Online happiness with advice
(a template for final project report)

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Abstract

Add your abstract here. When writing research papers/reports, we often write the abstract at the end (when we finished writing all other components). The abstract should provide a big picture for the research contributions. You typically mention what the problem is about (note that it is different from defining a problem in a formal way) and what your contributions are. The abstract should not be too short or too long (typically 10-15 lines in this format). Here is a typical example: We consider the online happiness problem under the advice complexity model where the ‘online constraint’ is relaxed and an algorithm receives partial information about the future items. In this problem, an online sequence of problems appear and the goal is to stay happy by taking the right online decisions. We provide tight upper and lower bounds for the amount of advice an algorithm needs to achieve an optimal strategy. We also introduce an algorithm that, when provided with $\log n + o(\log n)$ bits of advice, achieves a competitive ratio of $3/2$ for the happiness problem. This algorithm is simple and is expected to find real-world applications. We introduce another algorithm that receives $2n + o(n)$ bits of advice and achieves a competitive ratio of $5/3 + \epsilon$. Finally, we provide a lower bound argument that implies that advice of linear size is required for an algorithm to achieve a competitive ratio better than $11/10$.

1 Introduction

Assume that the reader has no idea about the problem you are considering. Start with an application, or a statement of significance (e.g., ‘the recent developments in cloud computation has given rise to the problem of renting servers in the cloud’). The first paragraph serves to prepare the reader for the problem that is being considered without mentioning it. You should provide evidence that it is an interesting and important problem.

In the introduction, as the name suggests, you should introduce the problem. It often requires a formal definition for a paper in theoretical computer science articles. You might use the same definition that you used for your proposal.

In the introduction, you might also add subsections about prerequisite material required to understand the paper, e.g., what the asymptotic competitive ratio is, what the advice complexity is why it is important/interesting, etc.
1.1 Previous works

This is a mandatory part of any research paper. Make sure to cite the results (e.g., [?, ?]). It might be a separate section or be embedded in the introduction. For many of your projects, this is the main part that I use for evaluating the reports. Don’t undermine the importance of this section. I will briefly review the existing results for the problems studied in your reports. You will lose some marks if a major directly-related result is missing in your study of previous works. Sometime it helps if you summarize the existing results in form of a table/figure.

2 Online happiness problem

Here provide the ‘body’ of your results. You might have separate sections for upper bounds and lower bounds. Or they might be different sub-sections of the same section. Try to organize your results in a way that is easy to follow and think of. A section/subsection in the body of a theoretical paper often ends with a statement of the results of that section in the form of a theorem, lemma, or corollary. That will be the main ‘contribution’ of that section. It always help if you include figures/tables/algorithms, etc. Try to make your paper ‘pleasing’ to read.

3 Concluding remarks

Here, you summarize what you have done in this report and what remains to be done. Often you list the major related problems that remained open. Some directions for future work can be added as well.

4 Hints about your project

The project reports are due December 10th at 23:00 pm. You are encouraged to prepare your reports using \LaTeX. You are not required to use any specific format. This document and its template are aimed to just provides a sample/guideline. You can use any other template and Latex style. I expect the project reports to be between 5 to 15 pages. But its is also not mandatory and they can be shorter or longer. I evaluate your projects based on their quality, which is independent of their length. From your reports and your discussions with me about your projects, I already have, to some extent, an estimate of your progress in your projects.

References
