M.Sc.(CA) 3rd Semester
040020310: Emerging Technologies

Natural Language Processing

Short Questions

1. What is Machine Translation?
2. What is Dialogue and Discourse Systems?
3. Define Parsing.
4. Give the application example of Information extraction.
5. List the area of language processing.
6. Give two examples of phonetics and phonology.
7. What is Word Sense Disambiguation?
8. What is pragmatics?
9. Give the example of discourse?
10. What is grammar?
11. Define regular expression.
12. What is Finite State Automata?
13. What is formal language?
14. What is transition function in FSA?
15. What are the functions of parser?
16. What is a single-error misspelling? What is lexical analyser?
17. Design an FSA that is equivalent to this regular expression 1(0)+1 over the alphabet $\Sigma = \{0, 1\}$.
18. Give the regular expression that applying the Kleene star operator to the regular expression 1(0)+1.
19. List of meta characters which you can use in regular expression.
20. List of meta characters which you cannot use in regular expression.
21. What is grammar and syntax?

Long Questions

1. What are the challenges for speech processing? Discuss in brief.
2. What are the challenges of NLP?
3. Give one example of following ambiguities: (a) Phonetic (b) Syntactic (c) Pragmatic
4. What are the applications of NLP?
5. What are the challenges of meaning representation in Natural language? Explain.
6. What are the basic concepts/ideas for representation of meaning of any given sentence?
7. Why the basic predicate logic cannot be used for representation of meaning? Justify.
8. What is morphology? List types of affix in morphology with examples.
9. Explain the steps to know the complex language behaviour.
10. List and explain the ambiguity examples for each steps of NLP.
11. Explain Noisy Channel Model in detail.
12. What are differences between DFA and NFA with examples.
13. Define regular language. Which is different operation for generating a new language?
14. What are the difference between spelling detection and correction with suitable application?
15. What are the causes of Spelling Errors?
16. Explain dealing of spelling errors in details.
17. Explain Bayesian method to spelling in detail with example.
18. Describe the class of strings matched by the following regular expressions:

a) [a-zA-Z]+
b) [A-Z][a-z]*
c) \d+(\.\d+)?
d) ([bcdfghjklmnpqrstvwxyz][aeiou][bcdfghjklmnpqrstvwxyz])*

19. The language consists of the characters a, b, c and d. Create a FSA and Regular expression which accepts:
    a) all strings which start with a b
    b) all strings which end with a b
    c) all strings which start with an a and which end with a c
    d) all strings with an odd number of c's
    e) all strings in which every a is followed by a b
    f) all strings such that a b is never preceded by a c

    For each of the automata, explain whether the automaton is deterministic or not.
20. Define a regular expression and FSA for the following languages:
    a) All strings containing two vowels, ending in a consonant, with an odd number of letters.
    b) All strings which end in a voiceless consonant
    c) All strings in which every a is preceded by b
    d) All strings in which the number of a's is larger than the number of b's
    e) All strings in which every a is preceded by b, and the number of b's is divisible by 5
    f) All palindromes (words that read the same backwards, e.g. anna)
    g) All strings in which every a is preceded by b, and every b is preceded by a

True/False

1. NLP is concerned with the interactions between computers and human (natural) languages.
2. An FST is an automaton that defines a relation between formal languages.
3. context-free languages are closed under concatenation
4. Any language accepted by a non-deterministic finite-state automaton can be captured by an equivalent regular expression.
5. A formal language is a set of strings consisting of symbols from a specified alphabet.
6. context-free languages are closed under union
7. An FST is an automaton that reads an input string and returns an output string.
8. Modern NLP algorithms are based on machine learning, especially statistical machine learning.
9. Natural Language generation is the main task of Natural language processing.
10. OCR (Optical Character Recognition) uses NLP.
11. Parsing determines Parse Trees (Grammatical Analysis) for a given sentence.
12. IR (information Retrieval) and IE (Information Extraction) are the two same thing.

Multiple Choice Questions

1. Natural Language Processing (NLP) is field of
    a) Computer Science
    b) Artificial Intelligence
    c) Linguistics
    d) All of the mentioned
2. One of the main challenge/s of NLP Is _____
    a) Handling Ambiguity of Sentences
    b) Handling Tokenization
    c) Handling POS-Tagging
    d) All of the mentioned
3. Choose form the following areas where NLP can be useful.

a) Automatic Text Summarization
b) Automatic Question-Answering Systems
c) Information Retrieval
d) Developing Autonomous Robots

4. The major tasks of NLP includes
a) Automatic Summarization
b) Discourse Analysis
c) Machine Translation
d) Semantic Analysis

5. Machine Translation
a) Converts one human language to another
b) Converts human language to machine language
c) Converts any human language to English
d) Converts Machine language to human language

6. Many words have more than one meaning; we have to select the meaning which makes the most sense in context. This can be resolved by
a) Fuzzy Logic
b) Word Sense Disambiguation
c) Shallow Semantic Analysis
d) All of the mentioned

7. Given a sound clip of a person or people speaking, determine the textual representation of the speech.
a) Text-to-speech
b) Speech-to-text

8. In linguistic morphology, _____ is the process for reducing inflected words to their root form.
a) Rooting
b) Stemming
c) Text-Proofing
d) Both a & b

9. Which of the following regular expression identity is true?
(a) r(*) = r*
(b) (r*s*)* = (r|s)*
(c) (r|s)* = r*|s*
(d) r*s* = r*|s*

Digital Image Processing

Short Questions

1 Define Digital image?
2 Define Intensity Resolutions?
3 What is noise and saturation?
4 Find the number of bits required to store a 256 X 256 image with 32 gray levels?
5 What is meant by illumination and reflectance?
6 What is image compression?
7 What are the steps involved in DIP?
8 What is Dynamic Range?
9 Define sampling and quantization?
10 What do you meant by Zooming of digital images?
11 What is meant by path?
12 What is contrast stretching?
13 What is meant by false contouring?
14 What is spatial filter?
15 What do you mean by image enhancement?
16 What is difference between image enhancement and image restoration?
17 What is grey level slicing?
18 Specify the objective of image enhancement technique
19 What is meant by masking?
20 What is meant by bit plane slicing?
21 Define histogram.
22 What are image sharpening filters? Explain the various types of it.
23 What is meant by Image Restoration?
24 What is segmentation?
25 What is Image Negatives?
26 What do you mean by intensity?
27 What do you meant by Gray level?
28 What is meant by path?
29 Define Fourier transform pair.
30 What is Chromatic Adoption?
31 Give the formula for calculating D4 and D8 distance
32 What is geometric transformation?
33 Define the term Luminance?

Long Questions

1 Write short notes on sampling and quantization.
2 Explain spatial filtering?
3 Explain the types of connectivity.
4 Explain image arithmetic operation.
5 Explain basic intensity transformation functions.
6 What is image interpolation? Write a note bicubic interpolation.
7 Explain the basic relationships between pixels?
8 Explain type of connectivity in pixels using example
9 Explain set operation on images.
10 Explain linear and non-linear operation. Also prove operation Max is non-linear operation.
11 Compare and contrast Log Transformation with Power-Law(Gamma) Transformation.

12 How is the process of Histogram Equalization carried out?
13 How is histogram equalization and histogram matching different? Explain.
14 Under what circumstances is Local Histogram Processing used and why?
15 Discuss with examples the steps to achieve spatial filtering in an image
16 How can vector representation of linear filtering be done?
17 Describe the steps to generate spatial filter masks.
18 Write a detailed note on intensity transformation and spatial filtering
19 What are smoothing filters? When should these and its types be used?
20 What is second derivative for image sharpening? Explain the method used to accomplish it
21 Which transformation is used to reverse the intensity levels and why?
22 When should first order derivatives for image sharpening be used? Why?
23 Which are the three basic functions of Piece-wise linear Transformation? explain any two in detail.
24 List and explain the advantages of Log Transformation
25 What are image sharpening filters? Explain the various types of it.
26 Explain Smoothing filters in spatial domain .
27 Explain the basic relationships between pixels?
28 Summarize the application of digital image processing in society.
29 Explain by drawing diagram fundamental steps in image processing
30 Explain with example a) Neighbors of pixel b) Connectivity.
31 Explain nearest neighbor interpolation method. Also give its disadvantage.

Multiple Choice Questions

1 Images quantised with insufficient brightness levels will lead to the occurrence of _____
a) Pixillation
b) Blurring
c) False Contours
d) None of the Mentioned

2 A continuous image is digitised at _____ points.
a) random
b) vertex
c) contour
d) sampling

3 What is the basis for numerous spatial domain processing techniques?
a) Transformations
b) Scaling
c) Histogram
d) None of the Mentioned

4 In _____ image we notice that the components of histogram are concentrated on the low side on intensity scale.
a) bright
b) dark
c) colourful
d) All of the Mentioned

5 What is Histogram Equalisation also called as?
a) Histogram Matching
b) Image Enhancement
c) Histogram linearisation

d) None of the Mentioned

6 Histogram Equalisation is mainly used for _____.
a) Image enhancement
b) Blurring
c) Contrast adjustment
d) None of the Mentioned

7 The type of Histogram Processing in which pixels are modified based on the intensity distribution of the image is called _____.
a) Intensive
b) Local
c) Global
d) Random

8 The smallest discernible change in intensity level is called _____
a) Intensity Resolution
b) Contour
c) Saturation
d) Contrast

9 What is the tool used in tasks such as zooming, shrinking, rotating, etc.?
a) Sampling
b) Interpolation
c) Filters
d) None of the Mentioned

10 The type of Interpolation where for each new location the intensity of the immediate pixel is assigned is _____
a) bicubic interpolation
b) cubic interpolation
c) bilinear interpolation
d) nearest neighbour interpolation

11 The type of Interpolation where the intensity of the FOUR neighbouring pixels is used to obtain intensity a new location is called _____
a) cubic interpolation
b) nearest neighbour interpolation
c) bilinear interpolation
d) bicubic interpolation

12 Dynamic range of imaging system is a ratio where the upper limit is determined by
a) Saturation
b) Noise
c) Brightness
d) Contrast

13 For Dynamic range ratio the lower limit is determined by
a) Saturation
b) Brightness
c) Noise
d) Contrast

14 MRI Technology used --------- band.
a) Gamma Rays
b) CT Scan
c) Visible
d) Radio waves

15 An image is considered to be a function of a(x,y) where a represents
a) height of image
b) width of image

c) amplitude of image
d) resolution of image

16 Which is the image processing technique used to improve the quality of image for human viewing?
a) compression
b) enhancement
c) restoration
d) analysis

17 The initial step in any image processing technique is
a) segmentation
b) masking
c) image acquisition
d) normalization

18 What's recognition?
a) It's the process that assigns a label to an object based on its descriptors.
b) it's process of search an image
c) a & b
d) None

19 Smoothing spatial filters are used for:
a)blurring
b) noise reduction
c) a & b
d) None

20 The process of extracting information from the image is called as
a) Image enhancement
b) Image restoration
c) Image Analysis
d)Image compression