Question 1

Camera calibration

1. Write a code segment and use Checkerboard-A4-25mm-8x6.pdf to calibrate your cell phone camera. You can call OpenCV functions to do the calibration.
2. Write a report to show the camera matrix and distortion parameters, and describe the meaning of every number in the matrix and distortion parameters. Also, put all the pictures which are used to run the calibration in the report.
3. **Submission**: 1. Submit your code. 2. submit the report (pdf file).

Question 2

ROC Curve

1. Use SamplesForROC.txt as testing samples and two classifiers to plot ROC curves and explain which classifier has a better performance.
2. SamplesForROC.txt: each row is a 2D sample (x, y). The first column is x, the second column is y and the third column is the label of the sample.
3. Classifiers: There are two classifiers here. The first one is $classifier_1(x,y) = \sqrt{x^2+y^2}$ and the second one is $classifier_2(x,y) = x+y$. In both classifiers, a larger response (return) value from the classifier functions indicates that the testing sample has a higher chance to be "class (label) 1".
4. Draw ROC curves of these two classifiers in the same plot and explain which one has a better performance and why you make this conclusion.
5. **Submission**: 1. submit your code 2. Write a report (pdf file), which includes the ROC curves and your discussion.

Question 3

Confusion matrix

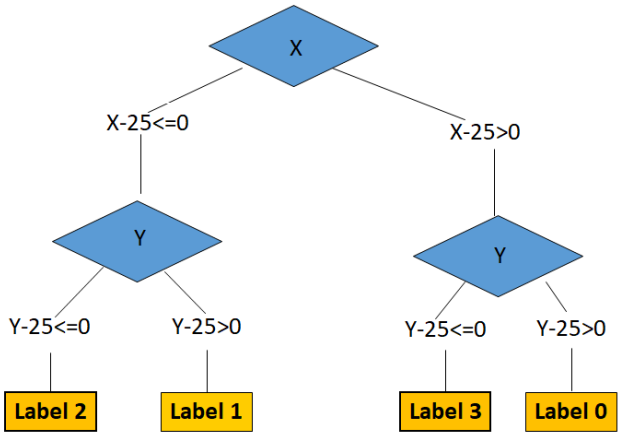
1. Use SamesForConfMatrix.txt as testing samples, test a multi-class classifier and plot the confusion matrix.

2. SamesForConfMatrix.txt: each row is a 2D sample (x, y). The first column is x, the second column is y and the third column is the label of the sample.

3. Select a color map to plot the confusion matrix. Put the color bar at the right hand side of your confusion matrix

4. Multi-class classifier: this classifier is a decision tree and illustrated in Fig. 1.

Figure 1: A multi-class classifier.



5. **Submission**: 1. Submit your code. 2. submit the report (pdf file) which include the confusion matrix.