Home Exercise 05

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20-00-0947 Deep Learning für Natural Language Processing
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May 25, 2020

Problem 1: Mandatory Paper

1. What is the difference between feature-based and fine-tuning pretrained language representation?
The feature-based approach uses task-specific architectures that include the pre-trained representation as additional features.
The fine-tuning approach introduces minimal task-specific parameters and is trained on the downstream tasks by simply fine-tuning all pretrained parameters.

2. State the major architectual improvement of BERT over OpenAI GPT
BERT overcomes the limitation of OpenAI GPT by allowing birectional instead of unidirectional architecture, so that the token can be evaluated from surrounding with contexts from both directions.

3. Explain the principle of both pre-training in BERT in two sentences each.
BERT proposes a new training objective: the masked language model (MLM) that randomly masks some of the token from the input, the the objective is to predict the original vocabulary id of the masked word based only on its context.
The second objective is next sentence prediction (NSP) with the goal: given a pairs of sentences as input, the model should learn to predict if the second sentence in the pair is the subsequent sentence in the original document.

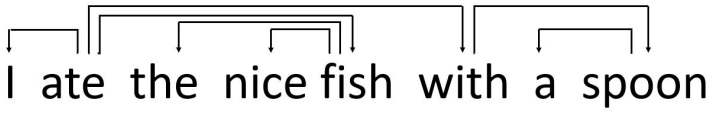
4. On which families of tasks can BERT be applied? Explain the input and the output of the model for each task?

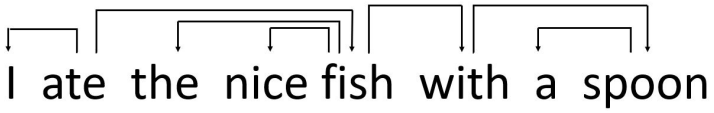
Question Answering:
- Information retrieval factoid: Given a collection of documents and a question as input the the model should be able to produce an answer to a users by finding a short text segments.
- Knowledge-based: Given a question from the users answering a question by mapping it to a query over a structured database.

Language inference: Given a premise and a hypothesis the model should determine the label of the hypotheis (true, false, undetermined)

Problem 2: Dependency Parsing

1. Draw the dependency graph for "I ate the nice fish with a spoon", which show the grammatical ambiguity of the sentence.





2. Give the corresponding table form for each of the two graphs as in Slide 20 ("How to deal with conjunctions") in the lecture notes.

Index	Word	Head
1	I	2
2	ate	0
3	the	5
4	nice	5
5	fish	2
6	with	2
7	a	8
8	spoon	6

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