
Examiners' commentary

2017–2018

CO3354 Introduction to natural language processing – Zone A

General remarks

The examinations were set generally as a mixture between questions that test basic knowledge and understanding of the material ('bookwork'); and questions that require candidates to apply their knowledge and demonstrate deeper understanding by solving specific problems. There was a choice of three out of five questions, which should enable candidates to address the areas in which they feel most confident. Each paper included an essay question, giving candidates an opportunity to show in-depth knowledge that may not have been covered by other questions and to develop an argument at length.

You are reminded to read each question carefully and address all aspects of the question. In particular, when instructed to 'explain' or 'describe' something, it is important to do so, rather than simply listing examples. As has been advised in previous years' commentaries, any answers involving calculation should show working, while worked examples are advisable in answers involving syntactic problems even if not specifically requested in the question. An incorrect solution can still get credit if you are able to show some understanding of the problem through your working.

Comments on specific questions

Question 1

This was an essay question, giving candidates an opportunity to reflect on some wider considerations about the purpose, achievements and state of the art in Natural Language Processing, and to apply knowledge they may have acquired through self-directed readings. Marks were awarded for showing appropriate technical knowledge, quality of argumentation, critical thinking and clarity of presentation. To get good marks on a question like this, it is important to structure your answer and make sure that the points you raise are relevant to the question.

Hayes and Ford's paper is now quite old and it is instructive to compare their prescriptions with the way the field has actually developed. Some arguments against their position could include the increasing use of chatbots which simulate human speakers to a certain degree, including digital "assistants" implemented as mobile apps, and applications where a "human touch" may give an advantage, e.g. robots that partially fill the roles of teaching assistants, or carers for the elderly. Credit would be given for appropriate reference to specific technologies.

Some arguments in favour of the position: a major thrust of NLP R&D is in applications in what can be loosely called text analytics, which do not require humanlike conversational abilities. The utility of these applications comes from the fact that they can analyse very large quantities of data, possibly including hundreds of millions or even billions of sentences, much faster and more accurately and reliably than humans would be able to do.

In short, NLP has advanced on a number of fronts, some of which involve humanlike abilities and others do not – indeed, some machine learning applications do manifest “superhuman” abilities. Good answers would show awareness of some of these developments and pick out selected examples in support of an argument either for or against the quoted statement.

Question 2

This question tested understanding of stemming and involved a comparison of two approaches to this task. This type of question comes up quite regularly in examinations and so students should be well prepared. In fact, most candidates gave very good answers to this question.

Part (a) was essentially bookwork, although appropriately selected examples from the text were required for full marks. Most candidates did reasonably well. In questions like this, it is important to give appropriate examples as required to avoid losing easy marks – some candidates disregarded this requirement. The required definitions can be found in the appropriate parts of the subject guide and/or the recommended textbook.

Part (b) involved comparing and evaluating the decisions made by the two stemmers. Answers to questions of this type should be stated at as general a level as possible, rather than simply giving lists of words with and without their endings. It is important to address all parts of the question, including the requirement to discuss motivations for the rules: typically, this would involve considerations of whether particular word-endings can be reliably associated with grammatical forms, and whether rules appear to apply iteratively. An example of the latter could be stemming locality to loc by successively stripping -ity and -al.

In (c), candidates were expected to explain why they judged that certain rules had been applied incorrectly, rather than to simply state that they were wrong. It is not enough to say that something can't be a stem because it is not a real word. An example could be reducing was to wa, which is not a stem of any wordforms related to was.

Question 3

This question concerned formal grammar. Some students have difficulty getting to grips with this kind of symbolic approach to language, and you are advised to revise the relevant sections of the subject guide and the recommended textbooks carefully.

Part (a) was quite straightforward and simply required candidates to apply a rudimentary set of grammar rules. When attempting questions like this, it is important to check that your constructed sentences actually conform to the grammar rules given in the question, rather than simply making up sentences with the provided vocabulary, and to give all available parses.

Part (b) involved adding rules to match new data. For full marks, rules should be linguistically motivated rather than tweaked to generate particular strings. For example, both nodes in a coordinate structure should be of the same phrasal category. Good answers would be both compact and generalisable, giving grammars that generate other grammatical sentences beyond the examples provided but do not allow for, or at least minimise the production of ungrammatical sequences.

Part (c) addressed a well-known problem with grammars that include recursive rules, which is discussed in the subject guide and has regularly featured in past examinations. Note that the question specifically asks for suggested modifications to the grammar rules, so answers which involve using a different parsing regime would be missing the point.

Question 4

This question addressed some formal and mathematical techniques in NLP, including probabilistic reasoning and use of regular expressions.

Part (a) consisted of “bookwork” and should have been easily answerable by anyone who had read the subject guide and recommended textbooks thoroughly. When answering definitional questions, it is important to avoid circular answers such as “a chunker combines words into chunks”, as this does not show that the candidate understands what is meant by a chunk.

Part (b) involved regular expressions, which are fundamental to many operations in NLP. Most candidates handled this quite confidently, but for full marks it is important to make sure you answer the question properly and *describe* the expressions as well as giving examples.

Part (c) involved another old favourite, Bayes' Rule. Again, most candidates seemed fairly confident with this: for full marks it is important to do all the question requires, including showing your intermediate calculations. You will still get some credit if you misremember the formula or if your calculations go awry, as long as some understanding is shown.

Question 5

This question concerned probabilistic grammars and parsing.

Part (a) was essentially book knowledge, which is covered in the subject guide and recommended textbooks.

In part (b) you should have found two different parses. Correct tree diagrams and clear paraphrases were required for full marks.

Part (c) involved calculation of probabilities. You should bear in mind that you can gain some credit for explaining your answers and showing calculations, even if you do not end up with a correct solution. The question asked which analysis had the highest/higher probability: this could be answered correctly without including probabilities which are the same for all analyses, such as those for individual words. Candidates were also asked to compare the result with their intuitive understanding of the sentence. It should not be surprising if there is a difference, as the numbers have been arbitrarily specified for the purpose of this exercise, while interpretations are influenced by content and context as well as by prior expectations about the most likely structure.

