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

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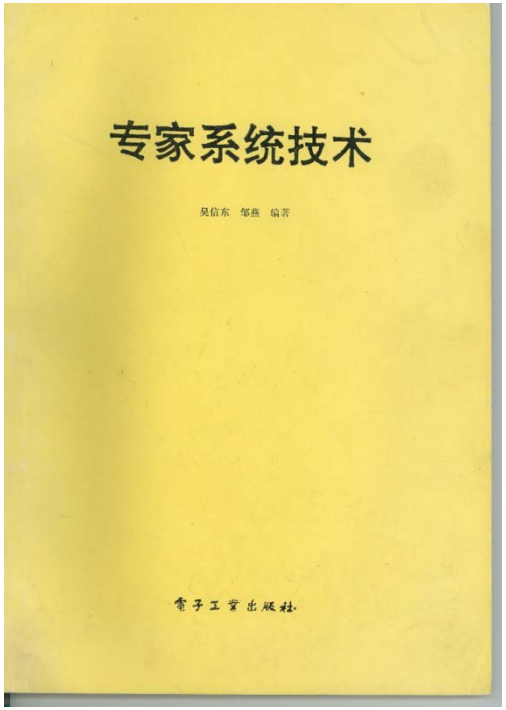
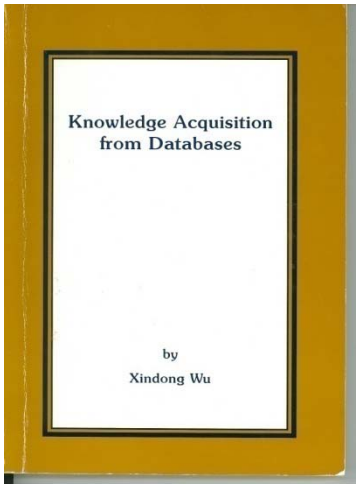
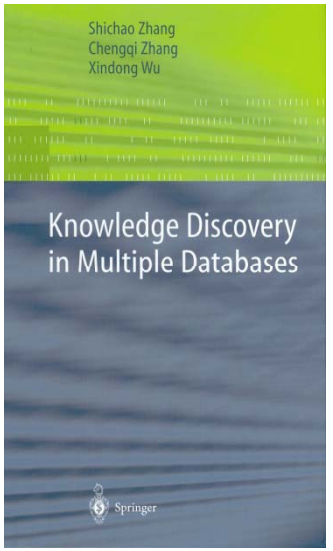
Deduction ⇨ Induction: My Research Background







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1988 Expert Systems

1990 Expert Systems

1995 数据挖掘

2004 数据挖掘

…

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

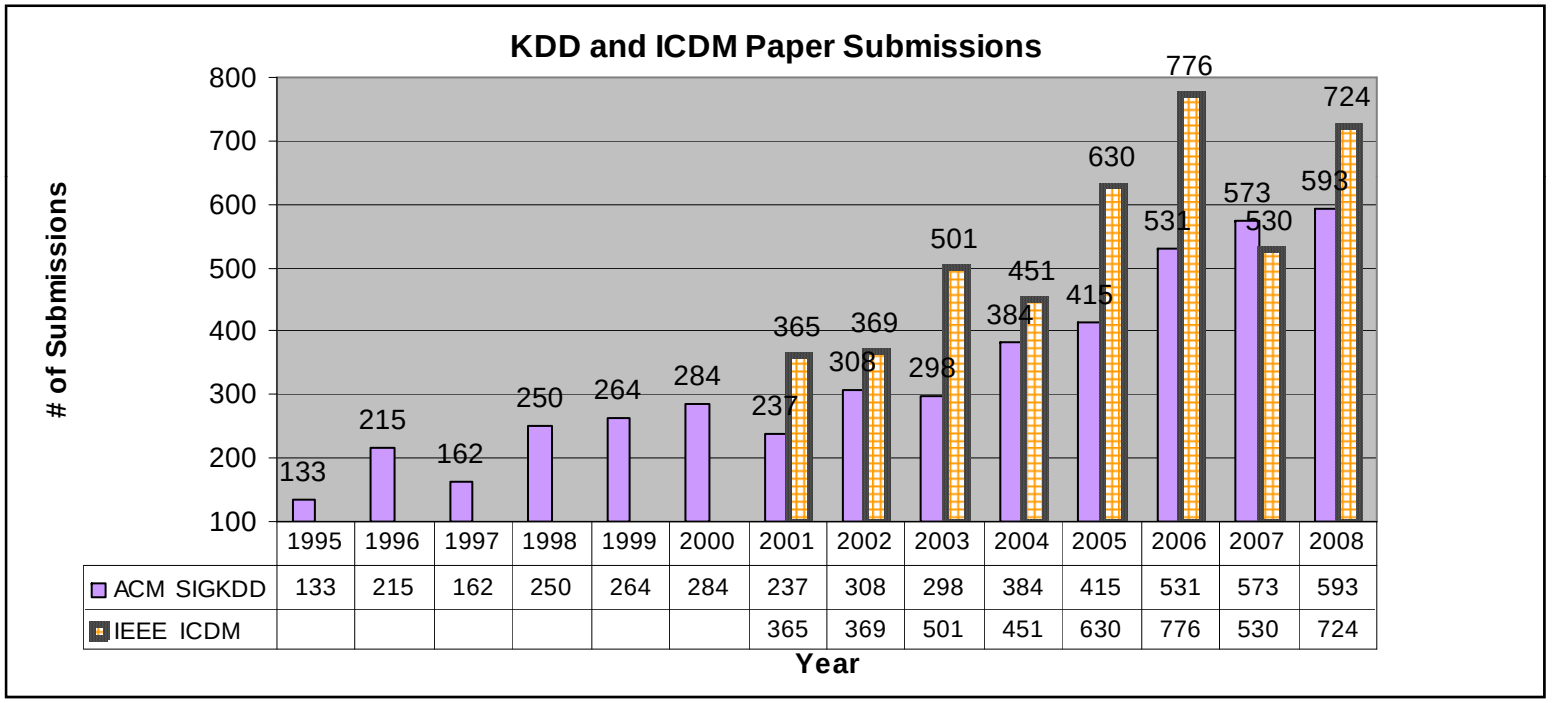
IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING

- 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 accpt'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], than its rivals:
  - Behaviour: X has a higher success rate then 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!
  - You 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.