Natural Language Processing

Assignment- 6

TYPE OF QUESTION: MCQ

Number of questions: 8 **Total mark: 6*1 + 2*2 = 10 [Q7, Q8 Carries two marks each]**

Question 1.

With respect to a Dependency Structure, which of the following is not a valid criterion for a syntactic relation between a head H and a dependent D in a construction C?

1. H determines the syntactic category of C
2. The form of H depends on D. D depends on H
3. H selects D and determines whether D is obligatory.
4. The linear position of D is specified with reference to H

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Answer: 2
Solution: Explained in Lecture 27.

H determines the syntactic category of C

H can replace C.

D specifies H.

H is obligatory; D may be optional.

H selects D and determines whether D is obligatory.

The form of D depends on H (agreement or government).

The linear position of D is specified with reference to H.

Solution: The size of the feature vector for any configuration always depends on no. of features defined and no. of possible oracle transitions. Refer transition based parsing lecture

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Question 2:
Which of the following is False about formal conditions of dependency graph?

1. Syntactic structure is hierarchical
2. Some word can have more than one syntactic head
3. There should not be any crossing of dependencies
4. Syntactic structure is complete

Answer: 2

Solution:

Refer lecture 27 of week 6

Question 3:

Which of the following condition is false about directed spanning tree?

A directed spanning tree of a (multi-) digraph G = (V, A) is a subgraph G' = (V', A') such that :

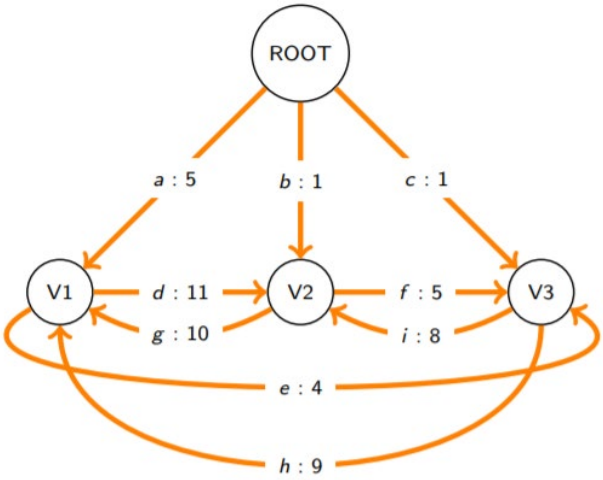
1. **V' = V**
2. **A' is subset of A**
3. **|A'| = |V'| -1**
4. **G' is cyclic**

Answer: 4

Solution: G' should be acyclic. Refer to lecture 30 of week 6

Question 4:

Consider the following graph with a root node and 3 other vertices. The edge weights between all the pair of modes have been provided. Suppose you use Chu-Liu-Edmonds algorithm to find the MST for this graph. Which pair of nodes will have to be contracted to form a single vertex during the algorithm in the 1st iteration?



1. (V2, V3)
2. (V1, V3)
3. All these pairs will get contracted at different times in the algorithm
4. (V1, V2)

Answer: 4

Solution: Solve by applying Chu-Liu-Edmonds Algorithm

V1→V2 having maximum weights, so in the first iteration this pair of nodes will be contracted

Question 5:

Suppose you write down the sequence of actions that generate the parse tree of the sentence "I prefer NLP course" using Arc-Eager Parsing. The number of times you have to use Right Arc, Left Arc, Reduce, Shift is:

Format of the answer is [a, b, c, d] corresponding to the 4 values in the order specified in the query.

1. [3, 0, 2, 1]
2. [1, 2, 1, 3]
3. [1, 2, 0, 3]
4. [1, 2, 0, 2]

Answer: 3

Solution: Solve by arc-eager parsing, Refer lecture 29

Question 6:

Correct sequence of actions that generates the parse tree of the sentence "I prefer NLP course" using Arc-Eager Parsing is:

Note: Right Arc (RA), Left Arc(LA), Reduce(RE), Shift(SH)

1. SH->LA->SH->SH->LA->RA
2. SH->LA->SH->RE->LA->RA
3. SH->LA->SH->SH->RA->LA
4. SH->LA->RE-->SH->SH->LA

Answer: 1

Solution: Solve by arc-eager parsing, Refer lecture 29

Aspect	Left Arc (LA)	Right Arc (RA)
Dependency Direction	From buffer to stack (leftward)	From stack to buffer (rightward)
Stack/Buffer Roles	Stack is the dependent; buffer is the head	Stack is the head; buffer is the dependent
Word Removed?	Yes, the top of the stack is removed	No, the word from the buffer is added to the stack

Question 7:

Suppose you are training MST Parser for dependency and the sentence, "I like offline exam" occurs in the training set. The POS tags for these words are Pronoun, Verb, PropNoun and Noun, respectively. Also, for simplicity, assume that there is only one dependency relation, "rel". Thus, for every arc from word wi to wj, your features may be simplified to depend only on words wi and wj and not on the relation label.

Below is the set of features

f1: pos(wi) = Verb and pos(wj) = Noun|Pronoun

f2: wi = Root | wi occurs before wj in the sentence

f3: wi = Root and pos(wj) = Verb

f4: wj occurs before wi in the sentence

The feature weights before the start of the iteration are: [5,20,15,12]

Suppose you are also given that after applying the Chu-Liu Edmonds, you get the following parse tree {Root → like, like → I, I → offline, offline → exam}

What would be the weights after this iteration?

1. [6, 19, 14, 13]
2. [6, 19, 15, 13]
3. [6, 19, 13, 13]
4. [6, 19, 15, 12]

Answer: 2
Solution: Please refer lecture 30

Question 8:

Assume that you are learning a classifier for the data-driven deterministic parsing and the sentence 'I prefer NLP course' is a gold-standard parse in your training data. You are also given that NLP and 'course' are 'Nouns', 'I' is a 'Pronoun' while the POS tag of 'prefer' is 'Verb'. Obtain the dependency graph for this sentence on your own. Assume that your features correspond to the following conditions:

1. **The stack is empty.**
2. **Top of stack is Noun and Top of buffer is Verb.**
3. **Top of stack is Pronoun and Top of buffer is Verb.**
4. **The word at the top of stack occurs before word at the top of the buffer in the sentence**

The initial weights of your features are
[2,2,2,2 | 3,3,3,2| 2,2,2,2 | 2,2,2,2] where the first four features correspond to LA, and then to RA, SH and RE, respectively

Use this gold standard parse during online learning. What will be the weights after completing two iteration of Arc-Eager parsing over this sentence:

1. [2,2,2,2 | 3,3,3,2| 2,2,2,2 | 2,2,2,2]
2. [2,2,3,2 | 2,3,2,1| 3,2,2,2 | 2,2,2,2]
3. [2,2,3,3 | 2,3,2,1| 3,2,2,2 | 2,2,2,2]
4. [2,2,3,3 | 3,3,2,1| 3,2,2,2 | 2,2,2,2]

Answer: 3
Solution: Refer lecture 29 of week 6