End-Sem

Duration: 2 hour **Total marks: 50**

- Please submit before the deadline. There will be five (5) marks deduction for the late submission up to 12:05 pm. After that your response will not be evaluated.
- Each student has to switch on his/her camera during the exam.
- Write to the point and according to the marks distribution. Writing lengthy responses would not fetch you more marks.

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1. What is the principal advantage of cross-lingual setup? **[2]**

   To bridge the language barrier. OR
   To leverage the resources of resource-rich language for learning in resource-poor language.

2. Discuss the advantages of converting a standard embedding space into hyper-space. **[2]**

   To normalize the way we optimize and evaluate the learned embeddings.

3. State (with examples) the difference between the contextual and non-contextual word embeddings. **[2]**
   My bank has imposed a penalty on my account.
   We're enjoying our outing at the bank of the Ganga.
   Argue along these examples.

4. What is the advantage of sinusoidal-based positional econding in Transformer? **[2]**
   To extrapolate to sequence lengths longer than the ones seen during training.

5. Suppose the source (s) and target (t) tasks have 5000 and 10000 disjoint labelled data samples, respectively. Would you suggest a transfer learning approach in the following scenarios? If yes, which one? Assumption: Domain (say, Twitter) and language (say, English) are the same for both s and t. **[3]**
   a. Tasks are same s = t
   b. Tasks are equivalent s ~ t
   c. Tasks are different s != t

   a. No.
   b. Yes, Multitask learning
   c. Yes, Sequential Transfer learning

6. For a vocabulary size $|V|$, context size C, and embedding dimension H, how many parameters (without biases) does a Skipgram-Word2Vec model will have at the? **[2]**
   a. Input-to-hidden layer
   b. Hidden-to-output layer

   a. |V| x H
   b. H x 2|C||V|

7. What are the wake-up words? Do you think that they pose any application-level privacy concern? Share your thoughts. **[2]**
   Words which are used to initiate a conversation with the chatbot agent, e.g., "Hey, Google".

8. Give an example of a sentence with a restrictive clause. **[2]**
   Buffaloe buffaloe buffaloe buffaloe buffaloe buffaloe buffaloe buffaloe.

[Or any other sentence.]

9. Name the technique that you would need for MT if you don't want to perform any analysis in the Vauquois triangle. **[2]**
   Encoder-decoder paradigm in deep learning.

10. In MT, what is the difference between the soft and hard alignment functions? The Bahadanu's attention is an example of a soft or hard alignment function? Suggest what modification would you do to convert it into the other one. **[2+1+1]**

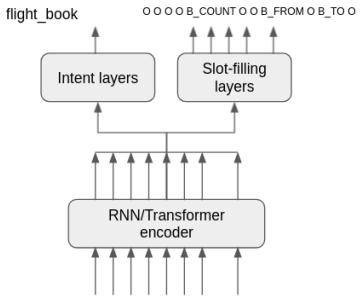
    Soft alignment function assigns some probability values to each component of the input, whereas, hard alignment function selects the most relevant component of the input.

    Bahadanu's attention is an example of a soft alignment function.

    To convert it into the hard alignment function, we can take the component with maximum probability values of the softmax output.

11. Which learning paradigms would you opt for the intent classification and slot-filling, respectively? Can you learn the two tasks in a multi-task setup? If yes, how? Describe with an example. **[2+3]**

    Classification and sequence-labelling.
    Yes, task-specific hidden and output layers for both tasks.



12. What are the core components of a goal/task-oriented dialog system? Give an example of one round of a dialog conversation. Also, at each step, highlight the tasks that need to be executed along with their intermediate outputs. Define each task (one line/task) that is necessary. **[3+4+3]**

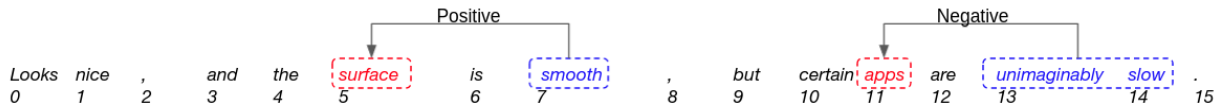
    NLU, DM, and NLG

    User: Are there any action movies to see this weekend?
    System: Where are you located?

13. Following Yan et al., (2021), given a review sentence, write the target sequence for the following tasks: AE, OE, ALSC, AOE, AESC, Pair, Triplet. **[6]**

Looks nice, and the surface is smooth, but certain apps are unimaginably slow.

Note: Pay attention to the indices. Any mistake will incur zero marks for the respective task.



Task	Target sequence
Aspect Extraction (AE)	5, 5, 11, 11, </s>
Opinion extraction (OE)	7, 7, 13, 14, </s>
Aspect-level sentiment classification (ALSC)	5, 5, Positive </s>
	11, 11, Negative</s>
Aspect-Opinion extraction (AOE)	5, 5, 7, 7, </s>
	11, 11, 13, 14, </s>
Aspect extraction-Sentient classification (AESC) [ALSC-joint]	5, 5, Positive, 11, 11, Negative, </s>
AOE-joint (Pair)	5, 5, 7, 7, 11, 11, 13, 14, </s>
Aspect-Opinion-Sentiment (Triplet)	5, 5, 7, 7, Positive, 11, 11, 13, 14, Negative, </s>

14. Draw the dependency parse tree for the following sentence. **[6]**

The complex houses married and single soldiers and their families.

A set of relations are given as: root, subject (subj), object (obj), modifier (mod), auxiliary (aux), conjunct (conj), coordinating conjunction (CC), deteriner (det), possessive-modifier (pos-mod).
[No partial marking]

If you missed the punct or the root, there will not be any penalty.