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 comparision 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]