



SET A

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**UNIVERSITI KUALA LUMPUR**  
**Malaysia France Institute**

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**FINAL EXAMINATION**  
**SEPTEMBER 2013 SESSION**

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**SUBJECT CODE** : FSB 38004  
**SUBJECT TITLE** : MACHINE VISION  
**LEVEL** : BACHELOR  
**TIME / DURATION** : 3 HOURS  
**DATE** :

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of **TWO (2)** sections, Section A and B. Answer **ALL** questions in Section A. For Section B, answer two (2) questions only.
6. Answer all questions in English.

**SECTION A (Total: 40 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

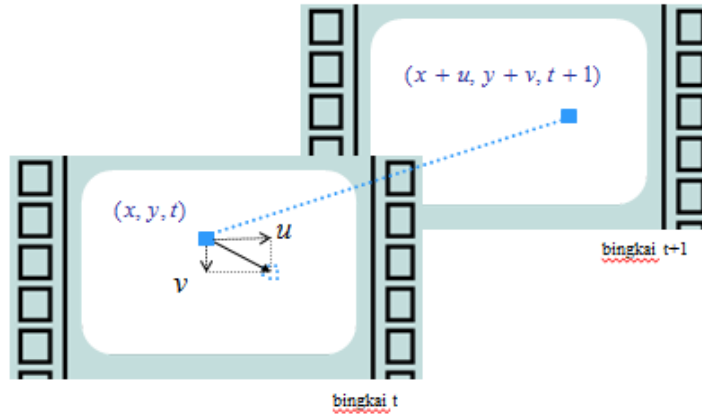
- (a) State the used of machine vision in robot (1 mark)
- (b) State the used of machine vision in Automation (3 marks)
- (c) State the advantages and disadvantages of using vision (6 marks)
- (d) Define the basic element for machine vision system. State an example for each of the elements. (5 marks)
- (e) Figure 1 shows the input image to be process. State the step to differentiate between cone and circle shape based on the step in machine vision.

**Figure 1: Image input**

(10 marks)

**Question 2**

- (a) Based on the following image In Figure 2 state the Optical Flow constraint Equation (OFCE).



**Figure 2:** Intensity in 2 sequence image

(6 marks)

- (b) From the OFCE in **Question 2(a)**, state the problem exists?

(2 marks)

- (c) State the feature that have been extracted by optical flow

(2 marks)

- (d) Explain briefly 5 steps of classification workflow

(10 marks)

**SECTION B (Total: 60 marks)****INSTRUCTION: Answer TWO (2) questions only.****Please use the answer booklet provided.****Question 3**

- (a) Figure 3 shows the frame sample to monitor the corridor situation. Figure 3(a) shows when there is 2 persons at the corridor and Figure 3(b) shows when the corridor have no object which is the background scene.



(a)



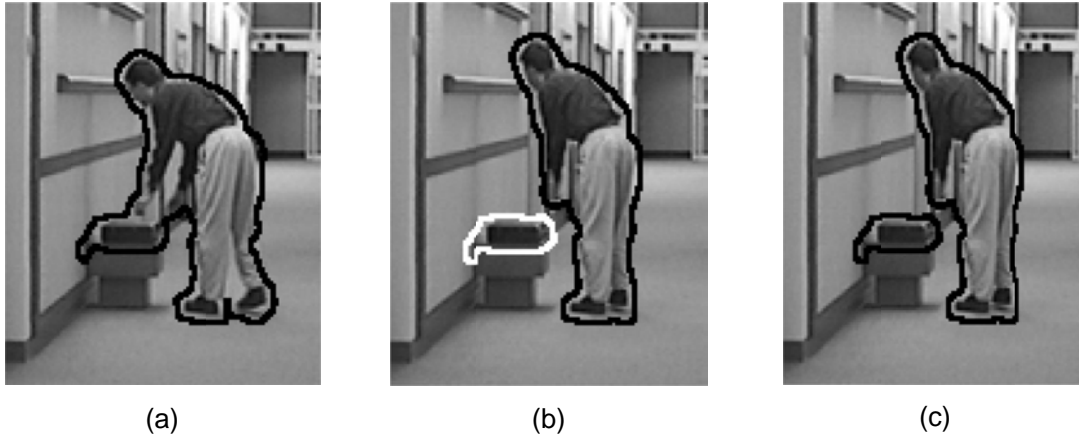
(b)

**Figure 3:** (a) Sample frame from the test sequence Hall Monitor and (b) frame representing the background of the scene.

From your observation, state your explanation in what will happen when the frame in Figure 3(a) and Figure 3(b) is being subtracted. Next, state the steps to differentiate between the movement of rectangle and oval shape in Figure 3(a).

(20 marks)

(b) Figure 4 shows the sequence movement based on rectangle shape in Figure 3(a). State the features that can be extracted from Figure 4. Apply the low and high level feature extraction.



**Figure 4:** The sequence of movement

(10 marks)

**Question 4**

Images in figure 5 show the set of vectors obtained by optical flow feature tracking in two different situations. The left image shows an organized vector flow. The right one shows a cluttered vector flow due to the collapsing situation.



Figure 5: Example of Vector flow

The right image of Figure 6 shows the mean direction in each block of the view field of an escalator camera. Some tendencies can be seen. In the blue region, the motion is from top to bottom. In the yellow region, the motion is from right to left.

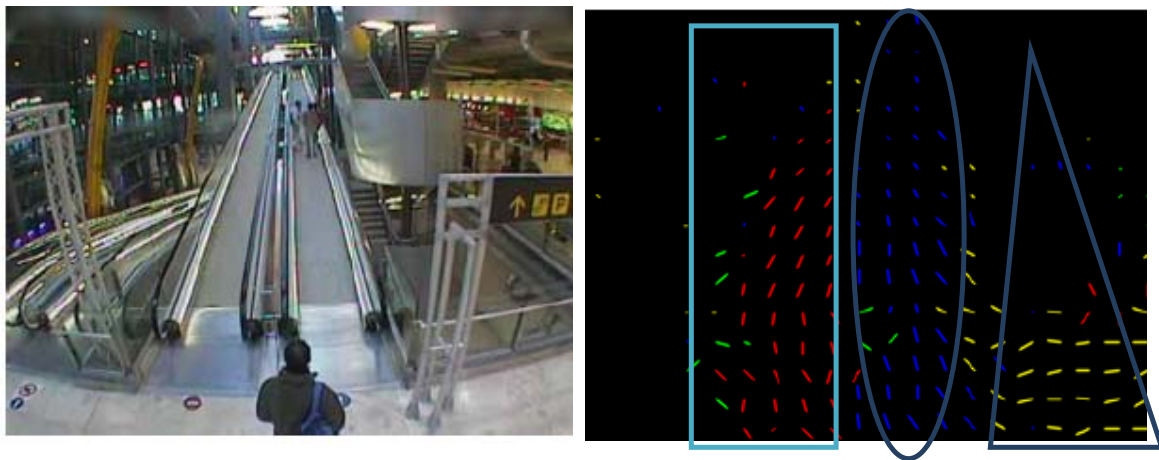


Figure 6: Example of block direction histogram: top to bottom for the left escalator, bottom to top for the right one.

Figure 7 shows an example of a collapsing situation in an escalator exit. The variation of the cluttering measure through time is shown in the graph. The block part of the curve represents the time interval where the collapsing event happened.

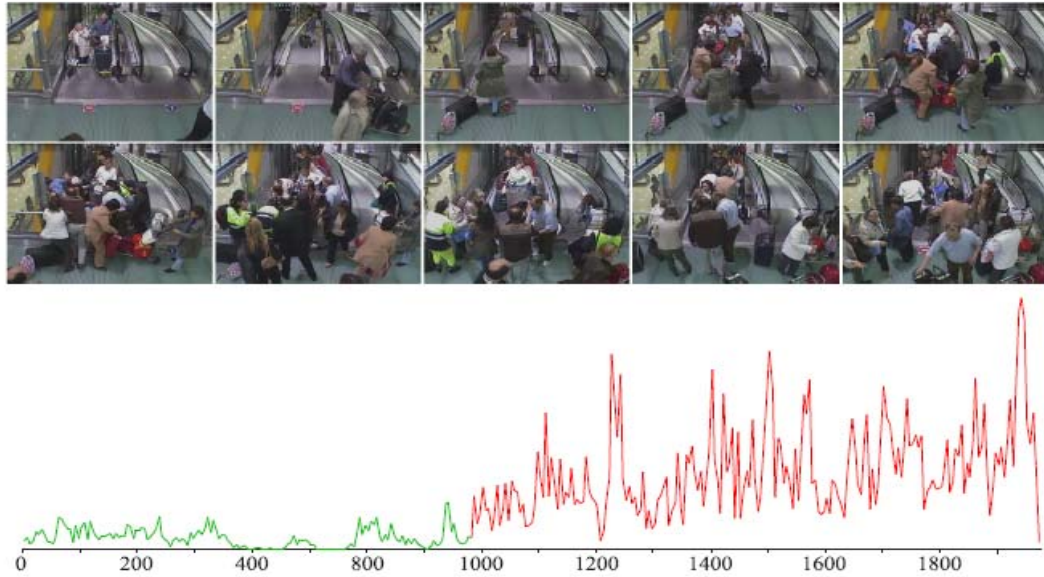


Figure 7: Measure variation.

Based on the above explanation state the detail algorithm step to get the output from Figure 5 to Figure 7.

(30 marks)

**Question 5**

Table 1 shows 4 features to differentiate types of irise. Define the step to do the classification of the data in Table 1 . Each steps that you give need to have brief explanation and example. In the part of choosing the type of classification, you need to choose the suitability of your choice and define your answer.

**Table 1:** Feature Extraction Fisher's iris data of 4 measurements on a sample of irise

Measurement 1	Measurement 2	Measurement 2	Measurement 3	Types
5.1	3.5	1.4	0.2	'setosa'
4.9	3	1.4	0.2	'setosa'
4.7	3.2	1.3	0.2	'setosa'
4.6	3.1	1.5	0.2	'setosa'
5	3.6	1.4	0.2	'setosa'
.	.	.	.	.
4.9	2.4	3.3	1	'versicolor'
6.6	2.9	4.6	1.3	'versicolor'
.	.	.	.	.
7.2	3.6	6.1	2.5	'virginica'
6.5	3.2	5.1	2	'virginica'
6.4	2.7	5.3	1.9	'virginica'
6.8	3	5.5	2.1	'virginica'

(30 marks)

END OF QUESTIONS