COMP37212

Two Hours

UNIVERSITY OF MANCHESTER

COMPUTER VISION

06 June 2022

Time: 14:00 - 16:00

Please answer ALL of the questions provided

This is a CLOSED BOOK examination

The use of electronic calculators is NOT permitted.

Q.2

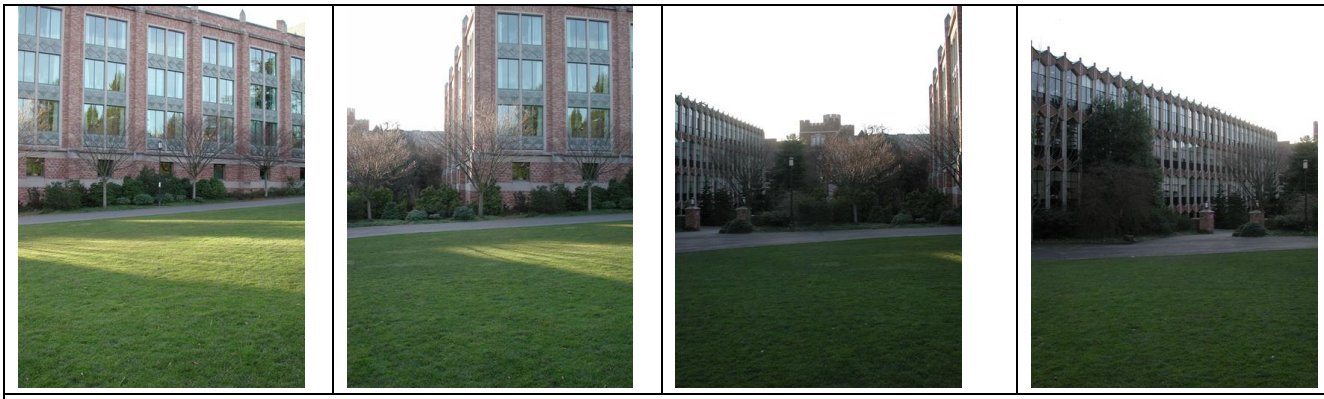


Figure 1

In a recent trip, a student captured the above images (Figure 1) and wants to write a computer vision application that can create a seamless panorama from these images.

a. Describe the assumptions under which this is possible. **[1 mark]**

b. Describe what computer vision/image processing steps could be used to achieve this and list the order of these steps. **[4 marks]**

c. Justify your choice of algorithm(s), describe the algorithm(s) briefly, and explain and how the algorithm(s) might achieve the desired results. **[10 marks]**

d. You should mention any difficulties that might arise, and how the values of any parameters used might be determined. **[5 marks]**

End of Question 2

Please turn over

Q.3

a) Describe in detail the Hough Lines transform (you may use Cartesian or polar coordinates). **[4 marks]**

b) Describe in detail the Generalised Hough transform. In your answer you should include details about the model creation and finding a shape within an image.

[6marks]

c) A group of students enjoy creating memes. Using the left and the centre image as input, how can they ***automatically*** create the image on the right when the ***only*** other user inputs are:

- the red oval on the left image in Figure 2, indicating the area/object of interest
- the green dot on the centre image in Figure 2, indicating the desired location for the object

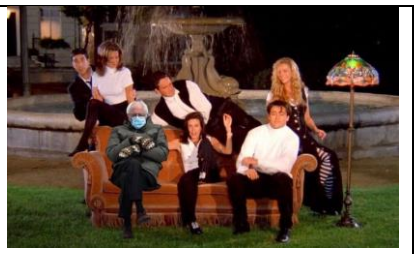
i. State the computer vision algorithms that can be used to achieve this. **[2 marks]**

ii. Explain why and how the algorithm(s) might achieve the desired results. **[4 marks]**

iii. How are they going to handle the difference in scale? What information can they extract from the input images to help them with this? **[4 marks]**

Left image

Centre image



Right image

Figure 2

End of Question 3

END OF EXAMINATION