

How to Write and Publish Research Papers for the Premier Forums in Knowledge & Data Engineering

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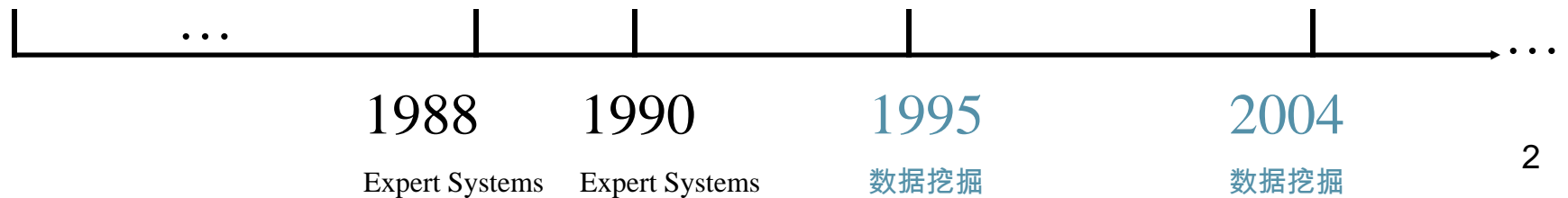
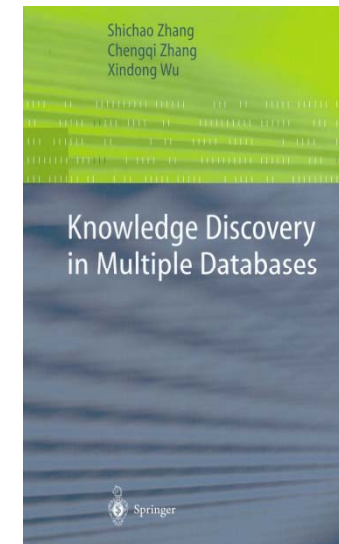
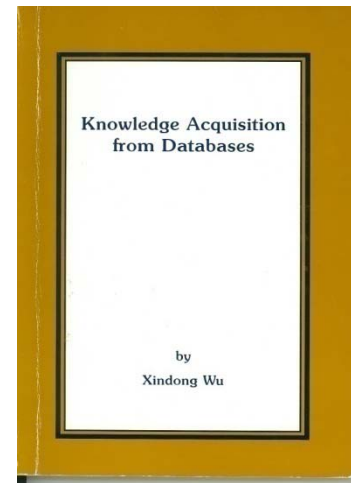
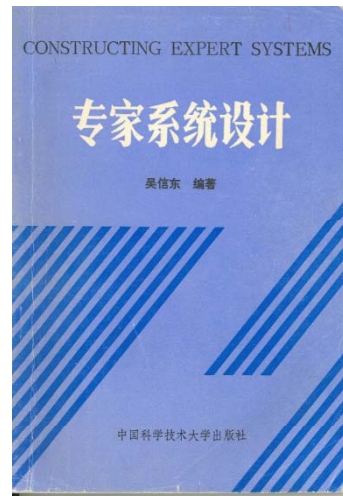
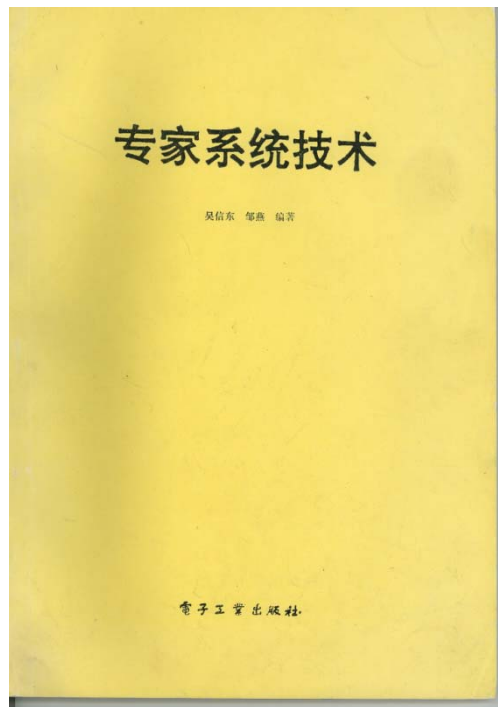
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Deduction → Induction: My Research Background



Contents

- Some TKDE and ICDM statistics
- Scientific writing and paper structure
- What to know and how to write a top-quality paper
 - A promising topic
 - A convincing case
 - In-depth analysis of empirical results
 - The most important part: the introduction
- How to publish at ICDM and TKDE
- Paper reviewing and its feedback
- Summary of take-home messages

Focused Areas in Knowledge & Data Engineering

IEEE TRANSACTIONS ON
**KNOWLEDGE AND
DATA ENGINEERING**

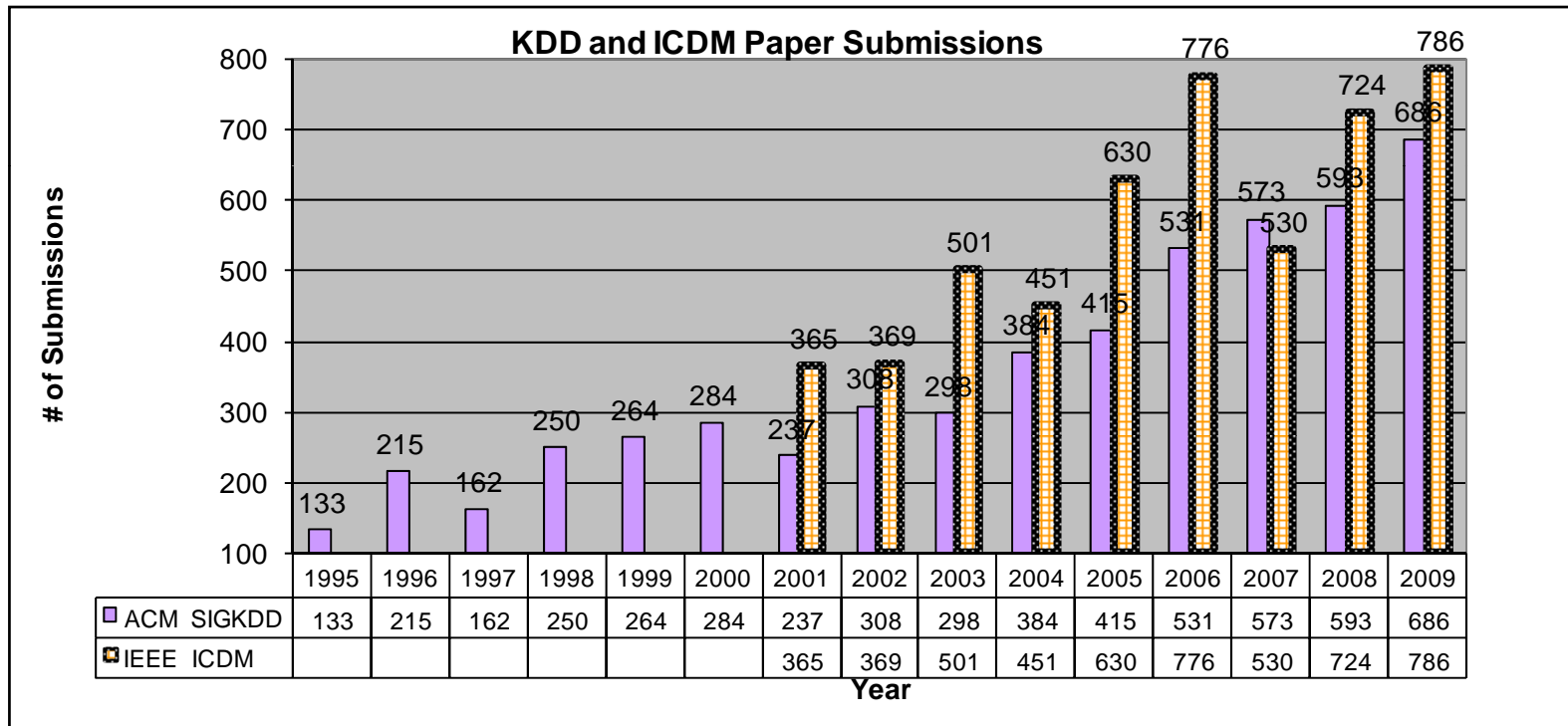
- Data Mining
 - Knowledge Discovery in Databases (KDD)
 - Intelligent Data Analysis
- Database Systems
 - Data Management
 - Data Engineering
- Knowledge Engineering
 - Semantic Web
 - Knowledge-Based Systems
 - Soft Computing

Major Forums in Data Mining



- **Conferences (conference publications are extremely important in Computer Science):**
 - **The birth of data mining/KDD: 1989 IJCAI Workshop on Knowledge Discovery in Databases**
 - 1991-1994 Workshops on Knowledge Discovery in Databases
 - 1995 – date: **ACM International Conferences on Knowledge Discovery in Databases and Data Mining (KDD)**
 - 2001 – date: **IEEE International Conference on Data Mining (ICDM)** and **SIAM-DM (SDM)**
 - Several regional conferences, incl. **PAKDD (since 1997)** & **PKDD (since 1997)**
- **Journals (top journals vs high-impact journals):**
 - **Data Mining and Knowledge Discovery (DMKD, since 1997)**
 - **Knowledge and Information Systems (KAIS, since 1999, Impact Factor: 1.733)**
 - **IEEE Transactions on Knowledge and Data Engineering (TKDE, Impact Factor: 2.236)**
 - **ACM Trans. on Knowledge Discovery from Data (TKDD, since 2007, not SCI indexed)**
 - **Many others, incl. TPAMI, ML, IDA, ...**

ACM KDD vs. IEEE ICDM



TKDE Submission Numbers and Acceptance Rates

2001	294	25.50%
2002	233	24.00%
2003	355	26.40%
2004	347	21.00%
2005	480	30.00%
2006	588	23.00%
2007	625	22.00%
2008	680	being acpt'd, 0.06% @ 1/23/09
Year	New Submission #	(Current) Accpt Rate

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Why Write a Scientific Paper

- Advance knowledge in your research field with evidence
- Explain your ideas and make them accessible to others
- Two key components in a research paper:
 - An explicit claim on your contribution on a research problem
 - Evidence to support your claim
- Your contribution can possibly be a refutation of a hypothesis on the research problem
- [Take-Home Message #1] **It is NOT enough to design yet another technique or system without convincing evaluation.**

What to Claim for a Scientific Paper

- Your technique solves a problem for the first time
- Your technique performs better, in one or more of the following dimensions [[Alan Bundy, How-To Guides, homepages.inf.ed.ac.uk/bundy/howtos/writingGuide.html](http://homepages.inf.ed.ac.uk/bundy/howtos/writingGuide.html)], than its rivals:
 - Behaviour: X has a higher success rate than Y or produces better quality outputs, e.g. shorter, easier to understand, more similar to human outputs, etc.
 - Coverage: X is applicable to a wider range of examples than Y
 - Efficiency: X is faster or uses less space than Y
 - Useability: Users find X easier to use than its rivals
- [Take-Home Message #2] **You should avoid claiming too many dimensions, but one or two with in-depth evidence.**

Typical Structure of a Research Paper (1)

- Title: Catchy and indicative of your research contribution
 - ICDM Data Mining on ICDM Paper Submissions: The shorter a paper title, the better its acceptance chance (less possibility for being incremental work)
- Abstract: A summary of the research problem, your claim, and the evidence
- Introduction: **Motivation**, a re-statement of the abstract information, **significance**, an outline of the rest of the paper
- Related work:
 - a. **A critical review** on the rival approaches that supports the motivation
 - b. How to differentiate existing work with your own **creative contributions**.

Research Paper Structure (2)

- Problem statement and algorithm design:
 - Explain your ideas in detail, with examples
 - Highlight your contributions
 - Do **NOT** simply put your algorithms in pseudo code!
- Evaluation: Evidence to support the claim of your research contribution
 - Unless you can provide proofs for a theoretical paper on theorems, experimental results are always expected
- Conclusion: A summary of the research contribution, a discussion on its significance, and a mention of future work
- References: List and **cite** related work.

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What to Know Before You Write

- Assess the audience: To whom are you writing? Why will they be reading your writing?
- Assess the purpose: What should the reader take away?
- Read other people's writing from the forums that you are targeting
 - Language skills and the writing style are always important
 - A paper published in one top journal can easily get rejected by another top journal – community difference or cultural difference
- [Take-Home Message #3] **Know your enemy: Check who are on the program committee or editorial board, and cite their relevant work with due credit**
- Follow the rules – length limits, formatting standards etc.

How to Write a Top-Quality Paper

- [Take-Home Message #4] **Choose a promising topic**
 - 10 Challenging Problems in Data Mining Research (presented by Qiang Yang & Xindong Wu at ICDM '05)
<http://www.cs.uvm.edu/~icdm/>
 - ❖ A topic of your interest
 - ❖ Your background for the topic
 - ❖ Advice from your advisor and senior researchers
- Present a convincing case
- Provide in-depth analysis of empirical results
- Spend more time on the introduction.

How to Present a Convincing Case

- What exactly is the problem being solved?
- How are your ideas **significant** (to justify a paper)?
 - Some ideas are so simple that have been used many times w/o being published
- Is all related work referenced and reviewed?
- Are the comparative studies with previous work convincing?
- Has your system been implemented and used, and if so what did it demonstrate from the real world (for you and the reader to learn)?

In-Depth Analysis of Empirical Results

- Enough details for (a) your experiment settings (so that other researchers can verify and improve your results), and (b) your experimental objectives
- What were the alternatives considered at various points of your experiments? Why and how have you made the choices for your experiments?
- [Take-Home Message #5] **Are the experimental results consistent and conclusive?**
- Can you fine-tune some key parameters to get better or worse results? If so, use figures and tables to show their impacts on your system performances
- How do the experimental results correspond to the motivation of the paper?
- What have you found surprising and tried to avoid in these experiments? How generally applicable are these lessons?

The Most Important Part of Your Paper: the Introduction

- The 1/3 – 2/3 Rule from a reviewer's perspective:
 - 1/3 time to read your introduction and make a decision
 - Remaining 2/3 time to find evidence for the decision
- [Take-Home Message #6] **A good introduction with a good motivation is half of your success!**
- What to cover in the introduction
 - The research problem
 - The motivation of your research on the research problem
 - The claim of your contribution
 - A summary of your evidence to support your claim
 - The significance of your contribution
 - An outline of the rest of the paper.

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How to Publish at ICDM and TKDE (1)

- ICDM and TKDE both look for significant technological contributions
- ICDM and TKDE are both very tough, expecting best results in their respective research field
- [Take-Home Message #7] **Reading and citing relevant papers from the premier forums (incl. ICDM/KDD and TKDE) is a must**
- A possible way to publish in both ICDM/KDD and TKDE:
 - Submit to ICDM/KDD to get (quick) feedback
 - Expand & submit to TKDE if positive feedback from ICDM/KDD, with
 - a. at least 30% new material, and
 - b. a title footnote to state the conference acceptance/publication.

How to Publish at ICDM and TKDE (2)

- How about application papers?
 - Application papers are always invited, but innovations are necessary. A case of an innovative application must be presented, for the ICDM/TKDE audience.
- How about data analysis w/o large volumes of data?
 - Experiments on large databases are not always required, but generally expected
 - Reasons on why not large data sets should be explained.
- Most important of all: the uniqueness of your research in the field!
 - Your work has to be (1) technically sound, (2) relevant, (3) original, (4) significant, and (5) well clarified.

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The Review Process

- TKDE
 - EiC: Assign papers to AEs, and handle inconsistency between the AE and reviewers
 - AE: Solicit reviewers, and coordinate the review process
 - Reviewers: Read and provide reviews
- ICDM
 - PC Chairs: Assign papers to Vice Chairs and PC members
 - Vice Chairs: Resolve conflicting reviews and make paper acceptance recommendations
 - PC members: Reviewers.

How to Deal with Feedback (1)

- How to deal with Handling Editors
 - Be polite, but to the point
 - Ask for a change, if a clearly biased or unfair case
- How to deal with conflicting review reports
 - For journal submissions
 - Try every effort to address every concern
 - [Take-Home Message #8] **Provide a point-by-point statement of changes**
 - Use other reviewers' comments to disagree with the negative ones
 - For conference submissions
 - Rebut if you think you have a reasonable chance to win – Nothing to lose
 - Get senior authors involved in the rebuttal.

How to Deal with Feedback (2)

- How to deal with “arrogant” and “ignorant” reviewers
 - If there is no chance to win them over, provide a gentle statement for the “unreasonable” criticisms that you are not addressing
 - You should still try and resolve some of their comments
 - Your attitude towards the reviewers’ comments is important
 - all reviewers will read your statement of changes, and an accommodating approach is useful.
- Critical reviews are always expected from first-rate journals and conferences – Don’t get emotional with negative comments
- **[Take-Home Message #9] Be accommodating and persistent in journal submissions & good luck! !**

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Summary of Take-Home Messages

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2. You should avoid claiming too many dimensions, but one or two with in-depth evidence
3. Know your enemy: Check who are on the program committee or editorial board, and cite their relevant work with due credit
4. Choose a promising topic
5. Are the experimental results consistent and conclusive?
6. A good introduction with a good motivation is half of your success!
7. Reading and citing relevant papers from the premier forums is a must
8. Provide a point-by-point statement of changes (when dealing with journal feedback)
9. Be accommodating and persistent in journal submissions.