How to choose a problem and read a paper abstraction when research doing
Author: Quan Hoang Ngoc - 22521178
The Professor: Phd. Duy ld - UIT
4/2024

A. Content of Lesson
I. How to find a problem to do research
Summary:
- Narrow down: Field → Topic → Problems
- Scientific paper: conferences and journal
- Top conferences, top papers & ERA (CORE) ranking
- Signs of the tops
- Tools for search and review

Recall
1. Where can you find a problem for research?
2. Which pages should you choose to read?
3. Why should I choose the top conferences to read?
4. How to define the quality of a conference?
5. Which tools can you use to search?
6. Mentor?

Notes
1. Where can you find a problem for research?
- Some pages of conferences, journals, or organizations

2. Which pages should you choose to read?
- The top conference which has a high ranking (A, A*, Q1)

3. Why should I choose the top conferences to read?
- This is due to the fact that top, significant, or SOTA papers are frequently published at top conferences. Besides, papers that are published here will be reviewed very strictly, so their quality will be always ensured.

4. What are the signs of the quality of a conference?
- Using ERA ranking which belongs to CORE - Australia organization.
- Besides, people also can consider some signs such as the age of pages, related to IEEE, ACM, and top researchers (university) taking part in.
- Using formulas that “top and top will be top”
- Some others ranking: SCOPUS, SCIMAGOJR

5. Which tools can you use to search?
- People can use keywords about the names of organizations, authors, universities, etc. to search on Google.
- Use Google Advanced Search if people need a detailed filter for keywords.
- Besides, use some chatbots such as Gemini, Chat GPT, etc. to support creating a summarized review.
6. Mentor?

- Connect with a mentor if you need support when hopeless.

II. How to read an abstraction of papers to understand keywords?

Summary:

- The objective of a scientific report (paper) is what?
- Unsolved problems
- Proposal method
- Results and experiments? SOTA?
- Generic and specific problem

***1. What is the objective of a report?

- Focus on one problem that has not yet been solved
- The current situation of this problem (before the paper):
  - Current baselines
  - SOTA Performance
  - Limitations, Difficulties
  - Weaknesses
- After proposing the novel method (after the paper):
  - improve the performance
  - extend the theory background
  - Build novelty techniques, engineering
  - New applications, etc.

***2. The main outline of the paper:

a. Introducing the unsolved problems from general to specific: big to small

- Current situation of the problem: which were solved and not solved?

SOTA performance

- Limitations, difficulties, weaknesses, etc. of traditional, existing, and current SOTA

b. Proposing novel method

- How to overcome these above issues?
- The creative and elegant of this proposal
- Keywords about novel approaches (ideas), techniques, theory background,...

c. The results and contribution of the paper are what?

- Provide new datasets, metrics
- Building a benchmark by experiments
- Novel proposal
- New applications

***3. The mission (steps to steps) when reading a paper abstraction:

- Firstly, read the title, abstraction, and illustration on paper.
- Define the generic problem mentioned in the paper
- Specifying this problem's current situation: limitations that were not solved
- Define the input and output of this problem by seeing a sample in the dataset or illustration on paper.
- Find keywords about the novel proposal: techniques, theory background, ideas explanation, etc.

***4. For example:
- Generic problem: Visual Instance Search
- Specifying by the input and output
- See a sample in the dataset or illustration
- Keywords: lack of high confidence, visual words
- See the Diagram of the proposal

B. Skills and Tools
***1. Using ERA ranking to find the TOP conferences
***2. Combine more ranking and pages: “TOP and TOP is TOP” formula.
***3. Using papers with code:
- Papers With Code is a fantastic platform designed to bridge the gap between research papers and their practical implementation. It caters specifically to the field of machine learning but also has sections for related fields like computer science, statistics, and physics.
- Feature:
 - Combined Resources
 - Community-Driven
 - Search and Filter
 - Comparison and Exploration

***4. Using Overleaf to Write a Professional Report:
- Overleaf is a cloud-based collaborative platform designed specifically for writing scientific papers and other technical documents. It uses LaTeX, a powerful typesetting language, under the hood, but offers a user-friendly interface that makes it easier to write and format complex documents compared to directly using LaTeX code.

***5. Using Google Advanced Search:
- Google Advanced Search allows you to refine your web searches with specific criteria to find more relevant and precise results.
- https://www.google.com/advanced_search

***6. The TOP conferences and Journal of Computer Vision:
**Conferences:
 - Conference on Computer Vision and Pattern Recognition (CVPR): This is the leading annual conference in computer vision. It's sponsored by the Institute of Electrical and - --- Electronics Engineers (IEEE) Computer Society.
European Conference on Computer Vision (ECCV): This is another top annual conference in computer vision. It's held in Europe and is also sponsored by the IEEE Computer Society.
 - International Conference on Computer Vision (ICCV): This conference is held every other year, alternating with ECCV. It's sponsored by the Association for Computing Machinery (ACM).
**Journal:
 - International Journal of Computer Vision (IJCV): This journal, published by Springer, publishes original research papers on a broad range of topics in computer vision.
 - IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI): This journal, published by the Institute of Electrical and Electronics Engineers (IEEE), covers all aspects of computer vision and pattern recognition.

- Pattern Recognition: This journal, published by Elsevier, focuses on theoretical and practical aspects of pattern recognition, including computer vision.
- IEEE Transactions on Image Processing (TIP): This journal, also published by IEEE, covers topics related to image processing and its applications, which is a foundational area for computer vision research.

***7. How to narrow down the problem: Field → Topic → Generic Problem → Unsolved Problem
***8. Some common gates about research: Google Scholar and research gates
***9. Using AI to support research (but not recommended)

C. Self-Study and Tips
***1. Presenting a problem with critical thinking:
- First, defining, modeling, or formalizing the problem more clearly
- If it is a pre-defined problem:
- Please show a sample in the dataset including input and output (illustration in paper)
- This is a hard and important problem.
    - If yes, specify them with some applications
- The challenges or difficulties of the problem
- Can the current SOTA baseline be solved?

2. Using the 10-20-70 model for learning and research:
a. Formal Learning:
  - Lesson from the professors
  - Collecting Surveys & Observations (find and select documents)
  - Reading and literature review (specify → overview analysis & review → advantage & disadvantage, challenge, limitation → related keywords and recall
  - Summarize and Systematization
b. Practical Experiential Learning:
  - Ideas (hypothesis) and outline
  - Doing
    - Design: detailed analysis → insight, pattern
    - Construction: coding, validation (experiments), evaluation and improvement, release
  - Presentation: writing a report, talk
  - Now, some issues or challenges occur, and people don't know what to decide to do. → hopeless
c. Social Learning (Feedback Learning):
  - People can find support from mentors, advisors, professors, and friends.
  - You are not alone!
  - Receive the feedback: reviewing, estimation, recommendation & direction, keywords.
  - But note that you should follow up with them.

d. Conclusion:
- Now, I understand why to say "research doing is a learning and sharing process"
- During the research process, you will inevitably encounter difficulties and lose confidence, but you can receive help and sharing from your companions.
- When researching, people can learn from more sides, useful skills, and tips.
- It is the loop that helps you improve yourself.

***3. Follow up with the professors, mentors, advisors, and buddies as a way to build your branding

- You maintain your interaction and interest with them and get help from them when needed

***4. The key to presentation is abstractable, the introduction
***5. Good writing is very important
***6.Two common types of problems?
- SOTA Technique Proposal
- and Practical Application Challenge
***7. Types of papers:
- Breakthrough techniques
- Dataset and benchmarks
- Survey
***8. The signs of understanding:
- represent it for others,
- analysis and review about it: advantages and disadvantages, limitations

***9. Sometimes, most of the time doing research is to find an unsolved problem: building a personal background and knowledge about the world.

***10. Use the “awesome” keyword to survey and summarize a topic

***11. Building the Tree of Unsolved Problems, Approaches, and Proposal Methods is very important

***12. Talent only accounts for 10%, the remaining 90% comes from perseverance

D. Expectation
- How to read a paper effectively?
- Tools and skills for research doing
- The channels and researchers that we should follow up on?
- How to Build the Tree of Unsolved Problems, Approaches, Proposal Methods
- How to identify the unsolved problems