

Communication in Computer Science

Planning your paper

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A simple test

Pick a random book (in a bookstore or library).

Which has the biggest font:

- The title?
- The name of the author?
- The name of the collection / series?

What does that say about this book?

Why does anyone publish?

- For the message (i.e., to inform others).
- For the messenger(s).
- For both.

Why do you need to write?

The punchline of your PhD studies
is your PhD dissertation.

Why do you need to publish?

You need to demonstrate

- that **your message** is at research level
(to get your PhD degree), and
- that **you** are at PhD level
(to get a position after your PhD studies).

Your papers and your dissertation

Nowadays, a dissertation is often in two parts:

1. A general introduction and overview.
2. A concatenation of your papers.

(The so-called “bottom-up” approach.)

A top-down dissertation?

The “top-down” approach:

1. write your dissertation first;
2. publish papers later.

A top-down dissertation?

The “top-down” approach:

1. write your dissertation first;
2. publish papers later.

This approach has fallen out of favor:

it is economically not viable

- for you, and
- for your PhD advisor.

Challenges in bottom-up dissertations

In increasing order of difficulty:

- structuring Part 2 and adding introductions;
- factoring all the bibrefs into one at the end;
- adding a general conclusion; and
- adopting a uniform notation throughout.

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- adopting a uniform notation throughout.

Temptation: writing your next paper instead.

All your papers?

Question:

Should your dissertation contain all your papers?

All your papers?

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Should your dissertation contain all your papers?

Answer:

Only if that is needed to make its point.

So what is a paper? (1/2)

The prime medium for reporting scientific results.

So what is a paper? (2/2)

In computer science: the conjunction of

- something **conceptual** (and preferably **new**),
- something **sound**, and
- something **practical**

that is **relevant today** (read: IT Technology).

The variety of papers

- Unpublished draft.
- White paper.
- Tech report.
- Workshop paper.
- Conference/symposium paper.
- Journal paper.
- Also: submitted / revised / final / extended.

The draft

Definition: the first shape assumed by a paper.

Use: for the author and
for his immediate collaborators.

Quality control: the author(s).

The white paper

Definition: a complete draft on one's web page
or a research proposal.

Use: advertising.

Quality control: the author(s).

The tech report

Definition: a draft readable by others.

Use: either as a time stamp
(new draft with a new result),
or for the record
(old draft with lots of detail).

Quality control: maybe a few colleagues & students.

The workshop paper

Definition: a record to document a talk.

Use: communication among specialists.

Quality control: the program committee (if any).

The conference/symposium paper

Definition: a record documenting a talk.

Use: communication in a larger community.

Quality control: the program committee.

The journal paper

Definition: the author's final word
on a particular topic.

Use: archival purposes.

Quality control: the journal reviewers.

The tech report (revisited)

Definition: extended version of a conference /
journal paper.

Use: typically includes all the proofs
(no copyright restrictions here).

Quality control: the reviewers.

The draft (revisited)

Definition: an unpublished paper.

Use: like wine, a draft may improve with age.

Quality control: unspecified.

Reading a paper

- Information acquisition and retrieval.
- Critical reading.

Information acquisition in principle

A scientific paper provides enough information for its reader to reproduce its contents:

- proof,
- experiment.

Information acquisition in practice

What do you expect from

- a survey paper?
- a paper about engineering?
- a paper about human-computer interaction?

Trust in the paper

Directly proportional to

- its advanced state: journal versions are more trustworthy than conference versions;
- its forum.

Information retrieval

It is a good idea to keep reading notes
(minimally as annotations in one's bibfile).

NB. It is a bad sign never to re-read anything.

Critical reading

The five stages of reading (as one grows up):

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1. the books say blah

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(Stage 1: the trusting undergraduate student.)

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah

Critical reading

The five stages of reading (as one grows up):

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2. this book says blah but not that other book;

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(Stage 2: the alert MSc student.)

Critical reading

The five stages of reading (as one grows up):

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2. this book says blah but not that other book;
3. the authors of this book wrote blah;

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;

(Stage 3: the junior PhD student.)

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;
4. this author asserts blah

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;
4. this author asserts blah but I don't buy it;

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;
4. this author asserts blah but I don't buy it;

(Stage 4: the senior PhD student.)

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;
4. this author asserts blah but I don't buy it;
5. this author asserts blah

Critical reading

The five stages of reading (as one grows up):

1. the books say blah and thus blah is true;
2. this book says blah but not that other book;
3. the authors of this book wrote blah;
4. this author asserts blah but I don't buy it;
5. this author asserts blah, unconvincingly.

Critical reading

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(Stage 5: the peer reviewer.)

Examples

1. “Introduction to Data Bases”
2. “Advances in Data Bases”
3. “A New Technique for Query Processing in Object-oriented Data Bases”

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Examples

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2. “Advances in Data Bases” [proceedings](#)
3. “A New Technique for Query Processing
in Object-oriented Data Bases” [paper](#)
4. “Data Bases for Big Data” [white paper](#)

Examples (continued)

5. “Quantum Data Bases – You Never Know”

invited paper

6. “Disentanglement in Quantum Data Bases”

paper

7. “Quantum Data Bases”

PhD thesis

8. “Principles of Quantum Data Bases”

workshop

Back on track

Here: paper, not book.

But one's critical sense should still apply.

On reading critically

Don't swallow the author's propaganda,
accepting the paper as the author shaped it:

- disassemble it to identify its real thrust;
- appreciate;
- probe / question / stress;
- (if needed) reassemble: minimize / expand.

A concrete example

AT&T's "1-800-OPERATOR"

VS.

MCI's "1-800-OPERATER"

Scientific reading (ended)

A paper should provide enough information for its reader to reproduce its contents:

- proof,
- experiment.

But does it?

What if

- What if you don't understand something?
- What if you think you found a bug?

Recommendation:

1. Consult people locally.
2. Send a very polite e-mail to the author (keeping in mind that you may well be wrong yourself), proof-read by your PhD advisor.

Prudence: You don't just represent yourself.

You represent **your advisor** and **your institution**.

Writing a paper

A paper is written for others to read:

- other researchers,
- reviewers,
- yourself in the future, and
- people you don't know yet.

It should thus be readable, clear, etc.

Canonical structure of a paper

- Title / list of authors / abstract
- Introduction / compelling example / related work / overview
- Development
- Conclusion (if any)
- Acknowledgments / references

The title

See slides on

“structure and interpretation of scientific titles”

The list of authors

See slides on

“the message and the messengers”

The abstract

- It should be brief.
- It should be as informative as possible.
- It should be updated last
(to account for the contents of the paper).

The abstract (continued)

Fact:

Many more people will read your abstract
than your paper
(e.g., in a bibliographic data base).

Abstracts, data bases, and search engines

Abstracts: a key to locate papers on the web.

They should stand alone, so: no bibrefs.

They are stored textually, so: no formulae
and no special symbols. (Ditto for titles.)

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and no special symbols. (Ditto for titles.)

(But but but: complexity? big-O notation?)

A reminder

An abstract is not an ad:
there is no need to repeat
the name of your product.

A concrete example

Pervasive 2005

www.pervasive.ifi.lmu.de/program.html

Session 2: Activity and Context

The session (1/4)

Bathroom Activity Monitoring Based on Sound

Jianfeng Chen, Alvin Harvey Kam,
Jianmin Zhang, Ning Liu, Louis Shue

Institute for Infocomm Research, Singapore

Huh?

Bathroom?

Huh?

Bathroom?

Bathroom **activity**?!?

Huh?

Bathroom?

Bathroom activity?!?

Bathroom activity **monitoring**?!?!?

Huh?

Bathroom?

Bathroom activity?!?

Bathroom activity monitoring?!?!?

What about our privacy?!?!?!!!!

What is going on?

Let's look at the other talks in the session.

The session (2/4)

Simultaneous Tracking and Activity Recognition (STAR) Using Many Anonymous Binary Sensors

Daniel Wilson
Carnegie Mellon University, USA

The session (3/4)

Enhancing Semantic Spaces with Event-driven Context Interpretation

Joo Geok Tan, Daqing Zhang,
Xiaohang Wang, Heng Seng Cheng

NUS, Singapore

The session (4/4)

The Java Context Awareness Framework (JCAF)

A Service Infrastructure
and Programming Framework
for Context-Aware Applications

Jakob Bardram
University of Aarhus, Denmark

What is going on at Pervasive 2005?

The 3 last titles look believable, but the first?

“Bathroom activity monitoring based on sound”

What is going on at Pervasive 2005?

The 3 last titles look believable, but the first?

“Bathroom activity monitoring based on sound”

Let's look at its abstract.

The abstract, minus the last sentence

In this paper an automated bathroom activity monitoring system based on acoustics is described.

The abstract, minus the last sentence

In this paper an automated bathroom activity monitoring system based on acoustics is described. The system is designed to recognize and classify major activities occurring within a bathroom based on sound.

The abstract, minus the last sentence

In this paper an automated bathroom activity monitoring system based on acoustics is described. The system is designed to recognize and classify major activities occurring within a bathroom based on sound. Carefully designed HMM parameters using MFCC features are used for accurate and robust bathroom sound event classification.

Abstract, minus last sentence (contd)

Experiments to validate the utility of the system were performed firstly in a constrained setting as a proof-of-concept and later in an actual trial involving real people using their bathroom in the normal course of their daily lives.

Abstract, minus last sentence (contd)

Experiments to validate the utility of the system were performed firstly in a constrained setting as a proof-of-concept and later in an actual trial involving real people using their bathroom in the normal course of their daily lives. Preliminary results are encouraging with the accuracy rate for most sound categories being above 84 percent.

Surreal, isn't it?

Surreal, isn't it?

But let's look at the last sentence...

The last sentence of the abstract

We sincerely believe that the system contributes towards increased understanding of personal hygiene behavioral problems that significantly affect both informal care-giving and clinical care of dementia patients.

The last sentence of the abstract

We sincerely believe that the system contributes towards increased understanding of personal hygiene behavioral problems that significantly affect both informal care-giving and clinical care of **dementia patients**.

This last sentence changes everything!

The reality

- A sub-optimally phrased title, and
- a sub-optimally written abstract.

Yet a courageous publication
and a potentially important work,
technically, humanly, and also economically.

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- A sub-optimally phrased title, and
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Yet a courageous publication
and a potentially important work,
technically, humanly, and also economically.

It is difficult to write a paper.

The story behind the paper

Courtesy of Jakob Bardram.

Exercise 1: another abstract

Overall, the abstract is misleading.

Write another abstract.

Hint: list its key points first.

In this paper an automated bathroom activity monitoring system based on acoustics is described. The system is designed to recognize and classify major activities occurring within a bathroom based on sound. Carefully designed HMM parameters using MFCC features are used for accurate and robust bathroom sound event classification. Experiments to validate the utility of the system were performed firstly in a constrained setting as a proof-of-concept and later in an actual trial involving real people using their bathroom in the normal course of their daily lives. Preliminary results are encouraging with the accuracy rate for most sound categories being above 84 percent. We sincerely believe that the system contributes towards increased understanding of personal hygiene behavioral problems that significantly affect both informal care-giving and clinical care of dementia patients.

Exercise 2: another title

Overall, the title

“Bathroom activity monitoring based on sound”
is misleading.

Propose an alternative title.

Hint: build on your new abstract.

(and see the set of slides about titles)

Organization of a paper

- Title / list of authors / abstract ✓
- Introduction / compelling example / related work / overview
- Development
- Conclusion (if any)
- Acknowledgments / references

Your introduction should

- start with a bang;
- stop with an overview of what follows;
- mention your prerequisites and notations;
- and
- clearly state the achievement of your paper.

A compelling example is always good, especially in a submission.

Starting with a bang

- “It was a dark and stormy night.”
- “The house had a slight German accent.”
- “He awoke—and wanted Mars.”
- “Whatever your gravity is when you get to the door, remember—the enemy’s gate is *down*.”
- “Mr. and Mrs. Dursley, of number four, Privet Drive, were proud to say that they were perfectly normal, thank you very much.”

Non-starters

- “The Ethernet nowadays permeates each and every single aspect of our daily lives today, to say nothing of tomorrow.”
- “Let β be an homeotonic dispersion isofactor in an α -stable wireless stochastic wifi network, without loss of tomographic generality.”
- “There is a general consensus that it has become cosmically important to be provided more privacy in our day-to-day social networks.”

Opening sentences of dissertations and more

Absolute **must read**:

Olin Shivers's dissertation advice

www.ccs.neu.edu/home/shivers/diss-advice.html

Eye catchers

- First words.
- Last words
(of paragraph / section / chapter / thesis).
- Capitalization (in an abstract).

Pitfalls

- Exaggerating.
- Seeking effect for seeking effect:
“This paper bridges a much needed gap.”
(quoted by Neil Jones)
- Practicing Cooper’s prose (cf. Mark Twain).
- Misspelling (always use a spell checker!).

Standing on the shoulders of giants
vs.
standing on each other's feet

Disparaging earlier work invites the reader
to disparage your own work.

Standing on the shoulders of giants

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to disparage your own work.

Better: think positive!

Think positive

For example:

- The goal is blah,
and it would be great to reach it.
- What has been done so far is remarkable,
but it does not quite reach the goal.
- In this paper, we take one step further
towards the goal.

Related work

- Mandatory.
- Situates the novelty and significance of your work.
- Where: either part of introduction, or part of conclusion, or stand-alone section (second or second-to-last).

What to do? What to write?

Main pitfall: misrepresenting or forgetting someone else's work.

- Your related work is **not a matter of citing**.
It is **a matter of comparing**.
- Keep yourself up to date.

See slides on “related work.”

Organization of a paper

- Title / list of authors / abstract ✓
- Introduction / compelling example / related work / overview ✓
- Development
- Conclusion (if any)
- Acknowledgments / references

Development

- Organized in sections.
- Should be progressive.
- Should be as complete as possible.
- Should be as concise and precise as possible.

Bibliographical references

Bibrefs should be used parenthetically, so that they do not interrupt one's reading.

Example: "...as seen in [2]." is awful,
and so is "[KAZAM97] shows that..."

Better: "...as introduced by Church
in his monograph on the λ -calculus [2]."

Organization of a paper

- Title / list of authors / abstract ✓
- Introduction / compelling example / related work / overview ✓
- Development ✓
- Conclusion (if any)
- Acknowledgments / references

The conclusion

None in the mathematical tradition.

Minimally:

- recapitulates the problem
and the contribution;
- assesses the significance of the contribution;
- suggests / outlines future work.

The pitfalls of one's future work

- Often presumptuous:

“Writing a “future work” section of a paper is like a dog pissing on the trees at the boundary of its territory.”

(John McCarthy, 1991)

- Often reveals the limits of the authors' understanding.

The acknowledgments

- Minimally, you should thank your anonymous reviewers.
- Rota's 8th lesson: your proofreaders will appreciate being mentioned.

See slides on “acknowledgments.”

The references

They must be impeccable:

- accurate (correct year, etc.),
- complete (page numbers, etc.), and
- consistent.

Standard pitfall: misspellings.

Back references

`\usepackage [backref=page] {hyperref}`

is your friend:

- Direct navigation from reference in the text to bibliographic reference **and back**.
- Frequency of each bibliographic reference.

Organization of a paper

- Title / list of authors / abstract ✓
- Introduction / compelling example / related work / overview ✓
- Development ✓
- Conclusion (if any) ✓
- Acknowledgments / references ✓

That was the form.
Now for the content.

Tips for writing a research paper

In general, the contents should come first.
(But often, spelling things out in the paper tends to clarify its contents.)

Approaches:

- Top-down: goal and significance first.
- Bottom-up: results first.

A rule of thumb:
put in your paper what you (would) like to find
in other's papers.

As time goes by

It sounds silly, but...

- remember to date your manuscripts, and
- remember to update your bibrefs
("This paper is superseded by ...").

Proofreading a paper

Form vs. content.

- Form: * what the reader sees
(or doesn't, cf. "The Da Vinci Code");
* translated work.
- Content: what the writer sees.

A subjective perception of our writing style

- We tend to like our writing style.
(Example: Harry Mairson's uncle.)
- We are blind to our flaws.

Proofreading each other

- What: an investment.
- How: with consideration.
- Be prepared to be misunderstood.

see slides on “the critical critique”

Learning by counter-example

See “How to have Your Abstract rejected”
by Mary-Claire van Leunen and Richard Lipton.

Conferences

Watch out for the theme of the conference.

Watch out for the program committee.

Watch out for what needs to be submitted:

- an extended abstract;
- a full version.

Classification (Parberry)

- Breakthrough.
- Ground breaking.
- Progress.
- Tinkering.
- Debugging.
- Survey.

Help the reviewer to make up his mind.

Methodological pitfall

Avoid core dumps:

- the paper should be focused on what it achieves;
- tangents should be eliminated.

Motivational pitfalls

Ambitious: “Let’s write a paper for LICS.”

Opportunistic: “I’ve got to beef up my CV.”

Jealous: “I want more papers than X.”

Competitive: “I want to show that X’s papers
are insignificant.”

Meteorological (esp. in Denmark): “Hmmm...
Hawaii...”

Beyond publishing

Hirsch's index.