Writing and Presenting Scientific Papers

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Why do you need to know it well?

Keep in your mind: Just know doing is not enough

- Writing and presenting (communicating) is an essential part of your life and career.
- My rule: Observe and learn from people who did it well, and avoid doing it as the people who did not do it well.
- People forget what you say, and they forget what you do. But they never forget what you make them feel.

Writing a scientific paper

Why write scientific papers?

- "Publish or Perish" should indeed be the rule for scientists. You don't publish, you're out.
- Essential part of master or PhD work.
- Quantity doesn't matter quality is what matters
- What determines the perceived quality of a paper?
  - Originality and importance of ideas
  - Effectiveness of communication
  - Advertising: presentations, communications at meetings, with visitors, email exchanges, citations…

Writing and submitting papers

- For a master's thesis, you should aim to have at least one "good" conference paper
- For a doctoral dissertation, you should aim for a couple of good conference papers and a journal paper
- Writing these papers is great practice for the thesis itself… (and you can reuse the material!)
- Where to submit?
  - Look at publication lists of people doing research related to yours, and see where they publish
  - Evaluate the "level" of your paper and choose the appropriate conferences or journals.

Adapted from Marie desJardins talk at ICML/SIGKDD 2003

Two main kinds of CS publications

- Journals
  - International: Google "computer science journal ranking"
  - Domestic: Generally lower quality
- Conferences
  - Conferences, symposiums, workshop, forums, congress
  - International: Google "computer science conference ranking"
  - Domestic: ICT, FAIR, etc.
- Measures: SCI, impact factor, citation
- In ICT, good conference papers are highly evaluated (different from mathematics, physics, chemistry, biology, …)

Computer science journal ranking

(Google "computer science journal ranking", AI journals)

- *Premium:* Artificial Intelligence, Artificial Intelligence Review, Computational Linguistics, IEEE Trans on PAMI, Robotics and Automation, Image Processing, Journal of AI Research, Neural Computation, Machine Learning, Intl Jnl of Computer Vision, etc.
- *Leading:* ACM Trans. on Asian Language Information Processing, AI Magazine, Annals of Mathematics and AI, Applied Artificial Intelligence, Applied Intelligence, Artificial Intelligence in Medicine, IEEE Trans on Neural Networks, Speech and Audio Proc, Systems, Man, & Cybernetics, Part A & B, Intl Jnl on Artificial Intelligence Tools, Machine Translation, Neural Networks, Pattern Recognition, etc.
- *Reputable:* Computer Processing of Chinese & Oriental Languages, Intl Jnl of Pattern Recognition & AI, Computers and Artificial Intelligence, IEEE Transactions on Fuzzy Systems, Journal of Intelligent and Fuzzy Systems, Knowledge Acquisition Jnl, Knowledge-Based Systems, Pattern Recognition Letters, Jnl. of Japanese Soc. of AI, Intelligent Data Analysis, etc.
- *Others*: Canadian Artificial Intelligence, Journal of Advanced Robotics, Journal of Artificial Intelligence in Education, Journal of Artificial Intelligence in Engineering, Automation, and Manufacturing, Journal of Computational Acoustics, Journal of Computational Neuroscience, Journal of Computational Vision, etc.
- *Easy:* WASET (World Academy of Science, Engineering and Technology) , WSEAS

Computer science conference ranking

(Google "computer science conference ranking", AI conferences)

- *Rank 1*: IJCAI: Intl Joint Conf on AI, AAAI: American Association for AI National Conference, ICML: Intl Conf on Machine Learning, UAI: Conference on Uncertainty in AI, UM: Intl Conf on User Modeling, NIPS: Neural Information Processing Systems, AGENTS: International Conference on Autonomous Agents [SIGKDD: ACM Knowledge Discovery and Data Mining, ICDM: IEEE International Conference on Data Mining], etc.
- *Rank 2*: ECAI: European Conf on AI, ECML: European Conf on Machine Learning, GECCO: Genetic and Evolutionary Computation Conference, GP: Genetic Programming Conference, IAAI: Innovative Applications of AI, ICIP: Intl Conf on Image Processing, ICPR: Intl Conf on Pattern Recognition, ICTAI: IEEE conference on Tools with AI, etc. [COLING: Intl Conf on Computational Liguistics, PAKDD: Pacific-Asia Conf on Know. Discovery & Data Mining, PKDD: European Conf Knowledge Discovery in Databases], etc.
- *Rank 3*: PRICAI: Pacific Rim Intl Conf on AI, AusAI: Australian Joint Conf on AI, etc.
- *Unranked Conferences*: AAMAS: Intl Joint Conf on Autonomous Agents and Multiagent Systems, NFOVIS: IEEE Symp. on Information Visualization, VIS: IEEE Visualization, etc.
- *Not Encouraged (due to dubious referee process):* Intl Multiconferences in Computer Science -- 14 joint int'l confs., SCI: World Multi confs on systemics, sybernetics and informatics , SSGRR: International conf on Advances in Infrastructure for e-B, e-Edu and e-Science and e-Medicine , IASTED conferences, CCCT: International Conference on Computer, Communication and Control Technologies.

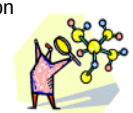
Typical parts of an IT paper


literature


method


implementation


figure & table


Evaluation

Sections in a paper	Recommended writing order
1. Title and abstract	1. References
2. Introduction	2. Introduction
3. Method	3. Method
4. Evaluation	4. Evaluation
5. Conclusion	5. Conclusion
6. References	6. Title and abstract

Others: Preliminaries, Related work, Discussion, Acknowledgements, Appendix, etc.

References

- Do it first. Without a good references you cannot write a good introduction.
- Poor references usually due to your careless or you don't understand how important it is.
- References are the first that shows how you know about the research context, your writing experience, … so take care of it from the starting days.
- Have recent references if possible.
- Provide enough information to the readers so that they can find the original work for themselves.

References

- Write with referencing style of journal or conference.
- Two kind of references: name-year system and citation-sequence system
- Common mistakes: format, format, format!
- Do not list anything that is not refereed to.
- Should list peer-reviewed journal articles, abstracts, books and should not list non-peer-reviewed works, textbooks, personal communications.
- Do not cite too many "home-made" references

Typical format of references

- Books: Names, Date, *Book Title*, Publisher, City, #pages
- In-Book Chapters: Names, Date, Chapter Title, in Authors or Editors, *Book Title,* Publisher, City, pp. nn-mm.
- Journal Articles: Name, Date, Article Title, *Journal Title,* Volume number, Issue number, pp. nn-mm
- Conference Papers: Name, Date, Paper Title, in *Proceedings of the Conference (full-name), acronym (e.g. PRICAI-08), City,* pp. nn-mm.
- Technical Reports: Name, Date, *Report Title,* Organization, Technical Report Number, n. pages.
- Internet Sources: Name, Date, Title, *Organization and Report Title,* URL (date)

From Duong Nguyen Vu tutorial at RIVF'08

Introduction: what to write?

- Brief description of the problem (scientific hypothesis). It should be clear and attractive, and will be the first point getting the readers' interest.
- Analysis of research context: what people have done before and their limitations (related work), and why you conduct the research (motivation).
- Your target on working with this problem in connection to related work.
- Key idea of your method, the main results and major contribution ("The contribution of our work is …".
- Briefly about the paper organization

Introduction: the five-point structure

1. *What is the problem?*
2. *Why is it interesting and important?*
3. *Why is it hard?* (e.g., why do naive approaches fail?)
4. *Why hasn't it been solved before?* (or, what's wrong with previous proposed solutions? How does ours differ?)
5. *What are the key components of our approach and results?* Also include any specific limitations.

A final paragraph or subsection: "Summary of Contributions". It should list the major contributions in bullet form, mentioning in which sections they can be found.

Introduction

- A very important part. Many reviewers have an idea on rejection of the paper right after reading the introduction.
- Do it early, revisit often; use it to think about what your paper is about, to test the literature.
- Show the state of art and most recent results
- Common mistakes:
  - Too much or not enough information
  - Unclear purpose and shallow analysis of related work
  - Unclear contribution

Method

- **Critical rule of thumb:** A clear new important technical contribution should have been articulated by the time the reader finishes introduction.
- The main requirement is you should provide instruction on exactly how to realize the method or repeat experiment.
  - System configuration, environment, etc.
  - Definitions of all notation for variables, symbols, etc.
  - Mathematical formulations, theorems and proofs
  - Main ideas to solve the problem
  - Descriptions of the approach or algorithm
  - Unique features of the method

Method

- Figures, Charts, Tables, Diagrams, etc. can be extremely helpful to communicate ideas, observations, or data to others.
- Many scientists outline their method by deciding on what figures, graphs and tables they need in order to convey their story, and then fill the text around these figures.
- If a figure is reproduced or copied or adapted from another source, that source must be properly acknowledged in the caption, and listed among other references.

Method

- Write this as soon as you think that your methods are mature, the writing process will make you check whether they really are.
- It is better to write in the top-down manner
- Try to find simple example to illustrate the idea of your method though often you'll be working with a complicated model or using a messy data set.
- Common mistakes:
  - Too little information
  - Verbosity but not clear how your work differs from others

Evaluation

- Theoretical evaluation
  - Performance analysis
  - Properties, complexity, etc.
- Experimental comparative evaluation
  - State clearly the target of experiments
  - Experiment design: should be fair
  - Draw conclusions from experiment results

Experimental evaluation

- What should performance experiments measure?
  - Pure running time
  - Sensitivity to important parameters
  - Scalability in various aspects: data size, problem complexity, …
  - Others?
- What should performance experiments show? Absolute performance (i.e., it's acceptable/usable)
  - Relative performance to naive approaches
  - Relative performance to previous approaches
  - Relative performance among different proposed approaches
  - Others?

Evaluation and discussion

- Interpret results
  - Did the study confirm/deny the hypothesis?
  - If not, did the results provide an alternative hypothesis? What interpretation can be made?
  - Do results agree with other research? Sources of error/anomalous data?
  - Implications of study for the field
  - Suggestions for improvement and future research?
- Relate to previous research
- Common mistakes: Experiments are unfairly done or cannot be repeated.

Conclusion

- Summary of what you did. Begin with “We have used …”, “We have investigated …”
- State your findings and contributions, elaborate them in a way that leads logically to your conclusions on how much you reached the research objective.
- Point out any exceptions to your general conclusions, discuss the assumptions you have made, and recognize any unresolved issues or cases.
- Final paragraph should have some forward-looking perspective.

Title and abstract

- … can wait to be written until rest of paper is mature
- Other scientists will first notice a paper in the table of contents of a journal, conference proceedings, and will be deciding on the basis of the title alone whether to look further at that paper.
- The title should be the fewest possible words that adequately describe the content of your paper. In other words, it should be descriptive, and the keyword here is adequate.

Title and abstract

- Abstract is of course the most important part of the paper, many readers will read just that.
- Abstract is to present your contribution to the research topic, not the summary of the paper.
- Focus on what is new, essential ideas, essential numbers. Everything that you would like the casual reader to remember should be there.
- Common mistakes: summary of the paper, too much background and method description, referring to other literature, figures, using abbreviations, etc.

Writing papers: Tactics

- Top-down design (outline) is very helpful
- Bulleted lists can help you get past writer's block
  - Unless you're a really talented/experienced writer, you should use these tools *before* you start writing prose
- Neatness counts! Check spelling, grammar, consistency of fonts and notation *before* showing it to anyone for review
  - If they're concentrating on your typos, they might miss what's interesting about the content
- Leave time for reviews!
  - Fellow students, collaborators, advisors, …

Pages 23-24 from Marie desJardins talk at ICML/SIGKDD 2003

Authorship

- Who should be an author?
  - Anyone who contributed significantly to the conceptual development or writing of the paper
  - Not *necessarily* people who provided feedback, implemented code, or ran experiments
- What order should the authors be listed in?
  - If some authors contributed more of the conceptual development and/or did most/all of the writing, they should be listed first
  - If the contribution was equal or the authors worked as a team, the authors should be listed in alphabetical order
  - Sometimes the note "The authors are listed in alphabetical order" is explicitly included

English barrier and tools to be used

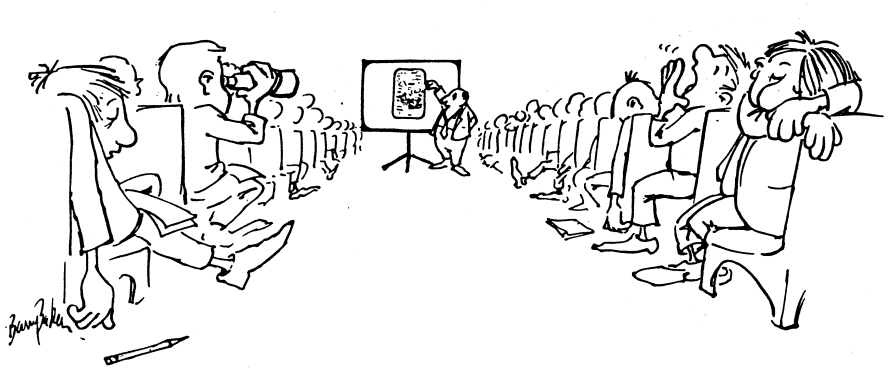
- Simple and clear sentences
- Refinement and iterative writing process
- Avoiding plagiarism
- Top-down style
- Carefully check typos
- Latex?
- MS words?

How papers are reviewed?

- First, I read the **title**: is it in my area?
- Next, I read the **abstract**: is it interesting?
- Next, I skim the **introduction** and form my opinion about the paper
- Next, I read the **rest of the paper** looking for evidence to support my view
- By the time I get to Section 2, I already have a very strong opinion about whether to accept or reject.
- Your job is to give me the evidence I need in the title and abstract to select your paper for review, and in the introduction to result in the right opinion!

From Marie desJardins talk at ICML/SIGKDD 2003

Giving a talk



. . . and this diagram clearly explains the principle underlying this very important concept.
Next slide please . . .

Giving talks

- Do your best to prepare good slides to talk to your audience
- Communicate well to convey what you want to bring to your audience

Giving talks

- Knowing well to whom you give the talk and design an appropriate talk
  - No need of providing background if you talk to people who work in the same field, but it is needed for other people (if not you will loose audience)
  - In all cases, the most important is to emphasize what you've done and why they should care
- Knowing well what you are giving them in your talk
  - Make your talk as a story. Slides should be linked together to serve for the purpose
  - Think what they will have after hearing your talk

Giving talks

- Knowing well your time to give the talk
  - How long? QA included in it?
  - It is good if each slides can be talked in 2-3 minutes
  - Distribute your times to each slide. Avoiding the situation when you are asked to stop and thus you skip the remained slides.
  - You will never have enough time to talk everything you know about your work thus don't worry to skip certain content.
  - Practice the talk with time control.

Design slides for the talk

- Top-down approach: how many parts? Each part has how many slides? Each slides talks about what (name of the slides)? The main content in each slide? etc. → All slides together allow you to achieve your presentation target?
- If OK → add the content of each slide.
- Importance is all slide should be linked to make a whole story.
- Using "design templates".

Preparing slides

- Don't just read your slides!
- Use the minimum amount of text necessary
- Use examples
- Use a readable, simple, yet elegant format
- Use color to emphasize important points, but avoid the excessive use of color
- "Hiding" bullets like this is annoying (but sometimes effective), but…

  Abuse of animation is a cardinal sin!
- Don't fidget, and…
- Don't just read your slides!

Power point basics: Color

Dark letters against a light background work.

Light letters against a dark background also work.

Many experts feel that a dark blue or black background works best for talks in a large room.

Dark letters against a light background are best for smaller rooms and for teaching.

Power Point basics: Color

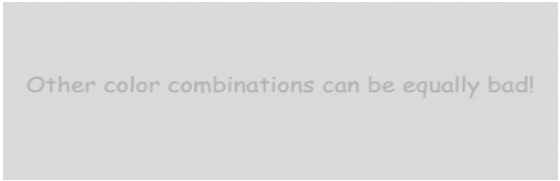
Avoid red-green combinations because a significant fraction of the human population is red-green colorblind.

Lots of people can't read this –
and even if they could, it makes the eyes hurt.

Power Point basics: Color

Other color combinations can be equally bad!

View your slides in grayscale to ensure that there is adequate color contrast in each slide.



Practice

- Pronunciation: Check the words that you are not sure how to read
- Write down as notes the sentences that you want to use in the talk, especially sentences to link slides
- Practice with time available
- Practice with video, audio or with friends
- Check by software of speech synthesis, e.g., http://www.research.att.com/~ttsweb/tts/demo.php
- C:¥Documents and Settings¥Ho Tu Bao¥デスクトップ¥14ca9a64a97643f90b2dbe057a911b22.wav
- etc.

Some hints

- Keep you feel comfortable, self-confident, no nervous
- Try to be elegant (?)
- Talk for audience not for you
- Answering the questions (example of the Chinese student at ECML-07). Some tricks:
  - Repeat the questions
  - Think before answering, at least one second!
  - Short answer
  - Do not abuse … “very good question”

References

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