

Natural Language Processing

Assignment- 6

TYPE OF QUESTION: MCQ

Number of questions: 8

Total mark: $6 \times 1 + 2 \times 2 = 10$

Question 1 : Which of the following is/are False about the criteria of head (H) and dependants (D) in a construction (C) in a dependency graph?

1. H is obligatory; D is mandatory
2. H selects D and determines whether D is obligatory
3. The form of D depends on H
4. H specifies D

Answer: 1,4

Solution: H is obligatory; D may be optional. D specifies H

Question 2. Which of the following is/are True about formal conditions on Dependency graph G?

1. G can be cyclic
2. G is projective
3. G is disconnected
4. G obeys the rule: if $i \rightarrow j$ then not $k \rightarrow j$, for any k not equal to i

Answer: 2, 4

Solution: G is connected and acyclic. G is projective and follows single head constraint (option 4)

Question 3: Which of the following is false?

1. Deterministic parsing requires an oracle and an oracle can be approximated by a classifier
2. Each vertex in the graph greedily selects the incoming edge with the highest weight in the Chu-Liu-Edmonds Algorithm
3. During the iteration of Chu-Liu-Edmonds Algorithm it never produces cycle
4. A multi-digraph is a digraph where multiple arcs between vertices are possible

Answer: 3

Solution: During the iteration of the Chu-Liu-Edmonds Algorithm it might produce cycle also.
Refer lecture 30

Question 4: Suppose you write down the sequence of actions that generate the parse tree of the sentence "I love AI 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, 2]
4. [1, 2, 0, 3]

Answer: 4

Solution: Please refer lecture

Question 5: Correct sequence of actions that generates the parse tree of the sentence "I love AI course" using Arc-Eager Parsing is:

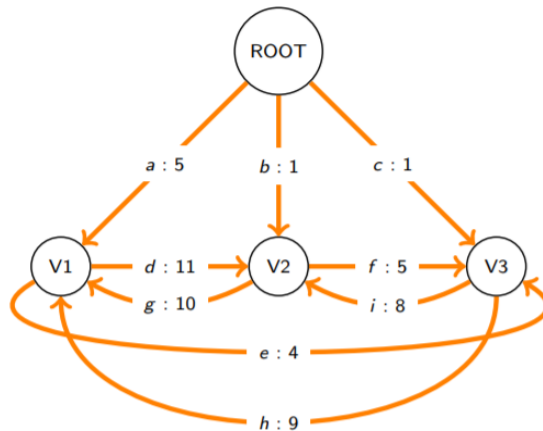
Note: Right Arc (RA), Left Arc(LA), Reduce(RE), Shift(SH)

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

Answer: 2

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

Question 6: Consider the following graph with a root node and 3 other vertices. I had drawn and put initial edge weights between all the pair of nodes at night as shown below. In the morning, my little brother added one (1) to each of the edge weight and said now the edge weight looks good. Suppose you use Chu-Liu-Edmonds algorithm to find the MST for the modified edge weighted graph by my brother. Which pair of nodes will have to be contracted in the modified edge weighted graph to form a single vertex during the algorithm in the 1st iteration?



1. (V1, V2)
2. (V2, V3)
3. (V1, V3)
4. (ROOT, V1)

Answer: 1

Solution: Solve by applying Chu-Liu-Edmonds Algorithm

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 w_i to w_j , your features may be simplified to depend only on words w_i and w_j and not on the relation label.

Below is the set of features

f1: $\text{pos}(w_i) = \text{Verb}$ and $\text{pos}(w_j) = \text{Noun|Pronoun}$

f2: $w_i = \text{Root}$ | w_i occurs before w_j in the sentence

f3: $w_i = \text{Root}$ and $\text{pos}(w_j) = \text{Verb}$

f4: w_j occurs before w_i in the sentence

The feature weights before the start of the iteration are: [6,19,15,12]

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

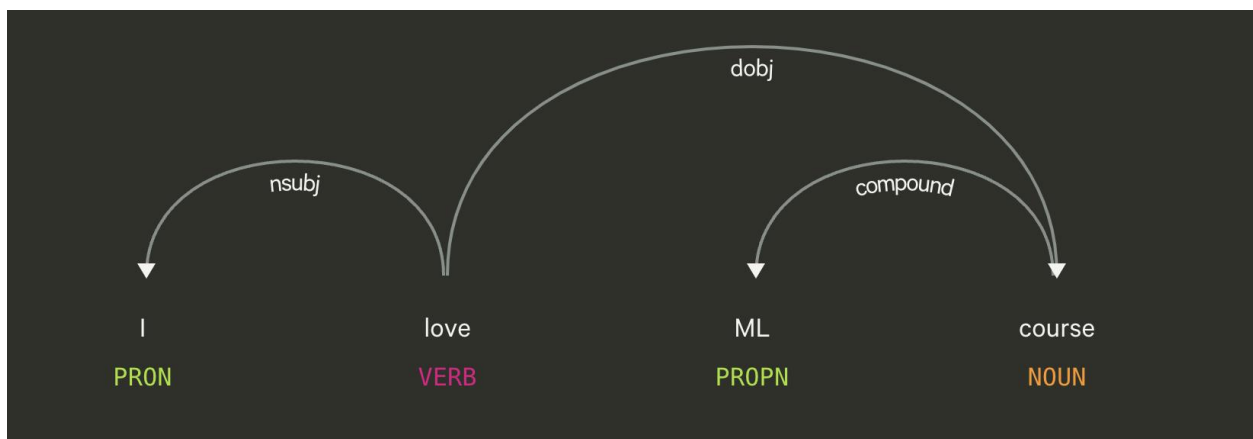
What would be the weights after this iteration?

1. [7, 19, 14, 13]
2. [7, 18, 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 love ML course' is a gold-standard parse in your training data. You are also given that ML and 'course' are 'Nouns', 'I' is a 'Pronoun' while the POS tag of 'love' is 'Verb'. Find the dependency graph for this sentence below. 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 | 3,3,2,1 | 3,2,2,2 | 2,2,2,2]
4. [2,2,3,3 | 2,3,2,1 | 3,2,2,2 | 2,2,2,2]

Answer: 4

Solution: Refer lecture 29 of week 6