Code No: M1121/R07

Set No. 1

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
IMAGE PROCESSING AND PATTERN RECOGNITION
(Bio-Medical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain in brief about the pattern classes.

   (b) Discuss a simple pattern recognition model to recognize chineese characters.
   [8+8]

2. With a brief note on clustering concepts, explain the k - means algorithm in detail.
   [16]

3. (a) Explain the multiclass perceptron algorithm.

   (b) Apply the multiclass perceptron algorithm to classify the following patterns in to their corresponding classes: w_1: $(0,0)'$, w_2 : $(1,1)'$, w_3 : $(-1,1)'$ Assume $w_1(1) = w_2(1) = w_3(1)=(000)'$ and $\eta=1$. [8+8]

4. Discuss Robbins-monro algorithm for pattern classification and extend the algorithm to multi - dimensional case. [16]

5. Write short notes on:

   (a) Pixel neighbors.

   (b) Pixel connectivity.

   (c) Distance measure.

   (d) Equivalence of pixels. [4+4+4+4]

6. (a) Name and explain different methods available for image enhancement in spatial domain and frequency domain.

   (b) Explain the concept of enhancement by point processing using suitable example. [8+8]

7. (a) With neat block diagram, describe the image compression system model.

   (b) What do you mean by mapper in source encoder?

   (c) Compare the statistical compression and spatial compression. [4+4+6]

8. (a) What is meant by image segmentation? Mention the applications of image segmentation. [4+4]

   (b) Explain about detection of discontinuities. [8]

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$\boxed{\textbf{Set No. 2}}$

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
IMAGE PROCESSING AND PATTERN RECOGNITION
(Bio-Medical Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. Explain in detail about the fundamental problems in the design of pattern recognition system. Also, discuss the methods to overcome them.   [8+8]

2. (a) What is the difference between single prototype and multi-prototype patterns.

   (b) Explain why patterns are not easily classifiable by proximity concept.   [8+8]

3. Find the solution vector ω using reward punishment algorithm to separate the two classes, where the patterns in each class are given by $\omega_1 : \{(0,0,1),(0,1,1)^1\}$ and $\omega_2 : \{(1,0,1)^1,(1,1,1)^1\}$ [16]

4. Discuss Robbins-monro algorithm for pattern classification and extend the algorithm to multi - dimensional case.   [16]

5. Write short notes on:

   (a) Pixel neighbors.

   (b) Pixel connectivity.

   (c) Distance measure.

   (d) Equivalence of pixels.   [4+4+4+4]

6. Explain in detail the different derivative operators used for image sharpening.[16]

7. (a) How do you measure information?

   (b) Describe the compression of image by eliminating coding redundancy [4+12]

8. (a) Explain any two methods for linking the edge pixels to form a boundary of an object.

   (b) Design suitable mask for detecting horizontally oriented lines in an image. Explain with an example how this could be done.   [8+8]

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Code No: M1121/R07

Set No. 3

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
IMAGE PROCESSING AND PATTERN RECOGNITION
(Bio-Medical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain in detail about patterns and pattern classes with examples. Also, explain how the pattern classes are useful for recognition.

   (b) With a neat block diagram, explain a pattern recognition system in detail.

   [8+8]

2. (a) Explain how minimum distance classification is useful for classifying different pattern classes.

   (b) Explain the maximin distance algorithm for pattern classification.   [8+8]

3. Compute whether the following patterns of two classes are linearly reparable using LMSE algorithm. ω_1: $\{(0,0)^1, (0,1)^1\}$ and ω_2: $\{(0,1)^1, (1,1)^1\}$.   [16]

4. (a) Discuss the Robbins-monro algorithm and compare its performance with LMSE algorithm.

   (b) Discuss the types of grammars for syntactic pattern recognition.   [8+8]

5. (a) Explain the periodicity, conjugate and rotation properties of Fourier transform.

   (b) A real function f(x) can be decomposed as the sum of even and odd functions. Show that $f_{even}(x) = (1/2)[f(x) + f(-x)]$ and $f_{odd}(x) = (1/2)[f(x) - f(-x)]$

   [8+8]

6. (a) Write a note on the following:

      i. image subtraction
      ii. image averaging   [4+4]

   (b) Show that a high pass filtered image can be obtained in the frequency domain as High pass = original - low pass (assume 3x3 filters)   [8]

7. Discuss about

   (a) correlation

   (b) quantization

   (c) subimage

   (d) transform coding error

   (e) zonal mask.   [3+3+3+4+3]

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Set No. 3

8. (a) What is meant by image segmentation? Mention the applications of image segmentation. [4+4]

   (b) Explain about detection of discontinuities. [8]

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Code No: M1121/R07

Set No. 4

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
IMAGE PROCESSING AND PATTERN RECOGNITION
(Bio-Medical Engineering)

Time: 3 hours
Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain briefly about the character recognition system?
   (b) Explain briefly about the speech recognition system? [8+8]

2. (a) Discuss various measures of similarity for cluster classification.
   (b) Explain in detail about Nearest Neighbor classification techniques in detail.
   [8+8]

3. (a) Explain what is meant by "reward" and "Punishment" in the contest of reward-punishment algorithm.
   (b) What is the objective of proof of convergence in the reward-punishment algorithm. [4+12]

4. (a) Discuss the least mean square error algorithm.
   (b) Determine the decision boundary by least mean square algorithm to classify the following patterns into two classes.
   Class 1: $\{(0,0,0),(1,0,0),(1,0,1),(1,1,0)\}$
   Class 2: $\{(0,0,1),(0,1,0),(0,1,1),(1,1,1)\}$ [8+8]

5. (a) Discuss the various geometrical transformations of the image function.
   (b) Suppose the sequence [2 3 2 1] represents a discrete function. Compute Discrete Fourier transform of the function. [8+8]

6. (a) Name and explain different methods available for image enhancement in spatial domain and frequency domain.
   (b) Explain the concept of enhancement by point processing using suitable example. [8+8]

7. (a) Write short notes on
      i. Zonal coding.
      ii. Threshold coding. [4+4]
   (b) Explain with an example, the Huffman coding algorithm for image data compression. [8]

8. (a) What is meant by image segmentation? Mention the applications of image segmentation. [4+4]
   (b) Explain about detection of discontinuities. [8]

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