Writing Research Papers

Taking care of your writing -- why bother?

- Reason for writing is conveying to research community- so be clear! Coherent writing may help readers understand your work better.
- Improve chances of your paper being accepted at conferences/journals
- May help in explaining your work without technical jargon
- Help clarify your thought process and improve your teaching
- Good writing is crucial for long-term impact

Process of Writing

- High level approaches- top down approach vs bottom up approach*.
- Top Down Approach- start from a big picture perspective, outline high level structure, then fill in details.
- Bottom Up Approach- write details first, then connect together

QE/S: What is your writing process? (maybe omit for time?)

*from Margaret Betke's slides

High Level Principles

- Identify the ‘key message’ of the paper and center it.
- Emphasize intuition heavily.
- Be aware of different groups of readers
  - Newbies (PhD students/undergrads/adjacent fields) vs people in your area, people skimming vs reading in detail, people trying to use/reproduce results, reviewers
- State your findings clearly
  - Try to separate the objective* content of your findings from your interpretation or discussion of them.
- Be aware of and connect to existing work
- Be generous with credit
- Be honest!

QS: Any more principles? What are some things that have frustrated you in papers you have read?

* There’s no such thing as truly objective content. But some statements are more objective than others.

Tips to implement High Level Principles

- Key Message
  - Simplify results; emphasize special cases.
  - Give examples of abstract concepts and definitions (*will add in an example of this* :))
  - If proving complicated theorems, give intuitive proof sketches (explain what you'd *like* to have proved)

- Accessibility/Different Reader Groups
  - Write introductions and related work sections assuming readers have never heard of problem.
  - Use arXiv! Conference version may also not be directly suitable for arXiv.
  - Give talks and put videos on webpage; write informal blogs/put on social media.
  - Use intuitive notation; add a notation section
  - Add important esoteric background knowledge to appendices
  - Try finding references for 'folklore' results.

Tips to implement High Level Principles Cont'd.

- Be generous/be aware of existing work
  - Mention results even if tangentially related
  - See work that related papers have cited
  - Keep in touch with people in adjacent subfields/related work from conferences outside subfield
  - Be aware of personal and field biases-
    racial, proximal, gendered, belief in field superiority etc.
  - Use acknowledgements
- Be honest
  - Don't misrepresent your results- be clear about limitations

QE: Who counts as a co-author to you?
QS: Do you have any other important tips?

Common Narrative Flow*

1. Problem
2. Why is it interesting?
3. What has been done on it before and what is left to do? (brief version)
4. Your contribution
5. Where it fits into related work—longer version
6. Details of your contribution
7. Limitations to your contribution
8. Ideas for future development

*loosely from Simon Jones' slides

General Paper Structure

1. Contents Page with hyperlinks (If long paper)
2. Abstract
3. Introduction
4. Related Work
5. Results Overview
6. Method/Techniques
7. (if theory, proof overview/sketch)
8. Results with detailed justification/proofs
9. Discussion of results
10. Conclusion and Future Work
11. References
12. Appendices (background, details of proofs/experiment details not in main body)

Some tips on specific sections

to be added

Good paper writing protocols

- Have the manuscript ready well in advance before the deadline
- Read the papers you are citing!
- Keep to length restrictions
- Use wide margins
- Do not use smaller font
- Provide with supporting evidence (experimental data/proof) in appendix
- Provide code and data when relevant (e.g. on github)
- Use spell checkers

QS: Any other tips ?

Visual Information and Proof sketches

- Provide self explanatory graphs and plots
- For main theorems, provide with proof sketches so readers get an intuition
- Provide figures explaining reductions between problems

QE: What figures do you find useful but not provided in papers ?

Feedback from colleagues

- Get opinions about your papers from experts and non-experts

- Explain carefully what you want from them - feedback on sections not understandable are more important than typos.

Feedback from reviewers

- Incorporate reviewer comments. Don’t get defensive!

QS: Good practice when writing rebuttals ?

How to improve writing

- Read a lot. Technical papers, poetry, novels, nonfiction, …
  - What do enjoy about the things you read?
- Ask your advisors for well written papers in your area
- Learn from your advisor’s edits of your paper
- Find a friend who edits well and get them to read/suggest
- Create a list of “to remember list” to improve your writing
- Keep in mind papers that you enjoyed reading and think about what caught your eye.

Writing takes time

- Don’t rush it
- Set aside time to write a bit every day
- Come back to a draft a few days later and read it with fresh eyes

Writing is an integral part of research

- As intellectual an activity as writing code or proving theorems

References

will add by Friday