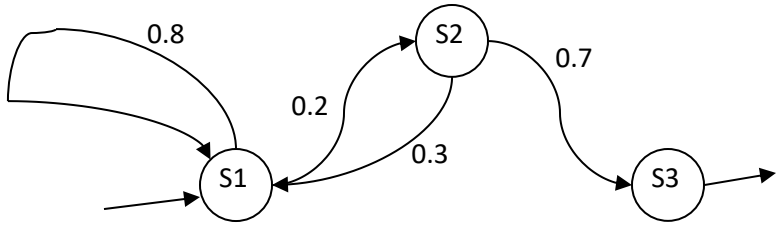
Question bank
NLP

1. What is NLP? Differentiate between NLU and NLG. What are applications of NLP? Why NLP is Hard? What are components of NLP? Why NLP is important to study?
2. What are different levels of analysis required for NLP applications? Explain NLP Processing steps?
3. What are challenges in Processing Natural Language?
4. Explain lexical ambiguity with example.
5. Explain Syntactic Ambiguity with example.
6. Explain Semantic Ambiguity with example.
7. What are techniques used to resolve ambiguities in NL?
8. Define morphology, inflectional morphology and derivational morphology.
9. What is FST (Finite State Transducers)? What is their Use in Morphological analysis?
10. Discuss lemmatization, stemming with example.
11. What is the role of Lemmatization and stemming in text processing?
12. Explain Porters stemming algorithm?
13. What is R.E.? What is role of RE in Morphological Analysis?
14. What is Syntax Analysis? Explain with its challenges.
15. What is POS tagging and its use in Syntax analysis?
16. What are different types of POS tagging?
17. What are different syntax analysis techniques?
18. Explain Rule based tagging, stochastic tagging, transformation based tagging with examples.
19. Give examples of Open classes and Close classes of pos tagging for English language.
20. Explain with example problems in POS tagging?
21. What are Ngrams ? Unigram? Bigram? Trigram? Give example
22. PO S tag the following sentences : <sentences >
23. What is HMM? What are applications of HMM
24. Write short note on lexicography.
25. What are different approaches to extract word level information in a sentence?
26. Write a short note on ambiguous grammar.
27. What is different between semantic and syntactic information?
28. What is the need of parsing of input sentences? What are applications of Earley algorithm?
29. What are different techniques for semantic analysis of a sentence?
30. Compare ATN and RTN with examples.
31. Differentiate between top down and bottom up parsing? What algorithms are used for each of these types of parsing?
32. Explain why CFG is used to represent natural language in parsing.
33. For each sentence, identify whether the different meanings arises from structural ambiguity, semantic ambiguity an pragmatic ambiguity?
    - *Time flies like an arrow*
    - *He crushed the key to my heart*
34. Identify the morphological types (noun phrase, verb phrase, adjective phrase) of following sentence segments
    - *Important to Bill*
    - *Looked up the tree*

35. Describe augmented grammar in syntactic analysis
36. Distinguish between semantics, pragmatics and discourse.
37. Explain lexicon, lexeme and different types of relations that hold between lexemes.
38. Perform parsing using simple top down parsing for the sentence “The dogs cried” using the grammar given below:
    - S->NP VP
    - NP->ART N
    - NP->ART ADJ N
    - VP->V
    - VP->V NP
39. Map the following CFG into an equivalent RTN that uses only 3 networks- an S, NP and PP network. Make your network as small as possible.
    S->NP VP
    VP->V | V NP | V PP
    NP-> ART NP2 | NP2
    NP2-> N | ADJ NP2 | NP3 PREPS
    NP3-> N
    PREPS->PP | PP PREPS
    PP->NP
40. Write FOPC for the following sentences:
    - *All cats and dogs hate each other*
    - *I arrived in New York.*
41. Explain surface anaphora and the different methods for dealing with surface anaphora
42. State the difference between hypernymy and hyponymy and give an example of each.
43. State the advantages of bottom-up chart parser compared to top-down parsing.
44. Derive a top-down, depth-first, left-to-right parse tree for the given sentence:
    - *The angry bear chased the frightened little squirrel*
45. Use the following grammar rules to create the parse tree:
    - S → NP VP
    - NP → Det Nom
    - VP → V NP
    - Nom →Adj Nom | N
    - Det → the
    - Adj→ little | angry | frightened
    - N → squirrel | bear
    - V → chased
46. Explain the Bayes’ rule on conditional probability of an event A given an event B
47. Why is semantic interpretation assumed to be a compositional process?
48. For the CFGs given:
    S ->NP VP
    VP ->V NP
    NP -> Det N
    Draw the shift-reduce parser in processing the sentence
    The woman saw a puppy
    Use the following lexical entries to create the chart parser.
    The | a: Det
    woman | puppy : N
    saw : V

49. What are the elements associated with a First Order Predicate Calculus?
50. Analyze the naive Bayes classifier approach to Word Sense Disambiguation in NLP.
51. State the difference between horizontal scoping and vertical scoping in semantic interpretation
52. Write the FOPC of the following sentences:
    - Chicken is food.
    - Either Sue is rich or she is poor
    - Bill eats peanuts and is still alive.
    - Sue eats everything Bill eats
53. What is meant by the semantics of a natural language, and how this differs from the pragmatics?
54. Identify the head and morphological type (Noun Phrase,Verb Phrase, Adjective Phrase, Adverbial Phrase) of the following sentence segments.
55. Identify the head and morphological type (Noun Phrase,Verb Phrase, Adjective
56. Phrase, Adverbial Phrase) of the following sentence segments.
    i. The president of the company
    ii. Looked up the chimney
    iii. Angry as a hippo
    iv. Rapidly like a bat
57. Identify and describe the ambiguities in the following sentences.
    i. The man kept the dog in the house.
    ii. Book that flight
58. Analyze the significance of Word Sense Disambiguation in NLP. Explain any one WSD method
59. Discuss dependency grammar and probabilistic lexicalized CFGs. Also explain the feature structures and how unification is done in it
60. Describe Syntax-Driven semantic analysis and Robust semantic analysis with Examples
61. What are stop words?
62. What is Latent Semantic Indexing (LSI)?
63. What is TF-IDF?
64. Explain Named Entity Recognition by implementing it.
65. Construct a parse tree for a statement " the girl plucked the flower with long stick" and Jeff pronounced that Fred snored loudly". Discuss the ambiguity arises from the parse tree.
66. Explain wordnet. List the applications of wordnet.
67. What are two key differences between how GLoVE vectors and CBoW/Skipgram (word2vec) vectors are trained? Give one major advantage of GLoVE when compared to word2vec based on the training difference.
68. Highlight the key differences between the LSTM and GRU recurrent network architectures?
69. What does embedding means? Discuss various techniques you know.
70. How deep learning can be used in NLP? Explain with examples.
71. Write down one path that could be taken through the following Hidden Markov model that produces the output “C1 C2 C3 C4 C5” and the probability of this path being taken. You don’t have to calculate the actual answer as a number, as long as you show the formula that would be used to calculate it.



State S1: Output	Probability	State S2: Output	Probability	State S3:Output	Probability
C1	0.5	C2	0.8	C4	0.5
C2	0.3	C3	0.1	C5	0.5
C3	0.2	C4	0.1		

72. Case studies:

- text classification
- sentiment analysis
- chatbot
- movie recommendation
- plagiarism checking