

Specialist English: Assignment 2

Rebecca J. Stones
rebecca.stones82@nbj1.nankai.edu.cn

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This second assignment (worth 5% of the final mark) is to explore how the English language interacts with mathematics and LaTeX. These snippets are from actual papers that were published; downloading and looking at these papers will help you understand the context (you won't need to read the whole paper).

Please write your assignments in LaTeX and email me the final .pdf (I don't need the LaTeX .tex file).

In this and the remaining assignments, my marking will be affected by (a) your English writing, (b) your LaTeX typesetting, (c) your mathematical presentation, and (d) your understanding of the underlying computer science. Basically, I will “peer review” your assignments.

Problem 1 What is grammatically wrong with the mathematical expression below? (Put aside how “freq” is spelled wrong.) [1 mark]

feature selection process. This weighting scheme follows the vector space model in text retrieval. Specifically the tf counts for the concept popularity and the idf counts for the concept specificity.

$$c\text{-}tf\text{-}idf(c,d) = freq(c,d) \log \frac{|D|}{freq(c)}$$

Based on the $c\text{-}tf\text{-}idf$ measurement, we can select concepts from relevance feedback with the intuition that concepts with higher

– Wang et al. *Learning Structured Concept-Segments for Interactive Video Retrieval*, 2008.

Problem 2 What are two distinct problems with the mathematical writing below? [2 marks]

It can be further formulated into the following problem:

$$\begin{aligned} \min_{\mathbf{v}} \mathbf{v}^T \mathbf{v} + \mathbf{v}^T \mathbf{h} \\ \text{s.t. } v_1 + v_2 = 1, 0 \leq v_1, v_2 \leq 1 \end{aligned} \quad (8)$$

– Zhang et al. *Direction based Graphical Model for Face Sketch Synthesis*, 2016.

Problem 3 Describe one way to improve the following snippet. [1 mark]

the core power capacity reference of the chip $P_{0,c}$. The power capacity of core j therefore is

$$P_{core,j} = r_j P_{0,c} = r_j \min(P_{0,i}), 1 \leq i \leq N. \quad (14)$$

– Chen et al. *TSocket: Thermal Sustainable Power Budgeting*, 2016.

Problem 4 What is wrong with the notation p_{nmt} and p_{smt} in the following snippet, and what is an appropriate way to fix it? [1 mark]

Specifically, we perform a linear interpolation between two probabilities of the NMT generations and SMT word recommendations, to update the prediction probability:

$$p(y_t | \mathbf{y}_{<t}, \mathbf{x}) = (1 - \alpha_t) p_{nmt}(y_t | \mathbf{y}_{<t}, \mathbf{x}) + \alpha_t p_{smt}(y_t | \mathbf{y}_{<t}, \mathbf{x}) \quad (15)$$

Note that $p_{smt}(y_t | \mathbf{y}_{<t}, \mathbf{x}) = 0$ for $y_t \notin V_t^{smt}$, as the SMT word recommendation vocabulary at decoding step t V_t^{smt} is N, \dots .

– Wang et al. *Incorporating Statistical Machine Translation Word Knowledge Into Neural Machine Translation*, 2018.

Problem 5 In the following snippet, rephrase the part after “(2)” to avoid using blackboard shortcuts (\forall and $:$) and better separate the mathematical expressions. [2 marks]

Definition 1: A linearization of a concurrent history ρ is a sequential history ρ' such that (1) $\rho' \sim \rho$, meaning that they share the same set of events, and (2) $\forall e_i, e_j : e_i <_\rho e_j$ implies $e_i <_{\rho'} e_j$. In other words, the non-overlapping method calls in ρ retain their execution order in ρ' , whereas the overlapping method calls may take effect in any order.

– Zhang et al. *Round-Up: Runtime Checking Quasi Linearizability of Concurrent Data Structures*, 2013.

Problem 6 Rewrite the following snippet (beginning with “Given n threads...” and ending with “...number.”) as one sentence. It should flow naturally as a sentence, with correct grammar, correctly typeset mathematics, and correct punctuation. [3 marks]

during normal execution. Given n threads each sending r requests, we calculate the availability of the protected system as:

$$\mathcal{A} = 1 - \bar{t} / (r * n) \tag{1}$$

where \bar{t} = Average timeout number,

r = Requests per thread,

n = Thread number.

– He et al. *Reverse Replication of Virtual Machines (rRVM) for Low Latency and High Availability Services*, 2016. <https://dl.acm.org/citation.cfm?id=2996894>

Your answer should (at least) fix these problems:

- The displayed equation should only be numbered (i.e., “(1)”) if that number is used in the paper. Moreover, the authors have used “QQQ...” (in white) to add the tag (1); we should use `\begin{equation}` ... or `\begin{equation*}` ... (or `\[... \]` or `$$... $$`).
- The asterisk $*$ is not a multiplication sign; we write ab or $a \times b$.
- Both “Average timeout number” and “Thread number” have a (very common) grammar error; compare “phone number” with “number of phones”.
- The authors define r and n twice. The authors twice fail to use math mode.
- It omits the “and” in the structure “X, Y, and Z”.
- Before “where” is an indentation, which indicates the start of a new paragraph.