

THE UNIVERSITY OF NEW SOUTH WALES

Sample Class Test

Data xx.xx.xxx
COMP9517

Computer Vision

Time Allowed: XX mins
Total Number of Questions: **5**
Maximum marks **40**

All questions must be answered in the space provided on the question paper.

This paper **may not be retained** by the candidate.

Note: **This is a sample test paper only and NOT a full test paper, in terms of time and marks.**

Question 1 (10 marks total)

Multiple Choice, **choose one answer only by a tick in front:**

- 1) For feature selection in pattern recognition, which one of the following is INCORRECT:
 - a) select features that are translation, rotation and scale variant in images
 - b) select features that can handle occlusion and projective distortion for 3-D objects in images
 - c) select features that are invariant to translations in time and changes in amplitude
 - d) select features that can handle non-rigid deformations common in 3-D vision
- 2) Which of the following statements on human vision are CORRECT:
 - a) human vision is provided by light-sensitive receptors called rods and cones
 - b) rods and cones operate day and night to provide colour vision
 - c) rods and cones are equally distributed on the retina
 - d) both luminance and chrominance are equally informative
- 3) One objective of image segmentation is to:
 - a) decompose the image into parts for further analysis
 - b) recognise the object in image
 - c) improve the quality of the image
 - d) classify the image into a category
- 4) For reliable feature detection and matching, which of the following statements is INCORRECT:
 - a) the detector should detect the same point independently in both images
 - b) the detector may detect different interest points as the image undergoes changes
 - c) the descriptor should be distinctive to reliably match the feature points
 - d) the transformation between images should be robust to erroneous correspondences.
- 5) Which one of the following statements about the Hough transform is INCORRECT:
 - a) it is based on a voting scheme
 - b) a line in the image corresponds to a point in Hough space
 - c) a point in the image space maps to a line in Hough space
 - d) it is easy to pick a grid size for the bins in Hough space

....

Question 2 (3 marks)

Consider imaging a scene and processing it to produce a binary image. Can this be achieved for the following scenes? Also explain why or why not.

- i. The input image is a typed sheet of paper that is scanned using a page scanner. The objective is to recognise the typed characters and make an ASCII file that can be edited using a word processor.
- ii. The input image is a satellite image of UNSW campus taken during winter. By using suitable algorithms, the objective is to create an image where a 0 indicates the presence of a camellia bush and a 1 indicates the absence of a camellia bush.

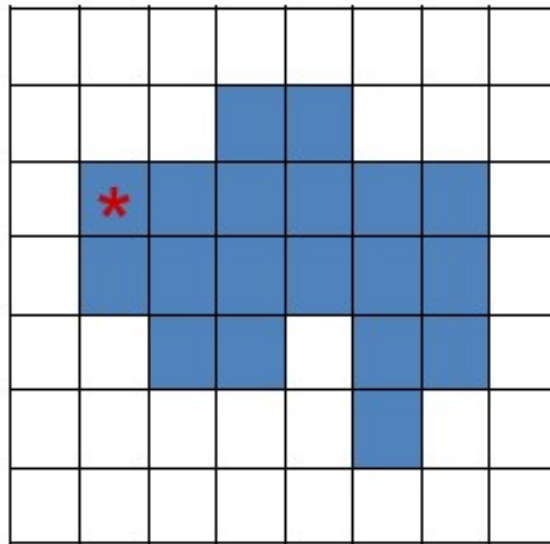
Question 3 (3 marks)

The results obtained by a single pass through an image of some two-dimensional masks can also be achieved by two passes of a one-dimensional mask.

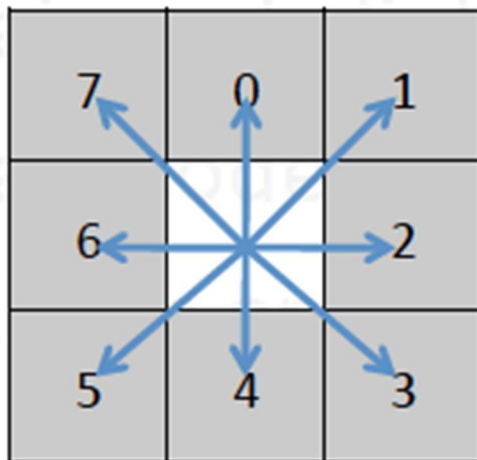
Show that the result of using a 3×3 smoothing mask with coefficients $1/9$ can also be obtained by first passing through an image the mask $[1 \ 1 \ 1]$, followed by a pass of its vertical counterpart, and finally scaling the result by $1/9$.

Question 4 (4 marks)

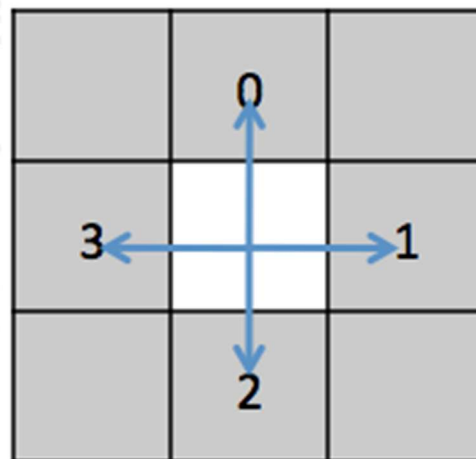
Provide 4N and 8N boundary coding solution for the following segmented image. Use the illustrated encoding schemas. Consider the square with a red star as the starting point. Please specify whether you traversed through clockwise or counter-clockwise direction.



Encoding schemas to be used are illustrated below:



8-N



4-N

Question 5 (5 marks)

- a) Briefly describe the three recognition problems in computer vision discussed in the class. Explain their differences and the main approaches for each task.
- b) You were asked to use a histogram in the assignment for finding the most frequent local pixel value.
 - i. Explain what a histogram is.
 - ii. How do you use the intensity histogram to find the most frequent local pixel value?