



COMSATS University Islamabad, Islamabad Campus
MID Term Fa-25

Class: BEE-2A, Date: 30 October 2025, Subject: Introduction to Computer Vision (AIC341),
Instructor: Dr. Tariq Bashir, Time Allowed 80 Mins, Marks: 35.
Attempt all questions, all questions have equal marks.

Question-1 (06 marks = 4+6) Corner Detection (CLO1)

- When would detecting corners be more appropriate than detecting edges as an initial step in an application using computer vision?
- The Harris corner detection algorithm computes a 2×2 matrix at each pixel based on the first derivatives at that point and then computes the two eigenvalues of the matrix, λ_1 and λ_2 , where $\lambda_1 \leq \lambda_2$. How can these two values be used to label each pixel as either a locally smooth region (S), an edge point (E), or a corner point (C)? Give your answer by specifying "Label pixel S if ...", "Label pixel E if ..." and "Label pixel C if ..."

Question 2 (a) (07 Marks) RANSAC (CLO2)

We use RANSAC to fit a line to a set of points and obtain the fitted line as shown in figure 1(a) below. The dashed line shows all the data points that are considered as inliers. Now we have a dataset with random outliers (the white data points). Using the same set of parameters, RANSAC gives a fitted line as in figure 1(b) below. Of all the listed approaches, which one is most likely to make RANSAC still give a similar result as in (a) on the noisy dataset in (b)?

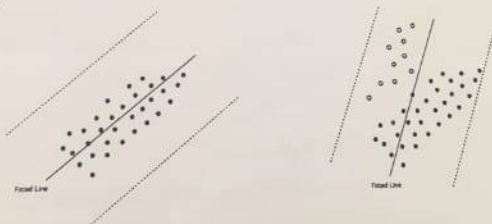


Figure 1: Left: Original dataset. Right: Noisy dataset.

Question-2 (b) (05 Marks)

One of the benefits to RANSAC is that we are able to calculate the failure rate for a given number of samples. Suppose we know that 60% of our data is outliers. How many times do we need to sample to assure with probability 20% that we have at least one sample being all inliers? You can leave your answer in terms of log functions. Assume that there are n data points and present your answer in terms of n .

Question-3 (a) (04 Marks) Machine Learning (CLO3)

Although your deep learning algorithm will automatically learn the appropriate weights through gradient descent, you as the engineer have to make the choice(s) about your system?

(b) (06 Marks)

Some patient features are expensive to collect (e.g., brain scans) whereas others are not (e.g., temperature). Therefore, we have decided to first ask our classification algorithm to predict whether a patient has a disease, and if the classifier is 80% confident that the patient has a disease, then we will do additional examinations to collect additional patient features. In this case, which classification methods do you recommend: neural networks, decision tree, or naive Bayes? Justify your answer in one or two sentences.