06.06.2025

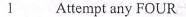BEC comp.)/Sem-VII / R-19/ c scheme / NLP

Duration: 3hrs   **Max Marks:80**

N.B. : (1) Question No 1 is Compulsory.
        (2) Attempt any three questions out of the remaining five.
        (3) All questions carry equal marks.
        (4) Assume suitable data, if required and state it clearly.

1   Attempt any FOUR   [20]

   a   Compare Derivational & Inflectional morphology

   b   What is the output of Morphological Analysis for Regular Verb, Irregular verb,
       Singular noun, Plural noun.

   c   What are the limitations of Hidden Markov Model (HMM) and MaxEnt Model for POS
       Tagging.

   d   Explain pre-processing steps generally used in NLP.

   e   Explain following Syntactic and Semantic Constraints on Co reference
       1) Number Agreement   2) Person & Case Agreement

2   a   Explain concepts of Bi-gram and n-gram with formula.   [10]
       For following corpus, apply Bi-gram model
       Training Corpus:
       <s> I am Sam </s>   <s> Sam I am </s>   <s> Sam I like </s>
       <s> Sam I do like </s>   <s> do I like Sam </s>
       1. What is the most probable next word predicted by the model for the following word
       sequences?
       (a) <s> Sam . . .   (b) <s> Sam I do . . .   (c) <s> Sam I am Sam . . .
       (d) <s> do I like . . .
       2. Which of the following sentences is better, i.e., gets a higher probability with this
       model?
       (e) <s> Sam I do I like </s>
       (f) <s> Sam I am </s>
       (g) <s> I do like Sam I am </s>

   b   Explain different stages of NLP. Also explain generic NLP system.   [10]

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3 a i) Why there is need of word sense disambiguation   [10]

    ii) Explain Naive Bayes Supervised algorithm for Word sense Disambiguation

  b Explain Shift Reduce Parser in NLP with example   [10]

4 a   [10]

\<S\>	Martin	Justin	can	watch	Will	\<E\>
\<S\>	Spot	will	watch	Martin	\<E\>	
\<S\>	Will	Justin	spot	Martin	\<E\>	
\<S\>	Martin	will	pat	Spot	\<E\>	

Foe given above corpus, S indicates start of the statement and E indicates end of the statement

N: Noun [Martin, Justin, Will, Spot, Pat]

M: Modal verb [can , will]

V:Verb [watch, spot, pat]

Create Transition Matrix & Emission Probability Matrix

Statement is **"Justin will spot Will"**

Apply Hidden Markov Model and do POS tagging for given statements

  b How Anaphora Resolution is performed with Hobbs and Centering Algorithm   [10]

5 a For a given grammar using CYK or CKY algorithm parse the statement   [10]

"The man read this book" Rules:

S → NP VP	Det → that | this | a | the
S → Aux NP VP	Noun → book | flight | meal | man
S → VP	Verb → book | include | read
NP → Det NOM	Aux → does
NOM → Noun	
NOM → Noun NOM	
VP → Verb	
VP → Verb NP	

  b Explain the significance of regular expression in NLP.   [10]

6 Write Short Note   [20]

  a Explain Semi-supervised method (Yarowsky) Unsupervised (Hyperlex)   [10]

  b Explain Question Answering System with Algorithmic approach   [10]

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