Sequence labelling: Exam practice

> **Note**
>
> This document gives *examples* for tasks similar to those that will appear on the digital written exam. The solutions are provided at the end of this document, in case you first want to try solving the tasks yourself. This is not meant as an exhaustive list; the exam may also feature other types of tasks/questions than the ones shown here.

Task 3.1

Below is a confusion matrix from evaluating a part-of-speech tagger. Rows correspond to gold-standard tags, while columns correspond to predicted tasg; for example, the **highlighted** cell contains the number of times the classifier predicted *VERB* where the gold-standard class was *NOUN*.

	ADJ	DET	NOUN	VERB
ADJ	485	1	74	4
DET	2	751	1	0
NOUN	12	0	2117	**92**
VERB	14	0	130	1586

Based on the confusion matrix above, compute the following evaluation metrics:

precision with respect to *DET*	recall with respect to *VERB*

Task 3.2

Which of the following features can be used in a part-of-speech tagger using a multi-class perceptron? Mark all that apply!

- ☐ the word form of the current token
- ☐ the word form of the next token
- ☐ the part-of-speech tag of the previous token
- ☐ the part-of-speech tag of the next token
- ☐ the last three letters of the current token
- ☐ the word form of the previous token

Task 3.3

Below is a sentence with named entity spans highlighted, both according to a gold-standard dataset and the prediction of named entity recognition (NER) model.

gold-standard: *Islamabad is the capital of the Islamic Republic of Pakistan.*

prediction: *Islamabad is the capital of the Islamic Republic of Pakistan.*

What is the span-level F1-score of the model on this sentence?

Task 3.4

Below is a sentence with named entity spans highlighted and annotated with their type, for example “PER” for a span indicating an entity of type “person”.

James Cameron’s directing career began in 1978
PER DATE

Convert these named entity annotations to BIO notation by filling out the table below. Assume that each row of the table corresponds to a single token, so that each row is annotated with exactly one tag.

token	tag
James	
Cameron’s	
directing	
career	
began	
in	
1978	

Solutions begin on the next page!

Solutions

Task 3.1

precision with respect to *DET*	recall with respect to *VERB*
$\frac{751}{1+751}$	$\frac{1586}{14+0+130+1586}$

> **Note**
>
> This works exactly the same way as computing precision/recall/F1-score from confusion matrices of text classification models (in L1)!

Task 3.2

- [x] the word form of the current token
- [x] the word form of the next token
- [x] the part-of-speech tag of the previous token
- [ ] the part-of-speech tag of the next token
- [x] the last three letters of the current token
- [x] the word form of the previous token

> **Note**
>
> You can define almost any feature you want when using a multi-class perceptron! Only "looking ahead" when it comes to the *predictions* of the model, i.e. the part-of-speech tag of tokens that come after the current one, is not possible.
>
> (Also note that "word form" is just a way of saying "the string of the word itself".)

Task 3.3

$$\frac{2 \times \frac{1}{2} \times \frac{1}{3}}{\frac{1}{2} + \frac{1}{3}}$$

Task 3.4

token	tag
James	B-PER
Cameron's	I-PER
directing	O
career	O
began	O
in	O
1978	B-DATE