Image Processing TOOLBOX

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The objectives of this course work were :

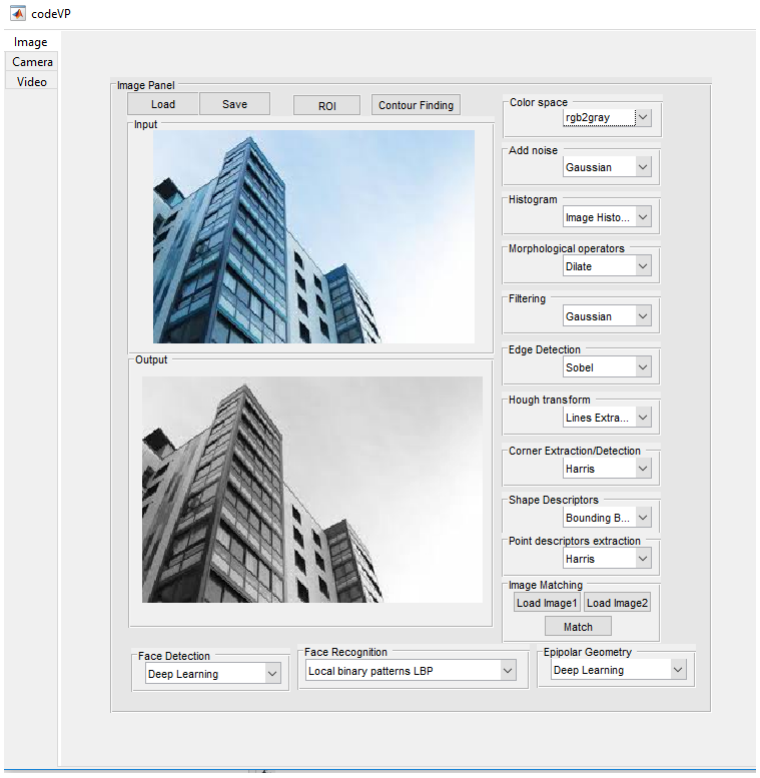
1. to learn MATLAB
2. to learn OpenCV as one of the most important computer vision open source libraries, OpenCV. 3.
3. to test and implement some important computer vision algorithms.

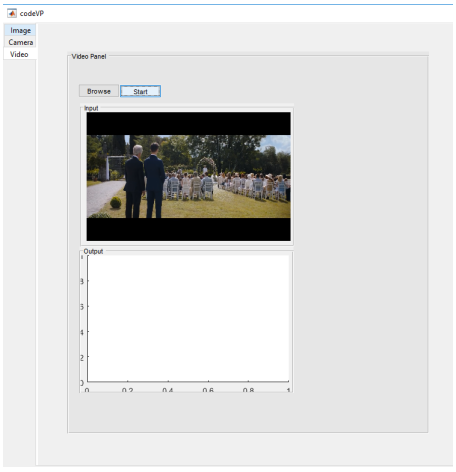
I. MATLAB ToolBox

1. Architecture of the Graphical user interface

The matlab GUI is presented as a table with 3 tabs " where every input chosen has its own different tab. The GUI is shown as follow:

Figure 1: GUI image tab , video tab, camera tab (left to right)


codeVP
Image
Camera
Video
Image Panel
Load
Save
ROI
Contour Finding
Input
Output
Color space
rgb2gray
Add noise
Gaussian
Histogram
Image Histo...
Morphological operators
Dilate
Filtering
Gaussian
Edge Detection
Sobel
Hough transform
Lines Extra...
Corner Extraction/Detection
Harris
Shape Descriptors
Bounding B...
Point descriptors extraction
Harris
Image Matching
Load Image1
Load Image2
Match
Face Detection
Deep Learning
Face Recognition
Local binary patterns LBP
Epipolar Geometry
Deep Learning


codeVP
Image
Camera
Video
Video Panel
Browse
Start
Input
Output

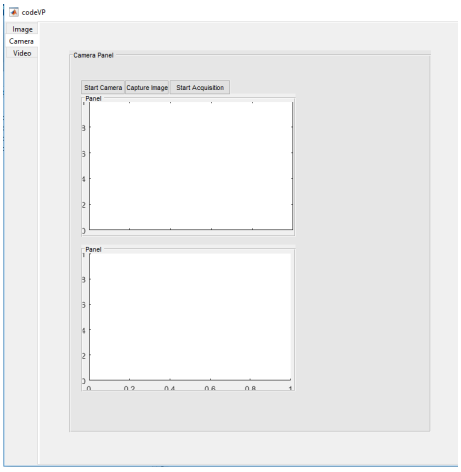

codeVP
Image
Camera
Video
Camera Panel
Start Camera
Capture Image
Start Acquisition
Panel
Panel

Figure 2: Original , grayscale and ycbrc image (left to right)

2. Tasks

2.1. Basics

2.1.1.Image tab Load image

Click on the tab *Image* , then the button *Load* , then choose any image from your computer. The result will be shown in the first axes window

2.1.2. Load video

Click on the button *Browse* , to get the file path of the video you wan to watch . Then click on *Start* to start the video. The video can be observed in the top window

2.1.3. Save Image

2.2. Changing the colorspace

2.2.1. Original image

Inside the *colorspace* box , click on the arrow then on *Original* .It will show the original image in the down window as shown in figure 2.

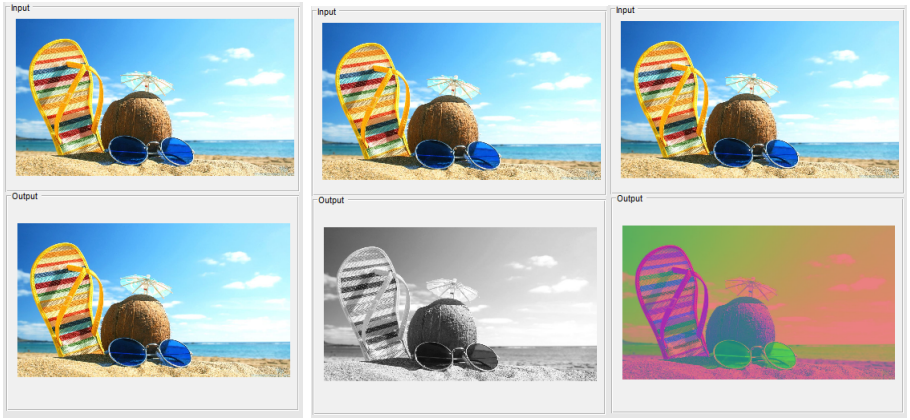
2.2.2. Grayscale image

Inside the *colorspace* box , click on the arrow then on *rgb*2*gray* . This function will converts the truecolor image RGB into the grayscale intensity image. The result is shown in the down window as shown in figure 2.

2.2.3. YCBR image

Inside the *colorspace* box , click on the arrow then on *rgb*2*ycbrc* . This function will converts converts the RGB color space values in rgbmap to the YCbCr color space. The result is shown in the down window as shown in figure 2.

Figure 3: Gaussian noise on original , grayscale and ycbrc image (left to right)

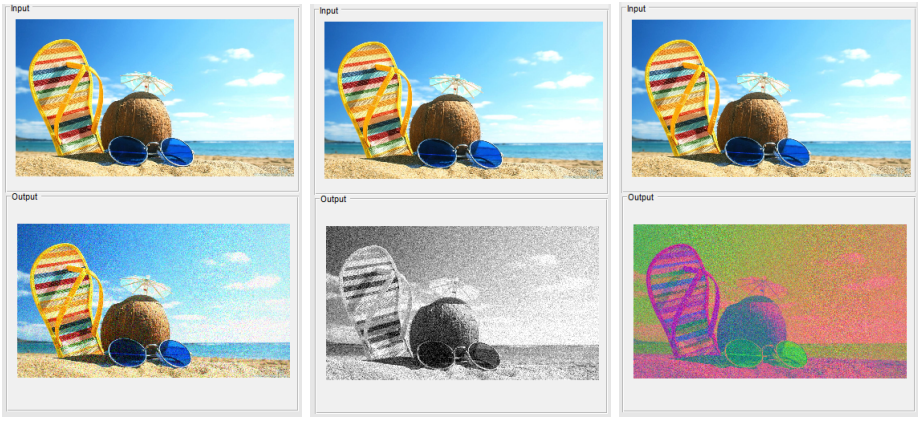


2.3. Add noise

Here we add different noise (gaussian, salt and pepper , poisson and speckle) to a basic image and watch the difference. We can see as an example the following step on how to compute it.

2.3.1. Gaussian noise

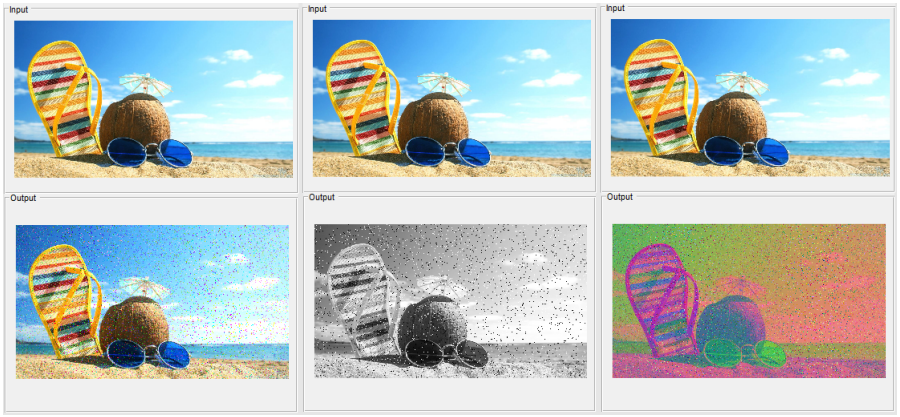
Inside the *Add noise* box , click on the arrow then on *Gaussian* . The result is shown in the down window as shown in figure 3.



2.3.2. Salt and Pepper noise

Inside the *Add noise* box , click on the arrow then on *Salt&Pepper* . The result is shown in the down window as shown in figure 3.

Figure 4: Salt&Pepper noise to original , grayscale and ycbrc (left to right)



2.4. Histogram
2.5. Morphological operators
2.6. Filtering
2.7. Edge detection
2.8.Hough Transform
2.9. Corner extraction
2.10. Shape Descriptor
2.11. Image Matching
2.12. Epipolar geometry
2.4. Face Detection
2.4. Face Recognition

II. Python using ToolBox

1. GUI user interface

2. Tasks

2.1. Display Input

2.1.1. Load image

2.1.2. Load video

2.1.3. Show Live camera