Kickoff meeting

Current Topics in Online Algorithms

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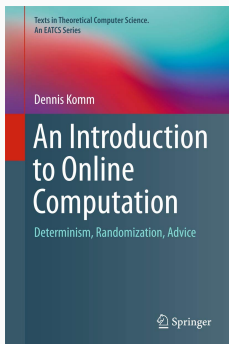April 06th, 2021

Introduction

Outline

- **Kickoff / Questions** (today)
- **Topic Assignment / Questions** (this Thursday)
  - Everyone gets a topic to present (1-2 persons per topic)
- **Preparation** (at least two weeks)
- **First Meeting** (week of 12th April)
  - Open Discussion about preliminary reading
- **Weekly Presentations** (starting first week of May)
  - One joined or two single talks
  - 30-40 minutes talk + 10-20 minutes discussion
- **Preparing Essay** (end of lecture period)
  - Summarize the main ideas, at most 8 pages, LATEX
- **Essay Deadline** (1st of September, 10:00)
  - Hand in via email as pdf

Preliminary Reading

- We will provide the first chapter.
- Goal: Learn the very basics of online computation.

Online meetings using Zoom.

Outline of a Seminar Meeting

If you are not presenting:

- Follow the talk closely
- Write down questions that you have about it
- Participate in the following discussion
- You may be randomly requested to ask a question to the speaker
- Give feedback to your peers

Outline of a Seminar Meeting

If you are presenting:

- Present a **selection** of topics of the paper
- Focus on the main ideas, but don't be too shallow
- Stay within the time limits for your presentation
- Your presentation should be understandable to the audience, including all of your peers
- Answer questions during the discussion round

Moderating a session

If you held the previous talk

- Introduce the speaker and topic
- Moderate the discussion
- You should have a question to start the discussion

Possible Structure of a Presentation

- Briefly introduce the topic
- Motivation: Why is it interesting? What are typical applications?
- Give necessary background knowledge. What techniques are used?
- Present the topic
- Conclude with a summary that encourages open discussion. What are some open problems?

Advice for topic presentation

Before you begin:

- Understand your topic, look at the sources
- Outline your talk. Select the topics of your focus
- Find good examples, create pictures!
- Find possible questions and open topics for discussion

Advice for topic presentation

When preparing the slides and presenting:

- Provide context. Make appropriate references to previous talks/chapters
- Go slowly. Do not expect everybody to understand everything immediately
- Keep the slides clean. Usually one figure is better than a wall of text
- Use simple examples to illustrate ideas. Sometimes a good example is better than presenting a proof
- Use Beamer with $\LaTeX$
- These presenation slides are a bad role model

Ressources on presentation

- Many available, e.g.,
  `http://ianparberry.com/pubs/speaker.pdf`
- Learning by doing... and from the mistakes made by others!
- Practise, practise, practise!

Essay

- Feel free to use the same structure as for the presentation
- LaTeX is mandatory (tutorial:
  https://www.latex-tutorial.com/tutorials/)
- 8 pages
- Template will be available on our website
- Give appropriate references

But:

- Do not simply retell the paper!

Discussion Group?

Telegram, WhatsApp, . . .

The Topics

First Meeting

On the week of the 12th of April

Chapters 1 Introduction

- Formalization of decision theory

After reading the first chapter, we will have a common discussion.

The presentations will start on the following week.

Topics

1. The start of Online Computation: The original paper by Sleator and Tarjon. Deals with paging and list update problems.

2. The k-Server Problem A survey on one of the most well-known online problem.

3. Randomization in Online Algorithms What if we allow an online algorithm to flip coins to make decisions?

4. Randomizing the Adversary What if the adversary chooses an instance from a known set randomly?

Topics

5. **Priority Algorithms** An algorithm determines an order, the adversary provides an instance on this order. A little bit similar to randomized adversary.

6. **Knapsack with Reservations** We allow an online algorithm to delay decision for a proportional cost.

7. **The Evolution of Advice Complexity** Which models were used before the current one was established?

8. **The Tape Model for Advice Complexity** The established model for advice in online algorithms.

Topics

9. The k-Taxi Problem A generalization of the k-server problem. (2 persons)

10. Online Computation with Untrusted Advice What if the advice that we are given is not always correct?

11. The Online Knapsack Problem: Advice and Randomization The knapsack problem is back, and it wants to perform competitively.

12. Machine learned Advice How well can we train a machine to output advice bits in real life? (2 persons)

Topics

Decision on a Date for a Regular Meeting