MATLAB Froze unfortunately – lost all data before calibration. Happened twice.

1. I used dx dy value of 100x100 as the graph has values in mm both in X direction and Y. Converted the png images to jpeg using script provided in tutorial 2. Used toolbox to enter all images then used extract grid corners. Do all the images 4 corners in order. Then use calibration and reproject on images. Save error and calibration data. Recompute corners. Calibrate again. Save data and comment error.
2. Causes of error – Human error as we didn’t use the same point everytime. Kc value had to be inputted (distortion) as the frame of the corner was outside the picture. And another reason could be due to not inputting in the same order( same order used in this exercise.

**Results**

**Calibration** results after optimization (with uncertainties):

Focal Length: fc = [ 879.91831 878.90125 ] +/- [ 2.39494 2.27480 ]

Principal point: cc = [ 514.60901 424.28943 ] +/- [ 1.97403 1.65116 ]

Skew: alpha\_c = [ 0.00000 ] +/- [ 0.00000 ] => angle of pixel axes = 90.00000 +/- 0.00000 degrees

Distortion: kc = [ -0.19982 0.14010 0.00028 0.00078 0.00000 ] +/- [ 0.00359 0.00783 0.00038 0.00039 0.00000 ]

Pixel error: err = [ 0.30203 0.39674 ]

**Recalibration**

Calibration results after optimization (with uncertainties):

Focal Length: fc = [ 879.72371 878.72978 ] +/- [ 1.76580 1.67723 ]

Principal point: cc = [ 514.82035 424.78055 ] +/- [ 1.45163 1.21795 ]

Skew: alpha\_c = [ 0.00000 ] +/- [ 0.00000 ] => angle of pixel axes = 90.00000 +/- 0.00000 degrees

Distortion: kc = [ -0.20227 0.14333 0.00044 0.00075 0.00000 ] +/- [ 0.00265 0.00575 0.00028 0.00029 0.00000 ]

Pixel error: err = [ 0.24315 0.27648 ]

Error is significantly lower as the camera is recalibrated. It is also known that recalibrating again would lower the error however, by doing so the calibration would get rid of outliers which may still occur in the real world.

B)

clc;

clear;

%Get the following parameters from your calibration

px= 514.60901;%Principal point X

py=424.28943 ; %Principal point Y

fx=879.91831; %Focal length

fy=878.90125 ;

%Homogenous transformation matrix

K = [fx,0,px;

0,fy,py;

0,0,1];

X\_cam = [-10;25;40;1]; %3D location

IM = eye(3,4);

x = K\*IM\*X\_cam;

u = x(1)/x(3)

v = x(2)/x(3)

u =

294.6294

v =

973.6027