Camera Calibration

1. Install ActiveGige SDK from http://www.ab-soft.com/activegige.php
2. After you install the software, make sure to disable firewall.
3. Connect the camera and place the Macbeth color checker chart in front of it. The image can be checked in the GIGEviewer. Adjust the aperture such that all the colors are clearly visible in the image. (Do not change any camera parameters)
4. Run matlab and open the attached files (MatlabViewer and camera_calibration).
5. MatlabViewer is the GUI code and contains many functions:
    - MatlabViewer_OpeningFcn : the opening function where the global variables are declared and the camera acquistion mode is switched on to start taking images
    - activex1_FrameAcquired: the main function where the whole algorithm takes place
    - pushbutton1_Callback : related to the gui graphs (not important)
    - activex1_FormatChanged : not important
    - activex1_MouseMove: not important
    - K2_segmentation: segmentation function which segments each color square. It happens once during the calibration but depending on the quailty of the image, it may tike some time to segment.
      Note: For segmenting, continuous and default values are set for the parameters to obtain a good image. After segmentation, parameters are made manual and are varied one by one.
    - error: the function that calculates the difference between the original chart values and those of the obtained image for each iteration (every time the parameters change)

6. **camera_calibration is the mail file to be run in matlab to start the calibration**.
   The input should be given by the user to create the parameter combination grid.

   camera_calibration('balance',[min max step], 'black level',[min max step],
   'gain', [min max step],'gamma', [min max step]);

Parameters	Min	Max
Gain	190	1023
Black Level	10	1023
Gamma	1	4
White Balance	1	4
Balance Ratio	1	15
Exposure	1000	1000000

Example: (ignoring exposure)

$$camera\_calibration('balance', [1\ 4\ 1], 'black\ level', [190\ 990\ 50], 'gain', [190\ 690\ 50], 'gamma', [1\ 3\ 1])$$

- In the paramter grid created, first down sampling size: $2^5 = 32$;
  second down sampling size: 2

7. After running the code camera_calibration. The resulting best parameters will be displayed on the matlab window.