CENTRAL INSTITUTE OF TECHNOLOGY KOKRAJHAR
(Deemed to be University)
KOKRAJHAR :: BTR :: ASSAM :: 783370

ESE – SEMESTER EXAMINATION
UG

Session: Jan-Jun, 2024   Semester: VI   Time: 3Hrs.   Full Marks: 100

Course Code: **UCSE613**   Course Title: **Speech and Natural Language Processing**

Answer any ten questions!

1	What are Syntax, Semantics, Pragmatics and Discourse? What do you understand by Morphological Analysis?	10
2	What is a Language Modelling? How Language Modelling solves the problem of Natural Language Processing? Explain any Language Modelling Technique.	10
3	Explain Chain Rule of probability. How do you compute the probability of "its water is so transparent" i.e., $P("its\ water\ is\ so\ transparen")$ using chain rule.	10
4	Explain Levenstein algorithm for calculating Minimum Edit Distance. Find the Minimum Edit Distance for correcting the spelling of **"KOKREJAR"** to **"KOKRAJHAR"** and **"BLAJAN"** to **"BALAJAN"**. Consider cost for each addition and deletion is 1 and replacement is 2.	10
5	What is the use of Regular Expression in NLP? What is the regular expression for matching only numbers in a Text? What is Byte Pair Encoding? Explain the process of generating BPE tokens for the following text - **"low low low low low lowest lowest newer newer newer newer newer newer wider wider wider new new"**	10
6	What is a Perplexity? Explain the perplexity in relation to probability of a sentence. How the perplexity can be used to measure the quality of Language Modelling?	10
7	From a particular text corpus we found the following raw bigram counts	10

	i	want	to	eat	chinese	food	lunch	spend
i	5	827	0	9	0	0	0	2
want	2	0	608	1	6	6	5	1
to	2	0	4	686	2	0	6	211
eat	0	0	2	0	16	2	42	0
chinese	1	0	0	0	0	82	1	0
food	15	0	15	0	1	4	0	0
lunch	2	0	0	0	0	1	0	0
spend	1	0	1	0	0	0	0	0

After normalizing the text we found the following unigram counts

i	want	to	eat	chinese	food	lunch	spend
2533	927	2417	746	158	1093	341	278

Calculate the sentence probability for the following sentence using bigram estimates.

$$P\ (I\ want\ food\ lunch)\ =\ ?$$
$$PP(I\ want\ food\ lunch)\ =?$$

Note: PP is Perplexity.

8	What is a classification task? Explain Naïve Bayes and Logistic Regression. Explain how a Spam Detection task can be solved using NLP?	10
9	What are Generative and Discriminative classifiers? Explain with examples.	10

10   What is a Neural Network? Design and solve XOR and NAND GATE Truth Table using   10
     Neural Network.

11   Consider the NAND GATE Network you solved for question 10. Now consider all the   10
     weights, biases and threshold functions are learnable from data. Design the Neural
     Network, Learnable functions and solve it for NAND Gate Truth Table.

12   Write short notes (any two)   10
     a.   Sentiment Analysis
     b.   Machine Translation
     c.   Bag of Word

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