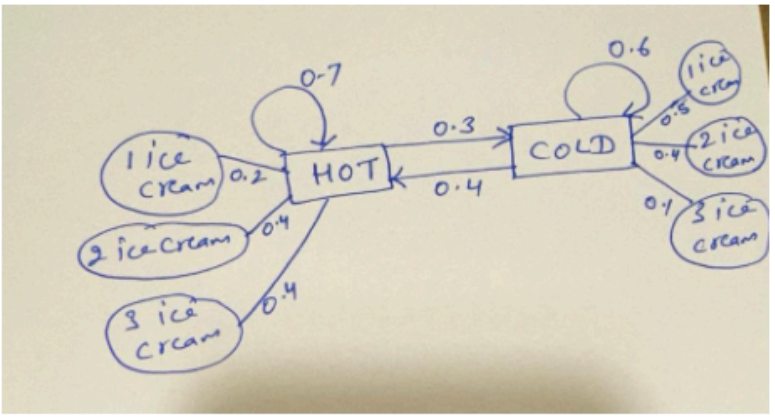
SVKM'S NMIMS Deemed to be UNIVERSITY | NAVI MUMBAI

School of Technology Management & Engineering
Program: B. Tech CE: VII
Course: Natural Language Processing
Assignment No 2

Q. No	Questions	Marks
1	Explain the need for Syntactic Analysis. Check whether the sentence "The big bird ate some food in the park." can be derived using the CFG given below. S → NP VP NP → Det N | Det N PP | Det Adj N | Det Adj N PP VP → V NP | V NP PP | V PP PP → P NP Det → 'the' | 'a' | 'an' | 'some' N → 'bird' | 'dog' | 'park' | 'food' | 'tree' V → 'saw' | 'ate' | 'walked' P → 'in' | 'with' | 'on' | 'for' Adj → 'big' | 'small' | 'green'	10
2	For the HMM model built on the below sentences, Sentence: "The child plays in the park." Tags: DET NOUN VERB PREP DET NOUN Sentence: "Dogs love to fetch balls." Tags: NOUN VERB PREP VERB NOUN Sentence: "They enjoy reading books." Tags: PRON VERB VERB NOUN Check whether the given sentence is tagged appropriately. Sentence: "The cat sleep on the sofa." Proposed Tags: "DET NOUN VERB PREP DET NOUN"	10
3	What is Syntax Parsing? Check whether the sentence "the big dog gave a treat to the small cat " can be derived using the CFG given below. S → NP VP NP → Det N | Det N PP | Det Adj N VP → V NP | V NP PP PP → P NP Det → 'the' | 'a' | 'an' N → 'cat' | 'dog' | 'treat' | 'park' V → 'gave' | 'saw' | 'walked' P → 'to' | 'in' | 'with' Adj → 'big' | 'small'	10
4	How HMM select an appropriate POS tag for a sentence based	10

	on probability when correctly tagged and incorrectly tagged for the below test data. Test data <s> Will can spot Mary </s> be tagged as - Will as a Model Can as a Verb Spot as a Noun Mary as a Noun Training Corpus <s> Mary Jane can see Will </s> <s> Spot will see Mary </s> <s> Will Jane spot Mary </s> <s> Mary will pat Spot </s> Note- Mary, Jane, Spot and Will are all names Calculate the probability of this sequence when a) correctly tagged and incorrectly tagged by constructing transition and emission probabilities.	
5	From the sentences given below, what is the probability of generating the text "*The dog barks when it sees a stranger*" "*The dog barks loudly*." "*Cats chase mice*." "*The sun shines brightly*."	10
6	A person XYZ sitting in a close room and eating ice cream whenever he feels hot. John is another person who are observing how many ice creams XYZ eats per day. Based on this observation John finds the weather condition whether outside is HOT or COLD. State transition diagram and initial probability are given. Π= [0.8,0.2]  Observable state is given: Day -1 XYZ eats one ice cream, Day-2 XYZ eats 3 ice cream and Day-3 XYZ eats one ice cream. Make a transition probability matrix and Emission probability matrix. Find the probability of sequence of weather as HOT, COLD, HOT in three days.	10

<table>
<tr>
<td>7</td>
<td>A company wants to classify emails as either Spam or Not Spam using Naïve Bays and based on the following dataset:

<table>
<tr><th>Email</th><th>Word "Offer"</th><th>Word "Free"</th><th>Word "Money"</th><th>Spam</th></tr>
<tr><td>E1</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td></tr>
<tr><td>E2</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>E3</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td></tr>
<tr><td>E4</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>E5</td><td>No</td><td>No</td><td>Yes</td><td>No</td></tr>
<tr><td>E6</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td></tr>
</table>
We want to classify a new email (E7) which contains the following words:
• "Offer": Yes
• "Free": Yes
• "Money": No</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Training corpus with POS tagging is given below-
<table>
<tr><td></td><td>Noun</td><td>Modal Verb</td><td>Verb</td><td>Noun</td></tr>
<tr><td>1</td><td>Rohan</td><td>will</td><td>spot</td><td>Will</td></tr>
<tr><td></td><td>Noun</td><td>Modal Verb</td><td>Verb</td><td>Noun</td></tr>
<tr><td>2</td><td>Will</td><td>can</td><td>pat</td><td>Rohan</td></tr>
<tr><td></td><td>Modal Verb</td><td>Noun</td><td>Verb</td><td>Noun</td></tr>
<tr><td>3</td><td>Will</td><td>Rohan</td><td>spot</td><td>Seeta</td></tr>
<tr><td></td><td>Noun</td><td>Modal Verb</td><td>Verb</td><td>Noun</td></tr>
<tr><td>4</td><td>Seeta</td><td>will</td><td>pat</td><td>Spot</td></tr>
</table>
With reference to Hidden Markov Model approach for POS tagging
i. Construct transition probability table
ii. Construct emission probability table

Note: Include start and end characters for all the sentences</td>
<td>10</td>
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<td>9</td>
<td>How HMM select an appropriate POS tag for a sentence based on probability when correctly tagged and incorrectly tagged for the below test data.
Test data – <s> Will can spot Mary </s> be tagged as -

Will as a Model
Can as a Verb
Spot as a Noun
Mary as a Noun

Training Corpus –
<s> Mary Jane can see Will </s>
<s> Spot will see Mary </s>
<s> Will Jane spot Mary </s>
<s> Mary will pat Spot </s>
Note- Mary, Jane, Spot and Will are all names

Calculate the probability of this sequence when a) correctly tagged and incorrectly tagged by constructing transition and emission probabilities.</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>For the HMM model built on the below sentences,</td>
<td>10</td>
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</table>

	Sentence: "*The child plays in the park*." Tags: DET NOUN VERB PREP DET NOUN Sentence: "*Dogs love to fetch balls*." Tags: NOUN VERB PREP VERB NOUN Sentence: "*They enjoy reading books*." Tags: PRON VERB VERB NOUN Check whether the given sentence is tagged appropriately. Sentence: "The cat sleep on the sofa." Proposed Tags: "DET NOUN VERB PREP DET NOUN"	
11	Differentiate between Pragmatic and Discourse Analysis with examples. Consider the following dialogue: **Speaker A:** "Can you open the window?" **Speaker B:** "It's really cold outside." ● **What pragmatic concept is used in Speaker B's response?** ● **What is the intended meaning of Speaker B's reply in terms of speech acts?** Explain the coherence and cohesion in Discourse Analysis with examples.	10