Factors Leading to A Distinguished Paper

Lin ZHANG, PhD
School of Software Engineering
Tongji University

The slides are available at http://sse.tongji.edu.cn/linzhang/ for one week

2017-12-05
Outline

- Overview
- Several Factors Deserving Consideration
- About Paper Writing
General Requirements for a Qualified PhD

- Solid and broad theoretical foundations
- Systematic and deep specialized knowledge
- Capability to perform independent research

One High-quality SCI Paper

How?
Publishing a High-quality Paper is Crucial to Your Future

- Make your work world-known
- It will bring you many benefits

Scholarship

Honors

Better positions
Outline

- Overview
- Several Factors Deserving Consideration
- About Paper Writing
Some Basic Principles Leading to a Qualified Researcher

- Research is for fun
  - Take it easy; do not consider it as a burden
- Paper reading is your life
  - Problem (research gap) identification; standard methods in your field; ideas for potential solutions
Some Basic Principles Leading to a Qualified Researcher

- Conduct the literature survey periodically
  - Make a conference & journal list; at least, you need to read the abstract to acquaint you with the recent development of the fields
  - Or, you can follow some “big guys” in your fields
Some Basic Principles Leading to a Qualified Researcher

- Journals related to my areas

- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Image Processing
- IEEE Transactions on Multimedia
- International Journal on Computer Vision
- Pattern Recognition
- Computer Vision and Image Understanding
- Image and Vision Computing
- Journal of Vision
- Nature. Neuroscience
- Vision Research
Some Basic Principles Leading to a Qualified Researcher

- Conferences related to my areas

  - IEEE Int’ Conf. Computer Vision and Pattern Recognition (CVPR)
  - IEEE International Conference on Computer Vision (ICCV)
  - European Conference on Computer Vision (ECCV)
  - Neural Information Processing Systems (NIPS)
Some Basic Principles Leading to a Qualified Researcher

- “Big guys” in my fields (http://sse.tongji.edu.cn/linzhang/UsefulLinks/links.htm)

**Sparse Representation, Dictionary Learning and Low-Rank**

   This is homepage for Julien Mairal, who works mainly on sparse representation and dictionary learning.

2. [http://yima.csl.illinois.edu/](http://yima.csl.illinois.edu/)
   This is the website of Dr. Yi Ma, at the Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, USA.

**Computational Biology**

   This is the website of Prof. David Baker’s lab. They mainly focus on prediction and design of protein structures.

2. [http://compbio.mit.edu/compbio.html](http://compbio.mit.edu/compbio.html)
   This is the website of MIT Computational Biology Group, lead by Prof. Manolis Kellis.

**3D Processing**

   This is homepage of Michael Bronstein, a very young however promising researcher in Israel. He and his twin brother focus on non-rigid shape (2D and 3D) analysis, 3D face recognition, multi-dimensional scaling, topology, and data dimension reduction.

   This is the homepage for Dr. AJMAL S. MIAN’s, an Australian researcher. He focuses on 3D face recognition, video surveillance, facial expression recognition, video-based face recognition, 3D modeling, and multi-spectral computer vision. On his homepage, he also provides some useful Matlab matrices for 3D processing.
Some Basic Principles Leading to a Qualified Researcher

- Cross-discipline usually is an easy way
  - Experts in fields A and B usually do not know stuffs in fields B and A; you can act as a bridge
  - So, do not always reading papers in one specific field

<table>
<thead>
<tr>
<th>LC-KSVD + 3D ear</th>
<th>= IEEE TMM (2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sparse representation + 3D palmprint</td>
<td>= IEEE TPAMI (2015)</td>
</tr>
<tr>
<td>Phase congruency + Image quality assessment</td>
<td>= IEEE TIP (2011)</td>
</tr>
</tbody>
</table>
Some Basic Principles Leading to a Qualified Researcher

- Cross-discipline usually is an easy way
  - Experts in fields A and B usually do not know stuffs in fields B and A; you can act as a bridge
  - So, do not always reading papers in one specific field
- Having discussions with your friends, especially working in different fields; join conferences/seminars if possible
Some Basic Principles Leading to a Qualified Researcher

- Do not depend on (or even believe in) your supervisors
  - Knowledge or notions in their mind are usually old stuffs
  - Most active researchers are always master or PhD candidates
- For a selected theory/topic, you need to know everything
- Foundations are the most important

Math  Academic writing

A bit one day, keeping on the habit

Composing your own notes is a good habit!
Outline

- Overview
- Several Factors Deserving Consideration
- About Paper Writing
General procedures to a paper

1. Problem (research gap) identification
2. Investigating existing solutions
3. Propose your new solution
4. Conduct experiments
5. If your solution performs better in some aspects
6. Compose the paper
7. Submit to a journal
8. Good luck
9. Major revision
10. Minor revision
11. Accepted
Achievements deserving publication

- A novel system of significance to some extent
- Novel algorithms/analysis methods to solve an existing problem
  - Several factors to quantify a solution: spatial complexity, time complexity, and accuracy
Problem (Research Gap) Identification

- Figure out a proper **scientific** or **engineering** problem from your supervisor’s current project
  - E.g., using iPhone5 to develop a simple game; it is not either a scientific or an engineering problem
  - Usually, the problem is a standard, well-recognized problem in a specific field (e.g., image quality assessment, palmprint classification, parking-slot detection, human detection)
- Problem to be solved in a single paper cannot be too big
  - Problems exist in the literature; in the current research world, it is quite difficult to propose novel problems
Propose a new solution

- This is the **core** of the research
- One recent survey paper is a good start
- When do not know how to start, try to implement a modern state-of-the-art approach
- Cross-disciplinary approach is an easy way and usually can have good results
  - In our relevant field, ideas in vision research, brain modeling, and mathematics are usually of significant values
Journal/Conference Selection

- Select journal/conf before preparing your paper
  - Submissions to different journals or conferences may have different writing styles and formats
- Reputed journals or conferences are preferred
- Journal selection
  - SCI indexed?
  - Impact factor
  - Length of review cycle
Importance of Writing Skills

- Publishing papers is critical for researchers
- Publishing is hard
  - Low acceptance rate
  - Competing with good papers
  - Reviewers are potential competitors
What Reviewers Want

- AAAI Reviewers (partial) check list:
  - Does the paper introduce a new problem or provide a new solution to an existing one?
  - What is the main result of the paper?
  - Is the result significant?
  - Is the paper technically sound?
  - Does the paper provide an assessment of the strengths and limitations of the techniques/result?
  - Is the paper clearly written so as to accessible to most AI researchers?
  - Does the paper reference appropriate related work?
What Gets You Accepted?

- **Attention** to details
- **Check and double check** your work
- **Consider** the reviews
- **English** must be as good as possible
- **Presentation** is important
- **Take** your time with revision
- **New, original and previously unpublished**
- **Critically evaluate** your own manuscript
- **Ethical rules** must be obeyed
Paper Organization

- 八股文
  - 破题、承题、起讲、入题、起股、中股、后股、束股
  - 每部分字数有限制
  - 每部分重要性不同
- The organization of a modern technical paper organization is actually the same as “八股文”
  - title, abstract, introduction, related work, proposed approach, experimental results, conclusions, references
  - For title and abstract, different journals (conferences) may have different limits for word numbers
  - Abstract and introduction are more important
Paper Organization

- Title
- Abstract
- Introduction
- Related Work
- Proposed Method
- Experimental Results
- Conclusion
- Reference
A good title should contain the fewest possible words that adequately describe the contents of a paper.

**DO**
- Convey main findings of research
- Be specific
- Be concise
- Be complete
- Attract readers

**DON’T**
- Use unnecessary jargon
- Use uncommon abbreviations
- Use ambiguous terms
- Use unnecessary detail
- Focus on part of the content only
Paper Organization

<table>
<thead>
<tr>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
</tr>
<tr>
<td>Introduction</td>
</tr>
<tr>
<td>Related Work</td>
</tr>
<tr>
<td>Proposed Method</td>
</tr>
<tr>
<td>Experimental Results</td>
</tr>
<tr>
<td>Conclusion</td>
</tr>
<tr>
<td>Reference</td>
</tr>
</tbody>
</table>

**Abstract**

Only several sentences, covering the background, the research gap, the main idea of your proposed approach, and the achieved results. Use the abstract to “sell” your article.

**Notes:**

- Is precise and honest
- Can stand alone
- Is brief and specific
- Cites no references
**Paper Organization**

<table>
<thead>
<tr>
<th>Title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Related Work</td>
<td></td>
</tr>
<tr>
<td>Proposed Method</td>
<td></td>
</tr>
<tr>
<td>Experimental Results</td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
</tr>
</tbody>
</table>

Example: “*This paper presents an innovative set of tools developed to support a methodology to design and upgrade wastewater treatment systems (WTS). Previous work by Grey (2004), Lacey (2001) and others …This paper illustrates the merits of these tools to make the innovative methodology of interest to everyone involved in WTS and will become the new design standard worldwide.*”

**Better to avoid:**
- Abbreviations, references (save for the introduction), and exaggerated conclusions
Paper Organization

An example drafted by my student

Convolutional Neural Network (CNN) is making an increasing success in various tasks of computer vision, e.g. object detection, depth estimation and semantic segmentation etc. Models in prior works for those tasks are usually transferred from AlexNet [1] or VGG [2] for classification, while few papers explore the newly proposed networks like ResNet and DenseNet which is expected to be better. What’s more, lots of works indicates that semantic segmentation and depth estimation share some commonalities. In other words, models for semantic segmentation is also suitable for depth estimation. In this work, models based on FCN [3] and DenseNet [4] to validate our thoughts are constructed and a novel neighbor smooth method in Neural Network form is introduced for better performance. we experimentally demonstrate that the proposed models can achieve state-of-the-art results on Make3d and NYNDepthV2 dataset.
Paper Organization

My amendment

Depth estimation from a single image is of paramount importance in various vision tasks, such as obstacle detection, robot navigation, 3D reconstruction, etc. However, how to perform this task accurately and efficiently still remains an unresolved issue. As an attempt to solve this problem, in this paper, we propose a novel approach, namely DFCN$_{NS}$, which makes use of a dense-connected fully convolutional network (FCN) with a neighborhood smoothness constraint. Specifically, DFCN$_{NS}$ uses a FCN as the end-to-end learning architecture and adopts the "dense block" as FCN's basic module due to its superior performance in data representation learning. In addition, DFCN$_{NS}$ incorporates a neighborhood smoothness regularization term to make sure that spatially closer positions would have similar depth values. The effectiveness and efficiency of DFCN$_{NS}$ have been corroborated through extensive experiments conducted on benchmark datasets. To make the results reproducible, the source codes have been made publicly available at http://*.*.
Paper Organization

Title

Abstract

Keywords: important for indexing; they enable your manuscript to be more easily identified and cited

Notes for keywords:
✓ Keywords should be specific
✓ Avoid uncommon abbreviations and general terms

Introduction

Related Work

Proposed Method

Experimental Results

Conclusion

Reference

Good Keywords: Groundwater flooding, frequency analysis, fractured aquifer, rainfall event, hydraulic head

Bad keywords: methodology, predetermination, aquifer, flood, analysis
Paper Organization

- Title
- Abstract
- Introduction
- Related Work
- Proposed Method
- Experimental Results
- Conclusion
- Reference

The most important section. It usually includes background introduction, related methods in the literature, research gap description, your contribution and main ideas of your work, and the organization of the paper.

Note:
1. It would be better if you could do some deep analysis to the existing methods, pointing out their potential drawbacks
2. Your motivations need to be clearly described here
3. Here, you need to stress your contributions and your ideas in a few powerful sentences; should be convincible, and sometimes a little aggressive
Paper Organization

| Title          | Usually, we follow such a flow, |
|               | General background              |
|               | A narrower background mostly relevant |
|               | Problem you want to solve       |
|               | Existing approaches             |
|               | Research gap analysis           |
|               | Your motivations and contributions |
|               | Organization of the remainder of your paper |

| Abstract       | An example here |
|               |                 |

| Introduction   |                 |
|               |                 |

| Related Work   |                 |
|               |                 |

| Proposed Method |                 |
|                |                 |

| Experimental Results |                 |
|                     |                 |

| Conclusion        |                 |
|                   |                 |

| Reference         |                 |
|                   |                 |
Paper Organization

Title

Abstract

Introduction

Related Work

Proposed Method

Experimental Results

Conclusion

Reference

If your solution is based on some theories not well known, you can give an introduction at this section. Sometimes, it can be omitted.
## Paper Organization

<table>
<thead>
<tr>
<th>Title</th>
<th>Describe your solutions or your algorithms here. It should be the bulk of the paper and it must provide sufficient information so that a knowledgeable reader can reproduce the experiment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Related Work</td>
<td></td>
</tr>
<tr>
<td>Proposed Method</td>
<td></td>
</tr>
<tr>
<td>Experimental Results</td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

1. Please DO NOT describe your method in a way as a computerized algorithm, step1, step2…; instead, you are telling readers a story; it should be narrated in a logical way, full of theoretical analysis; you need to convince the readers why your new solution can work.

2. Use present tense for methodology-type papers.
<table>
<thead>
<tr>
<th>Paper Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
</tr>
<tr>
<td>Abstract</td>
</tr>
<tr>
<td>Introduction</td>
</tr>
<tr>
<td>Related Work</td>
</tr>
<tr>
<td>Proposed Method</td>
</tr>
<tr>
<td>Experimental Results</td>
</tr>
<tr>
<td>Conclusion</td>
</tr>
<tr>
<td>Reference</td>
</tr>
</tbody>
</table>

Experimental results are used to corroborate the efficacy or the efficiency of your method

Note:
1. You need to adopt the standard testing methods in your field; however, sometimes, you can design some scenarios to show the superiority of your method to the others in some special cases
2. It will be more convincing if some of the latest state-of-the-art methods could be compared
3. Cite source of data
4. Use figures and tables to summarize results
5. Explain setup clearly
### Paper Organization

<table>
<thead>
<tr>
<th>Title</th>
<th>Several sentences summarizing your main contributions in the paper and the achieved results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Related Work</td>
<td></td>
</tr>
<tr>
<td>Proposed Method</td>
<td></td>
</tr>
<tr>
<td>Experimental Results</td>
<td></td>
</tr>
<tr>
<td>Conclusion</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
</tr>
</tbody>
</table>
Paper Organization

- Title
- Abstract
- Introduction
- Related Work
- Proposed Method
- Experimental Results
- Conclusion
- Reference

Try to avoid:
- Citing articles published only in the local language
- Excessive self-citation
- Citation of published journal papers is preferred over citations of conference proceedings or technical reports
Some General Tips to Write an Academic Paper

 Always keep in mind, how about if you are a reviewer?
   How would you rate the paper if you are the reviewer?

 The whole paper should be clearly and logically expressed
   Hence, therefore, moreover, furthermore, besides, in addition, consequently, accordingly, owing to, in terms of, with respect to

 You can at first draft your paper in Chinese and then translate it into English
   If you find your paper is not clear or does not read well, it is not because of your poor English; it is due to your messy minds

 Spelling errors, typo errors, or grammar errors is forbidden
   If I review such a paper, reject it directly without further reading
Some General Tips to Write an Academic Paper

- The whole paper should be neatly formatted
  - Formulas, equations, tables, figures, references etc.
  - I read so many manuscripts, encountering none without any of the above-mentioned issues
- The paper should have figures, tables, and plots
- Imitation is most effective if you do not know how to start
  - Preparing 3~5 eminent papers on your table; simulating their writing styles, organizations, and language
Some General Tips to Write an Academic Paper

▪ Record your own mistakes; eliminate them!
▪ Think about writing: 30%; writing: 70%
▪ About the language
  ▪ Clarity, Conciseness, Correctness (accuracy)
  ▪ Try to avoid repetition, redundancy, ambiguity, exaggeration
  ▪ If possible, invite one native speaker to polish your work

An example to language polish
About Response Letter

- Carefully study the reviewers’ comments and prepare a detailed letter of response
- Respond to all points; even if you disagree with a reviewer, provide a polite, scientifically solid rebuttal rather than ignore their comment
- Provide page and line numbers when referring to revisions made in the manuscript
- Perform additional calculations, computations, or experiments if required; these usually serve to make the final paper stronger
About Response Letter

- The reviewer is clearly ignorant of the work of Bonifaci et al. (2008) showing that the electric field strength in the ionization zone of the burned corona is less than the space charge free field before the corona onset....

- Thank you for your comment. However, we feel that the assumption in our model is supported by recent work by Bonifaci et al. (2008), who showed that the electric field strength in the ionization zone of the burned corona is less than the space charge free field before the corona onset.