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Qtext:-

Give a practical example of aspect based sentiment analysis and state problems associated with it. [4 Marks]

It seems like you have not uploaded any images/files for this question.

ENG 12:42 PM

NLP End Term exam

The English language has 26 characters. The unigram probabilities of the characters A, N and T are 0.1, 0.05 and 0.01. What will be the perplexity of the sequences "NAN" and "ANT". How will the perplexity change for the two sequences if the probabilities were equal for all the 26 characters? (4 marks)

Solution:
Perplexity ("NAN") = P("NAN")$^{-1/3}$= (0.05 * 0.1* 0.05)$^{-1/3}$
Perplexity ("ANT") = (0.1 * 0.05* 0.01)$^{-1/3}$

If the probabilities were the same, then
Perplexity ("NAN") = ((1/26)*(1/26)*(1/26)$^{-1/3}$
Perplexity ("ANT") = ((1/26)*(1/26)*(1/26)$^{-1/3}$

A sentiment classifier predicts the labels as given below. Find the precision, recall and accuracy of the model. (3 marks)

Expected	**Predicted**
Positive	Negative
Positive	Positive
Negative	Negative
Positive	Positive
Negative	Positive
Negative	Negative
Negative	Negative
Positive	Positive
Positive	Negative
Negative	Negative

Solution:

	Pos Actual	Neg Actual
Pos Pred	3	1
Neg Pred	2	4

Accuracy = 7/10
Precision = ¾
Recall = 3/5

Find the tf-idf vectors and cosine similarity between the following documents.
d1= The best team plays the finals
d2= India won a medal in the finals (7 marks)

Solution:

TF (2 marks) IDF (2 marks) TF-IDF (1 mark), Cosine Similarity (2 marks)

	d1	d2	IDF	TF-IDF d1	TF-IDF d2
the	0.33	0.14	0.00	0.00	0.00
best	0.17	0.00	1.00	0.17	0.00
team	0.17	0.00	1.00	0.17	0.00
plays	0.17	0.00	1.00	0.17	0.00
India	0.00	0.14	1.00	0.00	0.14
finals	0.17	0.14	0.00	0.00	0.00
won	0.00	0.14	1.00	0.00	0.14
a	0.00	0.14	1.00	0.00	0.14
medal	0.00	0.14	1.00	0.00	0.14
in	0	0.14	1	0.00	0.14

Cosine Similarity = 0

For the sentence, "Play this year's French radio-hit pop songs", a chatbot determines the following slots, Genre: Pop, Language: French, Year: 2020. Determine the intent accuracy and slot error rate. (1 mark)

Solution:
Slot Error Rate = ⅓
Intent Accuracy = ⅔

Q4. 10 Marks

Solve word sense disambiguation problem for below example. Recommend the best approach to solve and justify how?

Example: Anaconda is one of the popular frameworks to do python programming.

1. **Word: Anaconda. Actual Semantic Meaning: Type of snake.**
2. **Word: Anaconda, Expected Semantic Meaning: Programming framework.**
3. **Word: python. Actual Semantic Meaning: Type of snake.**
4. **Word: Python, Expected Semantic Meaning: Programming language.**

Solution: Anaconda has 2 meanings. Lesk algorithm will disambiguate. The given sentence and the second meaning of the word Anaconda have common word Programming framework.
Similarly for the word python.
NEED TO BRIEFLY EXPLAIN FOR BOTH THE WORDS ANACONDA AND PYTHON

Q6 (5+5=10 marks)

a)"These earphones are a good choice at this price. Connected with laptop for office calls and these are working well although there is no noise cancellation. Quality of wires are a bit thin and look delicate, though neckband is ok. Bass will seem ok if you have not used good quality earphones earlier."
You have been given product review data like the one shown above. You are asked to design a sentiment analysis model for this data. What would be your approach? Describe the different components of your solution. State any assumptions that you are making and pros/cons (if any) of your approach.

Solution: Its aspect based sentiment analysis.
The different components are
quintuple (e, a, s, h, t)
e is the earphones
(earphones, price ,good, opinion holder=Me, t=1)
(earphones, quality of wires, thin and delicate, opinion holder=me, t=1)
(earphones, NOISE CANCELLATION, NO, opinion holder=me, t=1)

(earphones, neckband, ok, opinion holder=me, t=1)
(earphones, bass, ok, opinion holder=me, t=1)

Assumption: If you have not used good quality earphones earlier."

b) Describe how ontology plays role in semantic web. Explain one example of Resource description framework (RDF) triple and RDFS.
Refer slides

Q7. [5 marks]
Given the grammar below, show how it would be used to derive a parse tree for the sentence below. Show the order in which rules would be applied if using a bottom up chart parsing. (5 MARKS)

The book covers key ideas

S → NP VP
NP → DET NOM
NOM → ADJ NOM
NOM → NOUN
VP → VERB NP
VP → VERB
DET → the
ADJ → ***book***
ADJ → key
VERB → covers
NOUN → ***book***
NOUN → covers
NOUN → ideas
NOUN → key

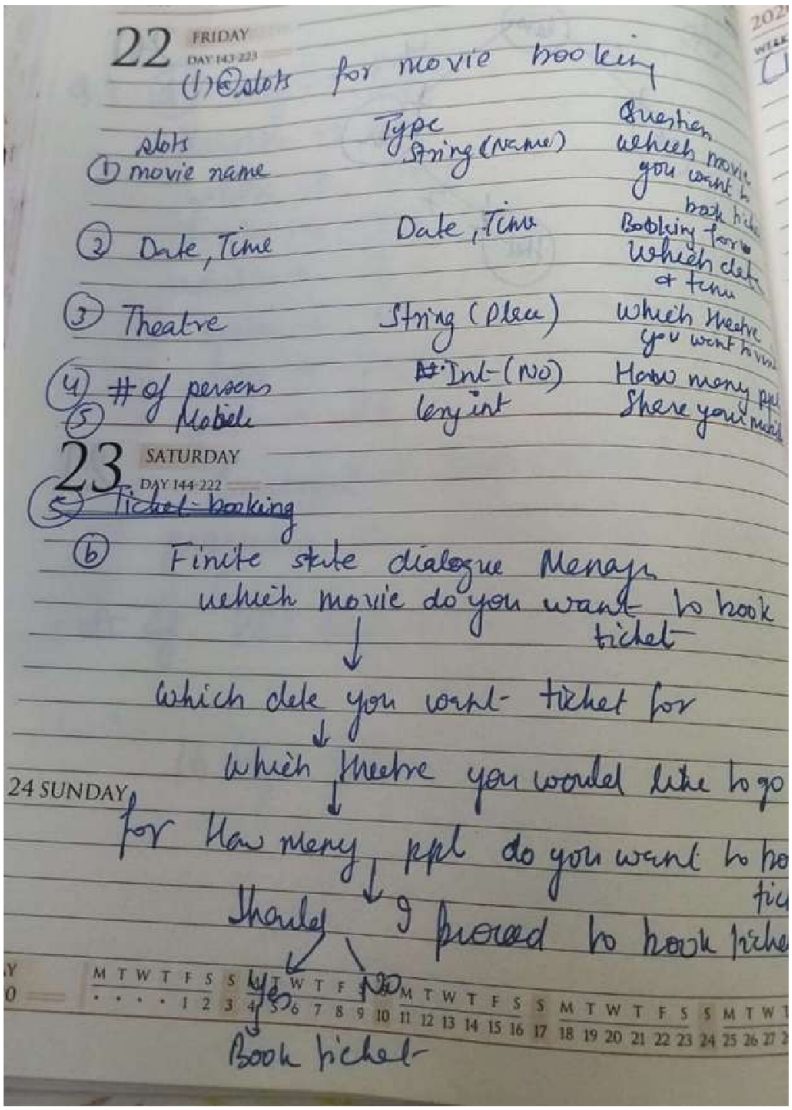
Ques:

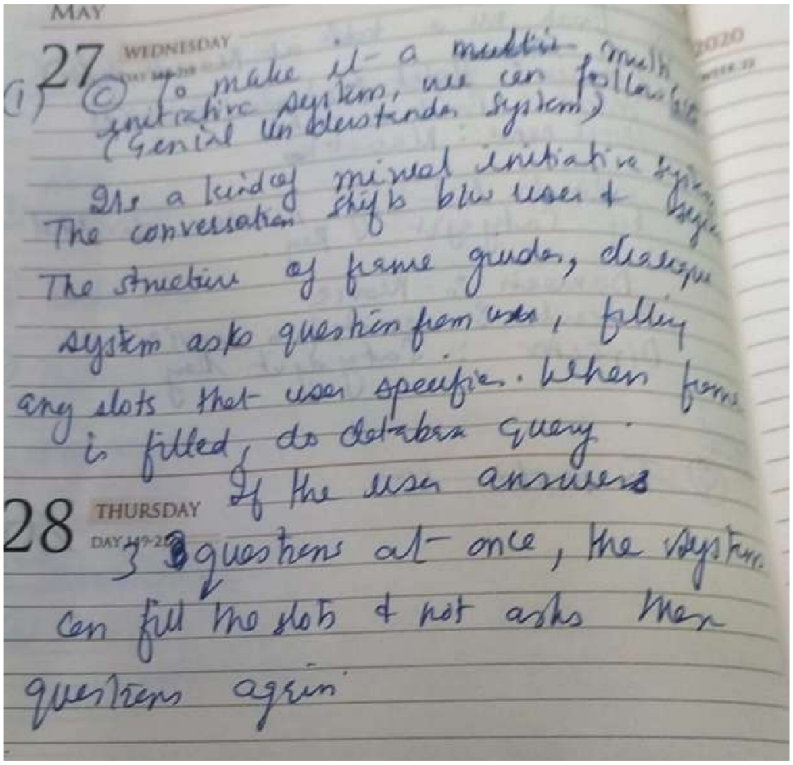
i) You are designing a frame-based dialog system for movie booking. [5 marks]
a). What are the different slots in your design? Mention along with their corresponding entity types and questions that the system would ask a user.
b). Show a finite-state dialog manager for the system
c). What changes would you make to the design to change it from a single initiative system to multi initiative system?

ii) Find Domain, Intent and Define Slots for each of the following Sentences: [4 marks]
a) Book me a table at Mariott hotel.
b) Search the list of movies directed by Satyajit Roy

iii) Develop an OWL ontology using the following for animal kingdom for classes like carnivorous, herbivorous and omnivorous. Use following Property characteristics, restrictions and Class expressions [4 marks]

a) inverseOf
b) domain
c) range
d) Cardinality
e) disjointWith
f) subClassOf





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(i) (c) To make it a mixed initiative system, we can follow (Genial Understander System)

It's a kind of mixed initiative system. The conversation shifts b/w user & system. The structure of frame guides, dialogue system asks questions from user, filling any slots that user specifies. When form is filled, do database query.

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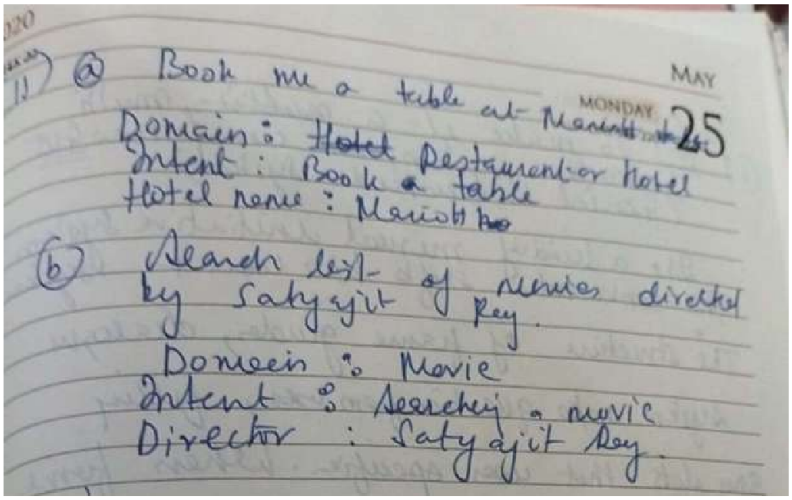
If the user answers 3 questions at once, the system can fill the slots & not asks those questions again.



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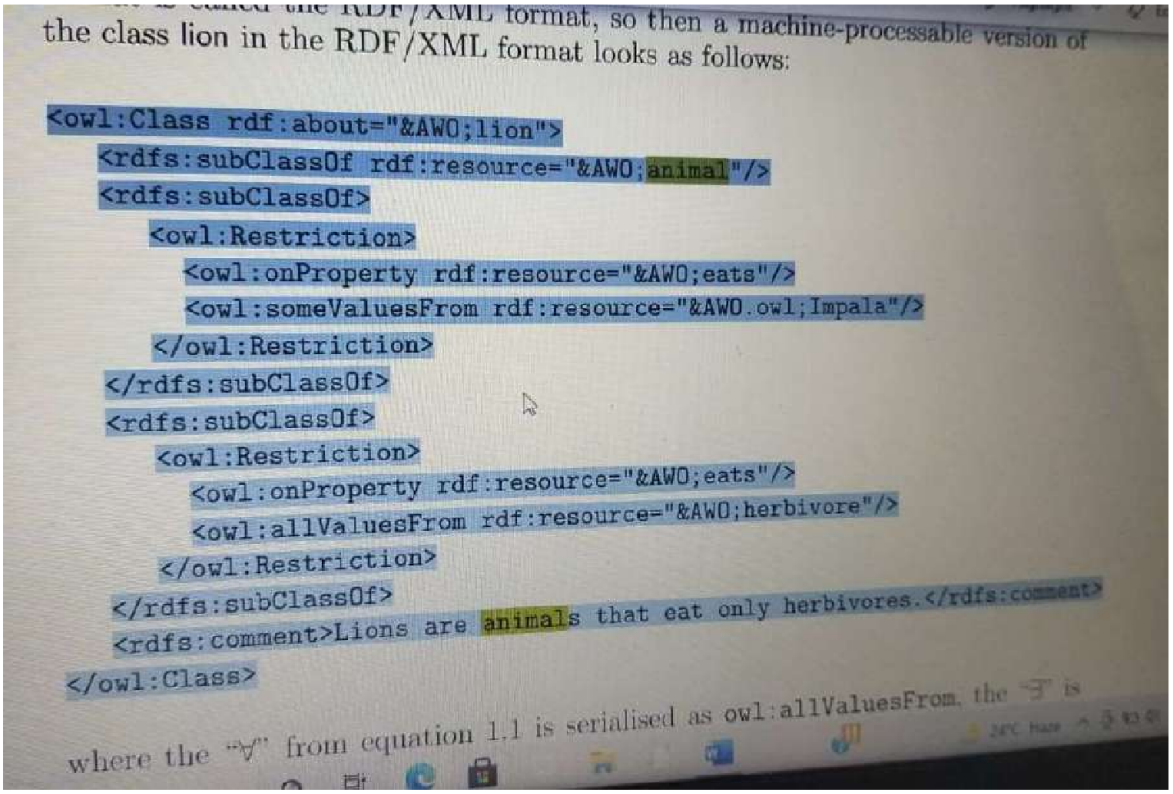
(ii) (a) Book me a table at Marriott

Domain: ~~Hotel~~ Restaurant or Hotel
Intent: Book a table
Hotel name: Marriott

(b) Search list of movies directed by Satyajit Ray.

Domain: Movie
Intent: Search a movie
Director: Satyajit Ray.



... is called the RDF/XML format, so then a machine-processable version of the class lion in the RDF/XML format looks as follows:

```
<owl:Class rdf:about="&AWO;lion">
    <rdfs:subClassOf rdf:resource="&AWO;animal"/>
    <rdfs:subClassOf>
        <owl:Restriction>
            <owl:onProperty rdf:resource="&AWO;eats"/>
            <owl:someValuesFrom rdf:resource="&AWO.owl;Impala"/>
        </owl:Restriction>
    </rdfs:subClassOf>
    <rdfs:subClassOf>
        <owl:Restriction>
            <owl:onProperty rdf:resource="&AWO;eats"/>
            <owl:allValuesFrom rdf:resource="&AWO;herbivore"/>
        </owl:Restriction>
    </rdfs:subClassOf>
    <rdfs:comment>Lions are animals that eat only herbivores.</rdfs:comment>
</owl:Class>
```

where the "∀" from equation 1.1 is serialised as owl:allValuesFrom, the "∃" is

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Makeup Exam

Q4 TF-IDF score

Document1 : study passing algorithm article NLP blog

Document 2 : study POS tagging article NLP blog

words	TF (doc1)	TF (doc2)	IDF	TF-IDF	TF-IDF
study	1/6	1/6	log(2/2)=0	0	0
passing	1/6	0	log(2)=0.3	0.3×1/6=0.05	0
algorithm	1/6	0	log(2)=0.3	0.3×1/6=0.05	0
article	1/6	1/6	log(2/2)=0	0	0

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NLP	1/6	1/6	log(2/2)=0	0	0
blog	1/6	1/6	log(2/2)=0	0	0
pos	0	1/6	log(2)=0.3	0	0.05
tagging	0	1/6	log(2)=0.3	0	0.05

TF-IDF (doc1) = [0 0.05 0.05 0 0 0 0.0]

TF-IDF (doc2) = [0 0 0 0 0 0 0.05 0.05]

Cosine similarity b/w them

= 0

M T W T F S S M T W T F S S M T W T F S S M T W T F S S M T W T F S S

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Q1(a) Top down Parsing (Depth first strategy)

1 The 2 young 3 women 4 cried 5

Step	Current state	Backup state	Comment
1	((S) 1)		
2	((NP VP) 1)		
3	(CART N VP) 1)	((ART ADJ N VP) 1)	
4	((N VP) 2)	((ART ADJ N VP) 1)	'The': Art
5	((VP) 3)	~~((V NP) 3)~~ ((ART ADJ N VP) 1)	
6	((V) 3)	((V NP) 3) ((ART ADJ N VP) 1)	
7.	(() 4)	((V NP) 3) ((ART ADJ N VP) 1)	
(8)	((V NP) 3)	((ART ADJ N VP) 1)	
(9)	((NP) 4)	((ART ADJ N VP) 1)	
(10)	((ART N) 4)	(CART ADJ N) 4) ((ART ADJ N VP) 1)	
(11)	((ART ADJ N) 4)	(CART ADJ N VP) 1)	
(12)	((ART ADJ N VP) 1)		
(13)	((ADJ N VP) 2)		
(14)	((N VP) 3)		
(15)	((VP) 4)		
(16)	((V) 4)	((V NP) 4)	
(17)	(() 5)	success.	

Grammar

S → NP VP
NP → ART N
NP → ART ADJ N
VP → V
VP → V NP

Cried: V
dogs: N, V
The: Art
young: ADJ, N
women: N, V

Ans 1(b) CKY Parsing

the man hit the dog

S → np vp

np → det n

det → the

n → man

n → dog

vp → tv, np

the → hit