How to find, read, write, review, and present scientific work

2IMF00: Formal System Analysis 2024

Clemens Dubslaff

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Disclaimer

- collection of points that I found relevant
  - take as an inspiration from experiences → always remain open for an *own style*
  - plenty of material in the web/youtube/...
- in the context of theoretical computer science (other areas might be different)
- room for improvements and your suggestions (techniques, tools you use, ... → mail me)
- interactive style: interrupt me, ask questions

General workflow in this seminar:

1. *find* related work
2. *read* papers
3. do research, *write*, and submit paper
4. *review* other papers
5. *present* results

LLM chatbots welcome

LLM chatbots: just don't

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Find

finding trustworthy resources in theoretical computer science

Find

- DBLP https://dblp.uni-trier.de
- Google scholar https://scholar.google.com

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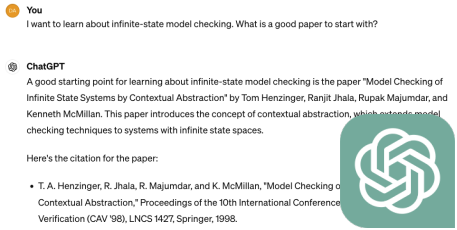
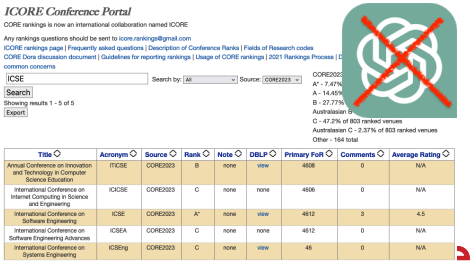
- DBLP https://dblp.uni-trier.de
- Google scholar https://scholar.google.com
- ChatGPT https://chatgpt.com
- Research rabbit https://researchrabbit.ai

trustworthy sources:

- own thinking
- “good” conferences and journals:
  https://portal.core.edu.au/conf-ranks
- publishers/venues with proper reviewing process
  - LIPIcs, ACM, Springer LNCS, IEEE, Elsevier, ...
  - MDPI, OMICS, ...
  - https://thinkchecksubmit.org





Title	Acronym	Source	Rank	Note	DBLP	Primary FoR	Comments	Average Rating
Annual Conference on Innovation and Technology in Computer Science Education	ITICSE	CORE2023	B	none	view	4608	0	N/A
International Conference on Internet Computing in Science and Engineering	ICICSE	CORE2023	C	none	none	4806	0	N/A
International Conference on Software Engineering	ICSE	CORE2023	A*	none	view	4612	3	4.5
International Conference on Software Engineering Advances	ICSEA	CORE2023	C	none	none	4612	0	N/A
International Conference on Systems Engineering	ICSEng	CORE2023	C	none	view	46	0	N/A

Conserve

How to conserve all the papers you read?

- maintain a library
- mindmap
- note-taking tools
- ... citation managers with BibTeX support:
  - Zotero https://zotero.org
  - BibDesk https://bibdesk.sourceforge.io (macOS only)
  - JabRef https://jabref.org
  - Mendeley https://mendeley.com (mainly other areas)

read the paper: write down for each paper two sentences → why? how/what?

Read

how to read papers

Reading

Before you are reading

1. What is the intended audience of the paper?
   - scope: lecture notes, workshop, conference, ...
   - area: formal methods, algorithms, AI, ...
2. Why are you reading it?
   – survey, related work, ... – review, lecture, ... – specific application, proof, ...

How to read – highly individual, but: always top down, never bottom up

1. title, abstract, structure (high-level view) → why? how? what?
2. graphics, experiments, definitions/lemmas/theorems (results)
3. introduction, conclusion (contribution)
4. detailed reading (only relevant parts)

suggestion: make notes immediately (iPad, print, ...)

Write

how to structure and write papers

Writing

Before you are writing

1. What is the audience you are writing for?
   - short term: you, supervisors, peers, reviewers, ...
   - long term: you, others to build upon your work
2. What are the constraints? (page limit, appendices allowed, ...)

General hints

- mirror your reading style – readers (and reviewers) usually do not have time
- use LaTeX (there is no alternative ...)
- graphics: TikZ (TikZ ist kein Zeichenprogramm) https://tikz.net
- inspiration: ArXiv https://arxiv.org
- take other material only as inspiration
  → if you copy or change only marginally: cite the authors

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Structure

Structure highly depends on content, but usually:

1. title, abstract
2. introduction
3. background or preliminaries
4. problem statement, technical contributions
5. (implementation and evaluation)
6. conclusion (and future work)
7. references

Flexible: research questions, related work, acknowledgements

Introduction

1. general broader context
2. motivation, lack of solution (why?)
3. informal problem statement (how?)
4. approach towards solution (what?)
5. contribution summary
6. (overview and structure of the paper)

Simon Sinek: The Golden Circle (TED'09)

Good things:

- introductory example and figure
- table summarizing results (e.g., complexity classes)
- bullet list contributions

	transition system	Markov chain	MDP
LTL	PSPACE [23, 25]	PSPACE [7]	2-EXPTIME [7]
Π_1^{QLTL}	PSPACE [22]	**EXPSPACE**	**2-EXPTIME**
Σ_1^{QLTL}	EXPSPACE [22]	**EXPSPACE**	**2-EXPTIME**
Π_k^{QLTL}	k-1-EXPSPACE [22]	**k-EXPSPACE**	**k+1-EXPTIME**
Σ_k^{QLTL}	k-EXPSPACE [22]	**k-EXPSPACE**	**k+1-EXPTIME**

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Approaches

Top-down

- start with structure (sections, subsections, paragraphs)
- provide bullet points what to state in the sections (go with the flow of ideas)
- gradually refine: only introduce things you really need

Bottom-up

- start with things you need in either case (preliminaries, notations, related work)
- establish lemmas/theorems as basic building blocks
- structure, add motivation, examples, connect with glue text

Often a mixture between those two the best

What to do if you are stuck?

- switch between levels of abstraction
- rubber duck method: explain to listeners (white board, colleague, ...)

Some rules for writing

- use ‘we’ (= you and the reader) instead of ‘I’
- never start a sentence with a number or mathematical symbol
- references as annotations, not as subject, i.e.,

  “Iterated transducers have been investigated [Dam01].” or
  “Dams et al. investigated iterated transducers [Dam01].” instead of
  “In [Dam01] iterated transducers have been investigated.” or
  “The authors of [Dam01] investigated iterated transducers.”

- conclusion ≠ abstract in past tense: if so, then drop conclusion
- avoid “orphans”
- add a tilde before citations (avoid line break)
- use cleveref (automated adding of, e.g., “Figure 4”)
- be consistent (AE/BE, Oxford comma, numbering, ...)

by the ROBDD on the right nodes.

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see, e.g.,~\cite{Dam01}

\cref{fig:duck}
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Review

how to review papers and give constructive feedback

Review

Before you write a review

- What is the venue? (workshop, area, ...)
- What are the constraints? (page limit, appendices allowed, ...)

Goal: *your* opinion/judgement on the paper, suggestions to improve

- history: letters between scientists $\rightarrow$ discussion
- on the "other side" it could be you $\rightarrow$ be constructive
- is the contribution
  - strong enough for the venue?
  - topic-wise fitting to the venue?
  - conforming the rules?

Structure of reviews

1. context and summary in your own words (3-5 sentences)
2. evaluation, with most important reasons (strengths/weaknesses)
   - originality, novelty, significance, clarity, (reproducibility, ethical)
3. detailed comments
4. minor issues, typos
5. (confidential) remarks to the conference chairs

Evaluation ratings:

- -2 (reject), -1 (weak reject), 0 (borderline), $+1$ (weak accept), $+2$ (accept)
- only in exceptional cases: -3 (strong reject), $+3$ (strong accept)
- confidence: 5 (expert), 4 (high), 3 (medium), 2 (low), 1 (none)

In this seminar: topics fit, $\geqslant -1$, and novelty, originality, ... etc. are no major criteria

Present

how to present scientific work

Presenting

Before you design your presentation/slides:

- What is the audience you are presenting for?
- Why are you presenting?
- What are the constraints? (time, online/offline, slides, LaTeX beamer, ...)

Structure – similar to writing papers

- motivation, problem statement
- outline
- solution with examples
- conclusion, outlook

Take care: anticipate knowledge of the majority and adjust (no lookup)

Slides

Please do:

- large fonts
- graphics and figures
- colors supporting information
- slide numbers $\rightarrow$ useful for questions in the Q&A
- pace: at most one slide per minute
- backup slides: similar to appendix in papers

Please don't:

- irritating transition animations
- unreadable color schemes, e.g., yellow font on blue background
- text, formula, or source code (overload)