

NLP Practical: Part III

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- Today's Practical Session
 - Practical Session Nov 13: Text Understanding
 - Nov 22: Receive Feedback on Report 1
 - Nov 29: Submit Report 2 by 4pm
 - Dec 6: Submit Report 3 by 4pm



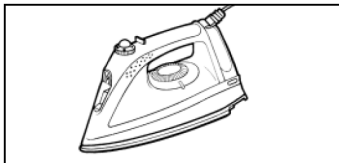
New Topic: IELTS Text Understanding Questions

- IELTS = International English Language Testing System
- Text understanding of L2 speakers is tested:
 - Read text
 - Answer non-trivial questions (designed such that inference is necessary)
- Possible automatically?
- Since 2015: Tokyo University + NII working on a system that automatically passes the University's entry test in various disciplines
- Important: Explanation (intermediate steps) necessary.
- You will here play through some scenarios and design a system that does this for one particular type of understanding questions



- Question: What sort of water are you advised to use?

YOUR MOULEX IRON



A Filling the reservoir

Your iron is designed to function using tap water. However, it will last longer if you use distilled water.

- Always unplug the iron before filling the reservoir.
- Always empty the reservoir after use.



Possible NLP ways of answering this

- POS-tagging (“to water the plants” is not relevant for this question).
- Word sense disambiguation (“iron” = tool here, not metal)
- Parsing – in particular finding all modifications of “water”, in all situations where the water is the direct object of “use” .
- Pronoun Resolution (“water” might occur in the form of “it”)
- Lexical inference (similarity in semantic space? WordNet? ConceptNet?): Instead of “use”, a similar verb such as “employ” or “take” might be used
- Treatment of question string – what type of answer is expected: Yes/no question/ wh-question?



In this particular case

- “What kind of” implies subtype of water
- So look for noun compounds with “water” as head
- particularly in contexts with “use”
- Two are found: “using tap water” and “use distilled water”
- Brilliant! All you need to do is get this to work on the basis of the parser output (**your Task 1**).
- Heuristic: If two seemingly good contexts appear, choose the later one (or how could we do this in a more principled way? (**Reasoning; your Task 3**))
- Of course, the trick is to do anything you do, in such a way that it **generalises** to as many questions as possible.



- “What should you do if your iron starts to drip water?”

B Temperature and steam control

Your Moulex iron has two buttons which control the intensity of heat produced by the iron. You can, therefore, adjust the temperature of the iron and the amount of steam being given off depending upon the type of fabric being ironed.

- Turn the steam control to the desired intensity.
- Turn the thermostat control to the desired temperature.

Important: *If your iron produces droplets of water instead of giving off steam, your temperature control is set too low.*



Two further problems with this question

- 1 Problem 1: “drip” is not mentioned anywhere in the text (“droplet” is the closest in meaning).
 - We could use word2vec similarity and a Wordnet search to find closest words to question words
- 2 Problem 2: The information of what to do is physically removed from the description of the situation, and requires some inference



Task 1 for Report 3

- Perform this task yourself for two questions, then describe how it could be automated:
 - Question 1 from Text 1.
 - Question 12 from Text 2.
- Use the parsed versions of questions and texts
- Narrow down the set of sentences that might contain answer material in the right syntactic form, until you have isolated the answer.
- Describe your findings, and your design of how to do this automatically, in 333 words or fewer.



Now treat the case when there is no lexical match between question and answer exists.

- You now want to identify and rank **lexically similar** answers.
- You need to provide evidence from Wordnet, word2vec embeddings, ConceptNet or other relevant resources you know.
- Simulate what an automatic system would do for:
 - Question 3 from Text 1 (“droplets”)
 - and at least one other question of your choice
- Describe your findings in 333 words or fewer.



Your Tasks for Report 3

Sometimes, inference is necessary, e.g. Question 5 of Text 1.

- Describe the reasoning chain that leads to success for this question.
- Can such a reasoning chain ever be automated and how? Why or why not?
- What speaks for or against such a system being successful by 2021? (333 words)

In all three tasks, please demonstrate knowledge of NLP **by citing relevant Overview of NLP lecture.**

