الرؤية بالحاسب
9:11
الاثنين 21/6/2021
أ.د/خالد فتحى حسين

Faculty of Computers & Information, Assiut University
4th Level
Final Exam
Duration: 2 hours

1

* الإسم الرباعي (بالعربي فقط)

محمود عبدالرحيم عباس حسنين

2

* رقم الجلوس

162018156

3

المستوي *

- الاول
- الثاني
- الثالث
- رابعة 2013
- رابعة 2014
- رابعة 2015
- رابعة 2016
- رابعة 2017

4

البرنامج *

- عام
- بايو
- هندسة

5

رقم المعمل *

- ج.
- د.

- اب
- اد
- اهـ
- أ٢
- ب٢
- ج٢
- د٢
- هـ٢
- أ٣
- ب٣
- ج٣
- د٣
- هـ٣
- أ٤
- ب٤

6

* رقم الكمبيوتر

19

7

* الكود (قد تمت مراجعة بيانات الطالب ورقم الجلوس)

0uVZ

8

Consider an image on which the Laplacian filter is applied for edge detection. An edge in the image corresponds to the following in the filtered image
(2 Points)

- Zeros
- Zero Crossings
- Maxima
- Minima

9

Which of the following is a Sobel operator?
(2 Points)

$$(a)\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \quad (b)\begin{pmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{pmatrix}\begin{pmatrix} 1 & 1 \\ 0 & 0 \\ -1 & -1 \end{pmatrix}$$

$$(c)\begin{pmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{pmatrix}\begin{pmatrix} 1 & 2 & 1 \\ 0 & 0 & 0 \\ -1 & -2 & -1 \end{pmatrix}$$

- (a)
- (b)

- [x] (c)

10

Which of the following is a second-order derivative operator?
(2 Points)

- [ ] Histogram
- [ ] Laplacian
- [x] Gaussian
- [ ] None of the mentioned

11

Assume a simple neural network model with one neuron and three inputs. The values of the input = 1,2,1, respectively. The weights to the neuron are 1,0.5 and 1 respectively. Assume the activation function is ReLU activation and the Bias is zero. What will be the output?
(2 Points)

- [ ] 0
- [x] 1
- [ ] 2
- [ ] 3
- [ ] None of the mentioned

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A half black and half white image chess board image with alternate black and white blocks of equal number and image of random black and white dots of equal distribution have different histogram
(2 Points)

- (●) True
- ( ) False

13

Consider the scenario. The problem you are trying to solve has a small amount of data. Fortunately, you have a pre-trained neural network that was trained on a similar problem. Which of the following methodologies would you choose to make use of this pre-trained network?
(2 Points)

- (●) Freeze all the layers except the last, re-train the last layer
- ( ) Fine tune the first couple of layers only
- ( ) Re-train the model for the new dataset
- ( ) Assess on every layer how the model performs and only select a few of them

14

For the following 3x3 gray image, compute the following for the center pixel
(2 Points)

$$\begin{bmatrix} 5 & 7 & 8 \\ 3 & 2 & 4 \\ 1 & 6 & 9 \end{bmatrix}$$

The derivative in the x direction using the derivative mas

- -1
- 1
- 0
- None of the mentioned

15

The Euler number of binary image of digit “B” is
(2 Points)

- 1
- 0
- -1
- 2

16

Response of derivative mask is zero at
(2 Points)

- constant intensities
- low intensities
- sharp intensities

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Sobel edge detection uses
(2 Points)

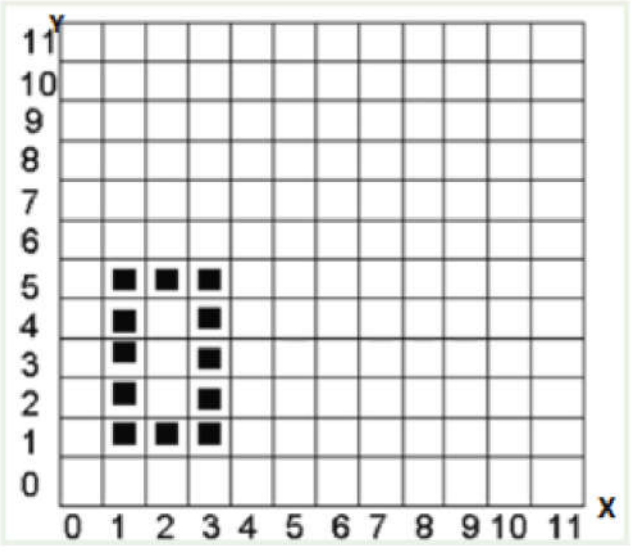
- First derivative
- Second derivative
- All of the above
- None of the mentioned

18

Hough transform is used for finding
(2 Points)

- Finding points in image
- Finding objects in image
- Finding lines in image
- Finding moments of an image

19



The y component of the centroid of following figure is:
(2 Points)

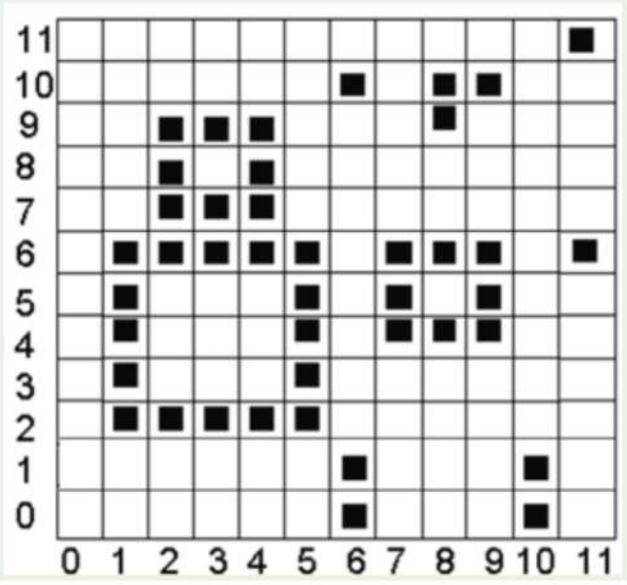
- 3
- 2
- 28/9
- 4

20

If the input to a ReLU activation function is -0.8, the output equals:
(2 Points)

- -0.8
- 0
- 0.8
- None of the mentioned

21



If we apply the Hough transform on the image below. Note: each black square denotes a point and the numbers are the coordinates.
The maximum value for the accumulator cell in the (ρ, θ) space is:
(2 Points)

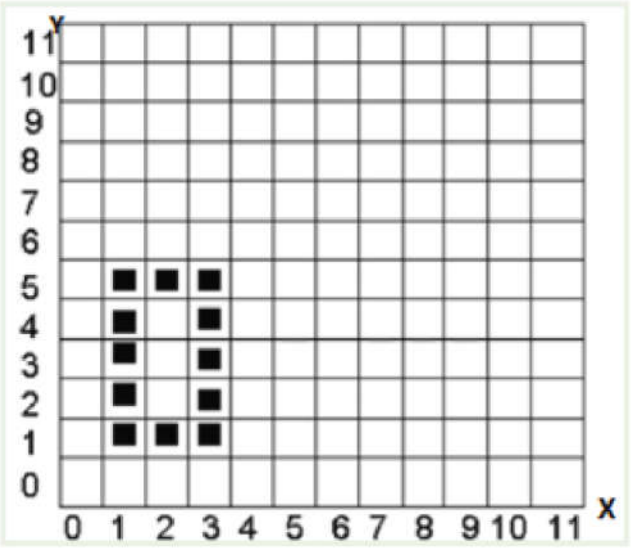
- 8
- 4
- 2
- 9

22

Neural networks learn by examples
(2 Points)

- True
- False

23



The x component of the centroid of following figure is:
(2 Points)

- 5/2
- 5/3
- 1.5
- 2

24

The main advantage of the Hough transform technique is that it is tolerant of gaps in feature boundary descriptions and is relatively unaffected by image noise
(2 Points)

- True
- False

25

Given the input matrix I to max pooling layer with 2x2 local receptive fields, calculate the output feature map for padding = 0 and stride = 1
(2 Points)

$$I = \begin{bmatrix} 1 & 3 & 2 & 3 \\ 9 & 8 & 1 & 4 \\ 4 & 6 & 1 & 2 \\ 1 & 5 & 3 & 5 \end{bmatrix}$$

A) $\begin{bmatrix} 9 & 4 \\ 6 & 5 \end{bmatrix}$

B) $\begin{bmatrix} 9 & 8 & 4 \\ 9 & 8 & 4 \\ 6 & 6 & 5 \end{bmatrix}$

C) $\begin{bmatrix} 9 & 8 & 3 & 5 \end{bmatrix}$

D) None of the mentioned

- A)
- B)
- C)
- D)

26

Image segmentation is the process of
(2 Points)

- Partitioning a digital image into multiple segment

- Classify the image into number of objects
- None of the above
- All of the above

27

Given the raw image I, and the weights H, assume the bias is zero, padding is 1 and stride is 2; compute the output feature map
(2 Points)

$$I = \begin{bmatrix} 3 & 2 & 2 & 1 & 3 \\ 1 & 0 & 0 & 0 & 1 \\ 2 & 0 & 3 & 3 & 1 \\ 0 & 1 & 0 & 0 & 0 \\ 2 & 0 & 0 & 4 & 0 \end{bmatrix}, H = \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 1 \\ 0 & -1 & 0 \end{bmatrix}$$

a) $\begin{bmatrix} 1 & 3 & 0 \\ -1 & 3 & 2 \\ 0 & 4 & 4 \end{bmatrix}$

b) $\begin{bmatrix} 2 & 4 & 1 \\ 0 & 4 & 3 \\ 1 & 5 & 5 \end{bmatrix}$

c) $\begin{bmatrix} 3 & 2 & 3 \\ 2 & 3 & 1 \\ 2 & 0 & 4 \end{bmatrix}$

d) None of the mentioned

- a)
- b)
- c)
- d)

28

Given the raw image I, and the weights H, assume the bias is 1, padding is zero and stride is 2; compute the output feature map
(2 Points)

$$I = \begin{bmatrix} 3 & 2 & 2 & 1 & 3 \\ 1 & 0 & 0 & 0 & 1 \\ 2 & 0 & 3 & 3 & 1 \\ 0 & 1 & 0 & 0 & 0 \\ 2 & 0 & 0 & 4 & 0 \end{bmatrix}, H = \begin{bmatrix} 0 & -1 & 0 \\ 1 & 0 & 1 \\ 0 & -1 & 0 \end{bmatrix}$$

a) $\begin{bmatrix} -1 & -3 \\ 0 & -7 \end{bmatrix}$

b) $\begin{bmatrix} 0 & -2 \\ 1 & -6 \end{bmatrix}$

c) $\begin{bmatrix} 2 & 1 \\ 0 & -4 \end{bmatrix}$

d) None of the mentioned

- a)
- b)
- c)
- d)

29

Compute the covariance matrix for the following data
(2 Points)

X	10	8	9	8	7
Y	9	7	10	7	5

a) $\begin{bmatrix} 358 & 327 \\ 327 & 304 \end{bmatrix}$

b) $\begin{bmatrix} 71.6 & 65.4 \\ 65.4 & 60.8 \end{bmatrix}$

c) $\begin{bmatrix} 14.32 & 13.08 \\ 13.08 & 12.16 \end{bmatrix}$

d) None of the mentioned

- a)
- b)
- c)
- d)

30

It is possible to represent an XOR function with a neural network without a hidden layer
(2 Points)

- True
- False

31

For the following 3x3 gray image, compute the following for the center pixel
(2 Points)

$$\begin{bmatrix} 5 & 7 & 8 \\ 3 & 2 & 4 \\ 1 & 6 & 9 \end{bmatrix}$$

The derivative in the y direction using the derivative m

- -1
- 1
- 0
- None of the mentioned

32

The Hough transform of a point in the image space is not a point in the Hough space
(2 Points)

- True
- False

33

18. Given the input matrix I to max pooling layer with 2x2 local receptive fields, calculate the output feature map for padding = 0 and stride = 2
(2 Points)

$$I = \begin{bmatrix} 1 & 3 & 2 & 3 \\ 9 & 8 & 1 & 4 \\ 4 & 6 & 1 & 2 \\ 1 & 5 & 3 & 5 \end{bmatrix}$$

A) $\begin{bmatrix} 9 & 4 \\ 6 & 5 \end{bmatrix}$

B) $\begin{bmatrix} 9 & 8 & 4 \\ 9 & 8 & 4 \\ 6 & 6 & 5 \end{bmatrix}$

C) $[9 \quad 8 \quad 3 \quad 5]$

D) None of the mentioned

- (●) A)
- ( ) B)
- ( ) C)
- ( ) D)

34

Why is the XOR problem exceptionally interesting to neural network researchers?
(2 Points)

- Because it can be expressed in a way that allows you to use a neural network
- Because it is complex binary operation that cannot be solved using neural networks
- Because it can be solved by a single layer perceptron
- Because it is the simplest linearly inseparable problem that exists

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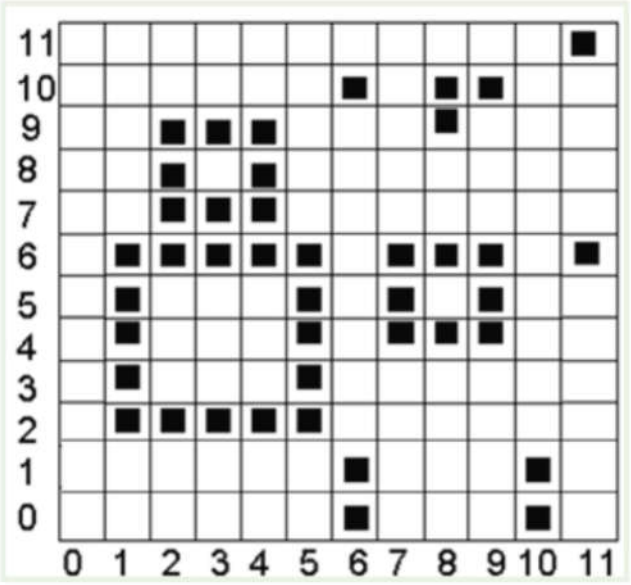


If we apply the Hough transform on the image below. Note: each black square denotes a point and the numbers are the coordinates.
The θ value corresponding to the maximum value for the accumulator cell is:
(2 Points)

- π/4
- π/2
- 0
- 3π/4

36

For the following 3x3 gray image, compute the following for the center pixel
(2 Points)

$$\begin{bmatrix} 5 & 7 & 8 \\ 3 & 2 & 4 \\ 1 & 6 & 9 \end{bmatrix}$$

The direction of the gradient using the derivative masks [-1 0 1]

- 0 degree
- 45 degree
- 90 degree
- None of the mentioned

37

A neural network with multiple hidden layers and Rectified Linear Unit (ReLU) nodes can form non-linear decision boundaries
(2 Points)

- True
- False

38

In a given image strip (S), second order derivative of S=[5 5 3 2 0 0 6 0 8 10] is:
(2 Points)

- [-2 1 -1 2 6 -12 14 -6]

- [ ] [0 -2 -1 -2 0 6 -6 8 2]
- [ ] [0 2 1 2 1 -6 6 -8 -2]
- [ ] [2 -1 4 8 6 12 14 6]

39

----------filter cannot be implemented using convolution mechanism
(2 Points)

- [ ] Average
- [ ] Gaussian
- [x] Median
- [ ] LOG

40

An input image with size 7x7 and a kernel/filter of size 3x3 with stride 1 and pad 0. What will be the size of the output feature map?
(2 Points)

- [ ] 3x3
- [x] 5x5
- [ ] 7x7
- [ ] None of the mentioned

41

For a given image strip S = [3 3 3 3 3 3 3 3 3], the derivative in the x direction using the derivative mask [-2 0 2] for the center pixel is:
(2 Points)

- -1
- None of the mentioned
- 1
- 0

42

X1	X2	X1 AND X2
0	0	0
0	1	0
1	0	0
1	1	1

Let us assume we implement an AND function using a single neuron with two input (X1, X2) and ReLU activation, below is a tabular representation of an AND function. What would be the weights and bias?
(2 Points)

- Bias = -1.5, w1 = 1.25, w2 = 1.25
- Bias = 1.5, w1 = 2, w2 = 2
- Bias = 1, w1 = 1.5, w2 = 1.5
- None of the mentioned

43

Which of the following is a challenge when dealing with computer vision problems?
(2 Points)

- Variations due to geometric changes (like pose, scale etc.)
- Variations due to photometric factors (like illumination, appearance etc.)
- Image occlusion
- All of the above

44

In Hough transform, the parameterization of a line given using equation y= mx+c has one problem. The line parallel to y-axis has infinite slope m which cannot be represented by a computer
(2 Points)

- True
- False

45

What does the total number of pixels in the region defines?
(2 Points)

- Intensity
- Perimeter
- Area
- Brightness

46

For edge detection we combine gradient with
(2 Points)

- smoothing
- set theory
- sharpening
- thesholding

47

Using the following data, compute the Mahalanobis distance for the point (8, 8)
(2 Points)

X	10	8	9	8	
Y	9	7	10	7	

- 0.5060
- 0.5532
- 0.7438
- None of the mentioned

48

Sudden change in intensity produce a peak in
(2 Points)

- second derivative
- third derivative

- first derivative
- first and second derivative

49

Which of the following gives non-linearity to a neural network?
(2 Points)

- Stochastic Gradient Descent
- Sigmoid activation function
- Convolution function
- None of the mentioned

50

LOG stands for
(2 Points)

- Laplacian of gray level
- length of Gaussian
- Laplacian of Gaussian
- length of gray level

51

Erosion could be used for
(2 Points)

- producing lines

sharpening image

removing lines

blurring image

52

For the following 3x3 gray image, compute the following for the center pixel
(2 Points)

$$\begin{bmatrix} 5 & 7 & 8 \\ 3 & 2 & 4 \\ 1 & 6 & 9 \end{bmatrix}$$

The magnitude of the gradient using the derivative masks [-1 0 1]

1

2

1.41

None of the mentioned

53

[2, 5, 8, 7, 2]
We apply median filter on this image of size 3. What would be the value of the third pixel?
(2 Points)

5

7

8

None of the mentioned

54

The purpose of the union-find data structure is to store a collection of disjoint sets and to efficiently implement the operations of UNION and FIND
(2 Points)

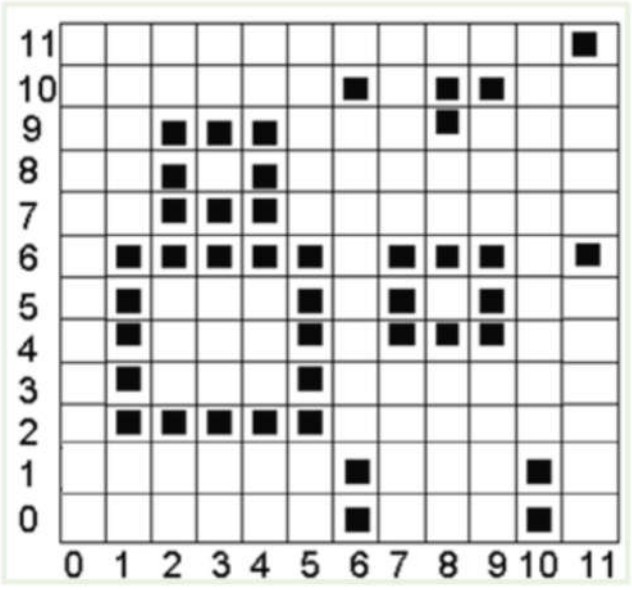
- True
- False

55

The derivative in the x direction is defined as
(2 Points)

- Differences
- Addition
- Division
- Multiplication

56



If we apply the Hough transform on the image below. Note: each black square denotes a point and the numbers are the coordinates.
The ρ value corresponding to the maximum value for the accumulator cell is:
(2 Points)

- 3
- 1
- 6
- 5

57

Identify the operator M. Where
(2 Points)

$$M = \begin{bmatrix} 0 & -1 & 0 \\ -1 & 4 & -1 \\ 0 & -1 & 0 \end{bmatrix}$$

- Laplacian Operator
- Robert operator
- Gradient Operator
- Prewitt Operator