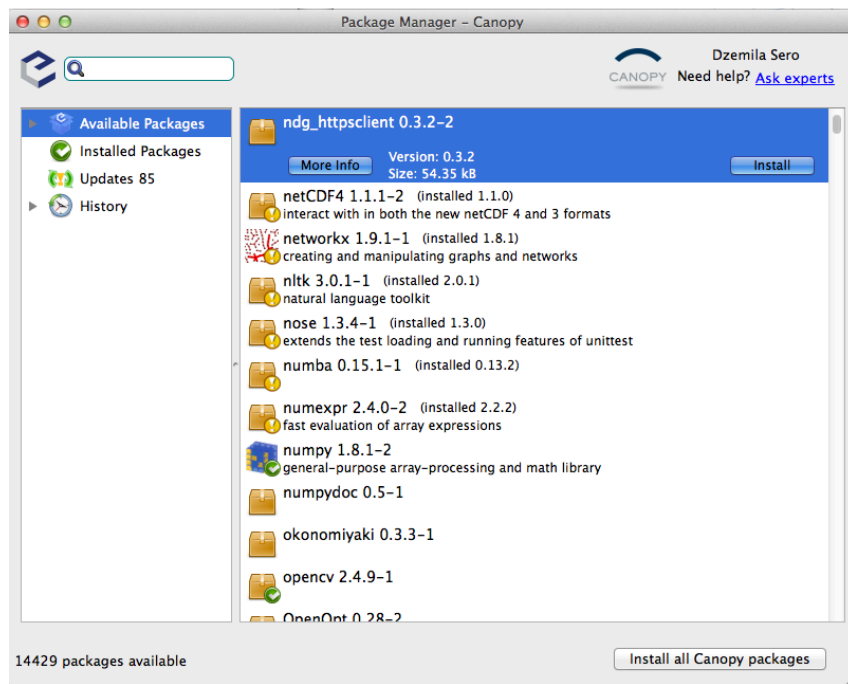
Fig 1. Canopy window interface.

Fig 2. Canopy Package Manager

Validation installation

1. From the main window interface go to Editor and then press Create New File
2. Type *print 'hello world'* and press enter to run your first command
3. Congratulations, Python works
4. Alternatively, you can create a text-file with extension .py, containing *print 'hello world'*
   Opening this file should execute it, yielding the same result.
5. Type *import cv2* and press enter. This should not give an error.
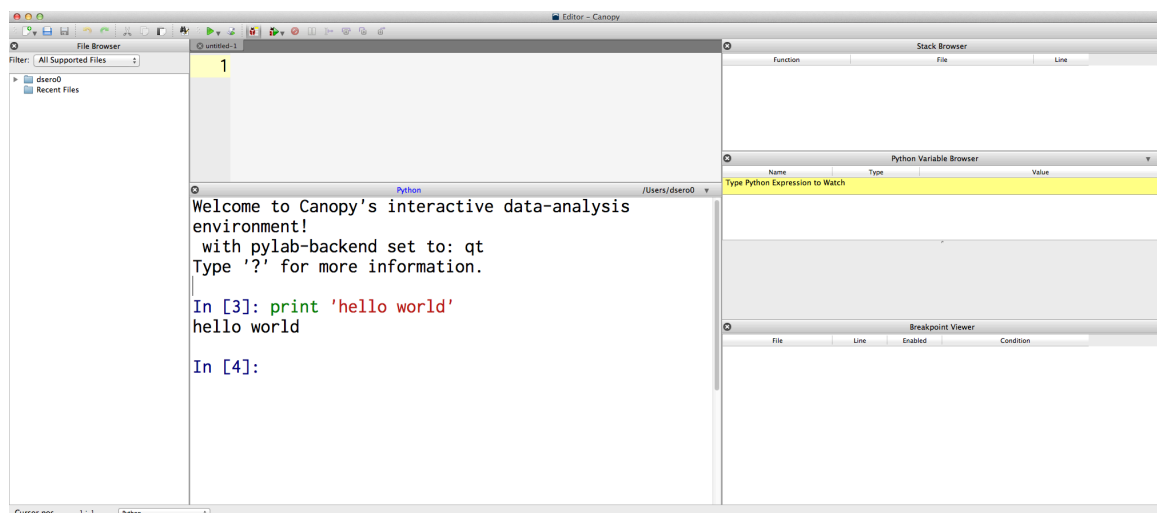6. Congratulations, your installation is successful

Fig 3. The Editor in Canopy

Troubleshooting

Sometimes installation is not as easy as it should be. Try searching on the internet: there are plenty of people explaining how to install Canopy and OpenCV for various OS and configurations. If things don't work out, ask on the Discussion Board on Toledo.

2. Get to know your new favorite language (1h)

Learn a bit of Python

Skim one of the many tutorials at: http://wiki.python.org/moin/BeginnersGuide/Programmers or consult the Python Documentation for further tips at: https://docs.python.org/2/index.html

Explore Numpy (the Matlab-lookalike of Python)

E.g. http://wiki.scipy.org/Tentative_NumPy_Tutorial

Appreciate the OpenCV library

On Toledo, you find several examples of what can be done with OpenCV. Run some of the examples, which are very entertaining, especially if you have a webcam.

Take a look at the example in the python2 directory and run e.g. *camshift,facedetect,feature homography,find obj,inpaint,lk_homography,plane tracker or stereo match*

3. Implement a smoothing filter (0.5h)

1. Implement 2D Gaussian smoothing using a separable filter in Python. A skeleton (smoothing1.py) is provided on Toledo. Suggestions: pay always attention on your current working directory for loading images and files; show Debug Panes to be always aware of the content of your variables.

2. Do the same, but use the OpenCV functions. A skeleton (smoothing2.py) is provided on Toledo. Use the online library to find the functions you need!

3. Submit your solution (the two python files) on Toledo using the Assignments-tool