Slacking with Slack

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Abstract

The classical *graduate student problem* is the well-studied problem of how a graduate student can spend all of their time slacking off in graduate school while still graduating. A famous impossibility result of Bovik [3] states that if all of a student's time is spent slacking, then it is impossible to graduate. We relax this problem by adding a slack parameter ϵ, representing the fraction of time that the student has to spend working. On this ϵ fraction we make no guarantee at all about the enjoyment of the student, but this enables us to guarantee graduation while also guaranteeing large enjoyment on the other $1 - \epsilon$ fraction of the time.

1 Introduction

It is well-established that the goal of graduate school is to slack off as much as possible while still eventually graduating [6]. Unfortunately it is impossible to both slack off all of the time and still graduate [3]. We can alternatively try for a more fine-grained analysis, where there is an unhappiness level at every time and the goal is to minimize the total unhappiness (the integral over time) while still graduating, where the unhappiness is a function of the current state (working or slacking) and the previous history of states. Suppose that graduate school last for n years. It is known that under plausible productivity and unhappiness functions, the minimum amount of unhappiness required is still $\Omega(\log n)$.

In order to get around this lower bound we introduce a slack parameter ϵ. This slack parameter lets us ignore the unhappiness at an ϵ fraction of the time (i.e. an ϵn total amount of time). In other words, we get to choose intervals of total length at most ϵn and take unhappiness integral over all times not in the segments. We show that by doing this we can drastically decrease the unhappiness, from $\Omega(\log n)$ to $O(\log \frac{1}{\epsilon})$. Thus if ϵ is a constant, we can get down to constant unhappiness!

1.1 Related Work

In the last few years there has been a great deal of work on problems with slack parameters. Slack was originally defined by Kleinberg, Slivkins, and Wexler [7] in the context of metric embeddings. They proved that by ignoring an ϵ fraction of the pairs in the metric space, the distortion of the rest can be made extremely small. This was continued by Abraham et al. in [1], and taken even further by Abraham, Bartal, and Neiman [2]. It was first studied in contexts other than metric embeddings by Chan, Dinitz, and Gupta [4], who studied spanners with slack. Their techniques were then used by Dinitz to give good compact routing schemes with slack [5].

2 Slack Construction

Our construction is based on the following simple observation: graduate student unhappiness is sharply concentrated around a few specific events. These events are the thesis defense, the thesis proposal, the speaking skills talk, and advisor meetings, all of which require considerable work and thus do not allow for significant slacking off. But since these events together are only a negligible fraction of the time that a student spends in graduate school, by ignoring the unhappiness of these times we see a drastic decrease in unhappiness. This is formalized by the following theorem:

Theorem 2.1 *Let $u : \mathbb{R}^+ \to [0,1]$ be an unhappiness function that is $O(1)$-concentrated around the thesis defense, thesis proposal, and advisor meetings, where $u(t) = 1$ means extreme unhappiness and $u(t) = 0$ means no unhappiness. Then there is a slacking schedule $s : \mathbb{R}^+ \to \{0,1\}$ (where 0 represents slacking and 1 represents working) and an ignore function $g : \mathbb{R}^+ \to \{0,1\}$ such that*

$$\int_{t=0}^{n} u(t)s(t)g(t)dt \leq O(\log \frac{1}{\epsilon})$$

where g is only 1 on an ϵ fraction of the time, i.e. $\int_{t=0}^{n} g(t)dt \leq \epsilon n$. Furthermore, at time n the student actually manages to graduate.

Proof: Deferred to the full version, or left as an exercise for the interested reader if the full version is never written. ■

3 Conclusion

We have proved that by enduring a few periods of extreme unhappiness, it is possible to graduate with only mild total other unhappiness. Yay!

References

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