

# Natural Language Processing Applications

End Semester Exam

April 27, 2019

MM: 180

Time: 3 hrs

Note: Marks are mentioned next to the questions.

1. For the following sentence:

*Ram saw the girl on the hill with a telescope.*

For the above sentence, assume that it is known that the girl is on the hill.

- (a) Draw all possible meaningful dependency trees.
- (b) For each tree, show the translated sentence in Hindi or Telugu.
- (c) For each translated sentence, show what rules were used.

[15 marks]

2. For the following sentences:

(i) *She asked Gayatri to eat the laddu herself.*

(ii) *She promised Gayatri to eat the laddu herself.*

- (a) Show the dependency tree for each of the above two sentences.
- (b) To whom does 'herself' refer to in each sentence, explain. Give the rule to get the right referent.
- (c) Does the identification of the referent cause a change in the translated sentence? Why? If not, what feature in the language would make it change (namely, what if such a feature is there in the language)?

[15 marks]

3. For the following sentence:

*The librarian issued a book to the student who Mohan said was given an award in the hall.*

- (a) Show both possible meaningful dependency trees.
- (b) For each tree, show the translated sentence in Hindi or Telugu.
- (c) For each translated sentence, show what rules were used.

[20 marks]

4. For the following sentence:

*Shyam saw the child put the toy on herself.*

- (a) Draw its dependency tree.
- (b) Draw its conceptual graph. Show coreference. How are you handling names?

[15 marks]

5. (a) Give two advantages and two disadvantages of Neural Machine Translation (NMT).  
(b) Repeat (a) for Linguistics Based MT (LBMT).  
(c) Give your critical comparison between NMT and LBMT approaches.  
[10 marks]
6. In Attention based translation methods, we see a tendency to repeat words or phrases in the output. Why does this happen? How would you fix it? [20 marks]
7. Explain Luong Attention mechanism. Why is it better than Bahdanau Attention? [20 marks]
8. Explain Transformer model. What is the importance of linear transformation for Q, K and V. What are positional encodings and why are they important? [30 marks]
9. Explain DCN model. Can you explain importance of the three components of the input to BiLSTM in this model? [20 marks]
10. What mechanism would you add to the Attention based models to address out-of-vocabulary words in the source? Explain your choices. [15 marks]