



TECHNICAL UNIVERSITY OF KENYA
FACULTY OF APPLIED SCIENCES AND TECHNOLOGY
SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
END OF SEMESTER DECEMBER 2016 EXAMINATION SERIES
FIRST SEMESTER EXAMINATIONS 2016/2017
FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF TECHNOLOGY IN COMPUTER TECHNOLOGY
BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY
BACHELOR OF TECHNOLOGY IN COMMUNICATION AND COMPUTER NETWORKS

ECSI 4108: COMPUTER VISION

TIME: 2 Hours

DECEMBER 2016

Instructions to candidates:

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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QUESTION ONE (30MARKS) COMPULSORY

- a. In optical motion estimation, describe the key parameters that an IT personnel can make use of to change the gray scale level hence state two application of motion estimation (4Marks)
- b. Using illustration, explain the principle of reflectance lambertian model (3Marks)
- c. When light energy hits a surface, several things can happen, depending on the surface properties (texture, color, opacity, material). Discuss? (3Marks)
- d. Explain the following terms : illumination model, radiometric and photometric (3Marks)
- e. Explain the technique of shape from shading (3Marks)
- f. i. Distinguish between optical flow and motion field (2Marks)
- ii. Describe various stages performed during edge detection (3Marks)
- g. i. Briefly describe the challenges that most of media specialize encounter in object recognition hence state any two application of object recognition (4Marks)
- ii. Pose estimation in object presentation and analysis its great challenge unless various models are adapted to compute it. Explain various forms used in pose estimation (3Marks)
- h. Outline the effect of tracking object on motion (2Marks)

QUESTION TWO (20 MARKS)

- a. Describe the various components involved in image acquisition and processing in computer vision system (6Marks)
- b. Illustrate image formation using pinhole camera (6Marks)
- c. Solid state camera override pinhole camera as one of the basic acquisition tool in computer vision. Engineers have address various issue in designing solid state camera of which to date provide a platform to enhance better imaging analysis and presentation . Explain? (8Marks)

QUESTION THREE (20 MARKS)

- a. Explain how the aperture problem and corresponding aperture problem is being resolved in motion estimation (6Marks)
- b. Geometry translation can provide a powerful means of enhancing and restoring distorted image during acquisition by camera configuration errors, registering satellite land pictures to maps, and creating stunning special effects. Discuss various techniques associated with image geometry (8Marks)
- c. Discuss any three techniques used in motion estimation (6Marks)

QUESTION FOUR (20 MARKS)

- a. Explain the role of image segmentation , its application hence discuss three different techniques applied in image segmentation (8Marks)
- b. Object recognition is vital technique in computer vision to analyses the objects. Discuss two approaches used in object recognition (4Marks)
- c. Explain the schematic functional block diagram of computer vision elements (8Marks)

QUESTION FIVE (20 MARKS)

- a. Briefly explain the usefulness of image retrieval to the user (4Marks)
- b. i. Discuss various bottleneck of image content retrieval (4Marks)
- ii. Image presentation is done on different levels .Describe three techniques devised in image presentation (6Marks)
- b. Several data acquisition tools have been deployed everywhere in most of our metropolitan city in Kenya. To have an optimized tracked data is a challenge .Explain (6Marks)