

Improve Your Academic Reading Skills

from two strategies:
Extensive and Intensive Reading

Jiayi Shen, Fatemeh Gholamzadeh Nasrabadi

MultiX

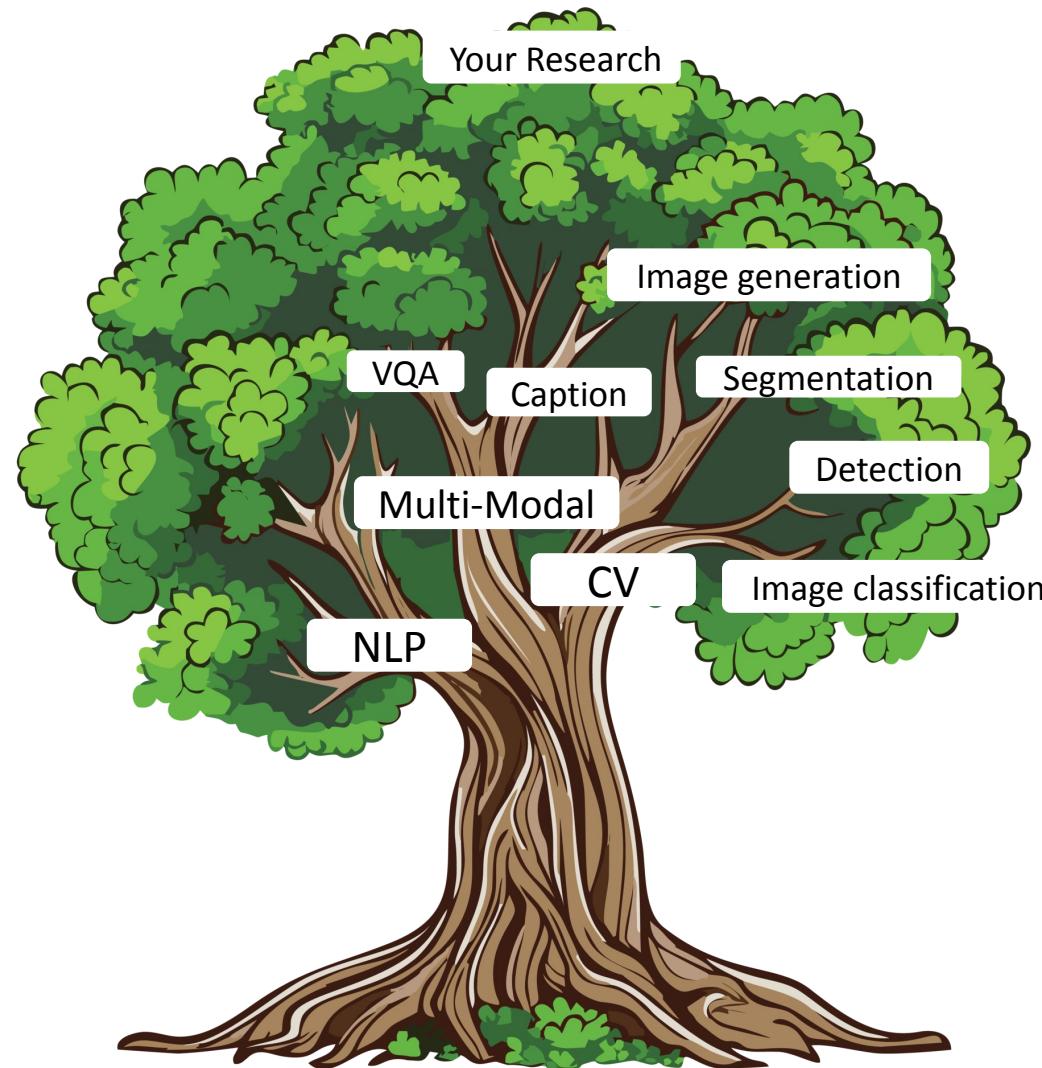
February 21

Outline

- Introduction
- Extensive Reading
- Intensive Reading
- Summary

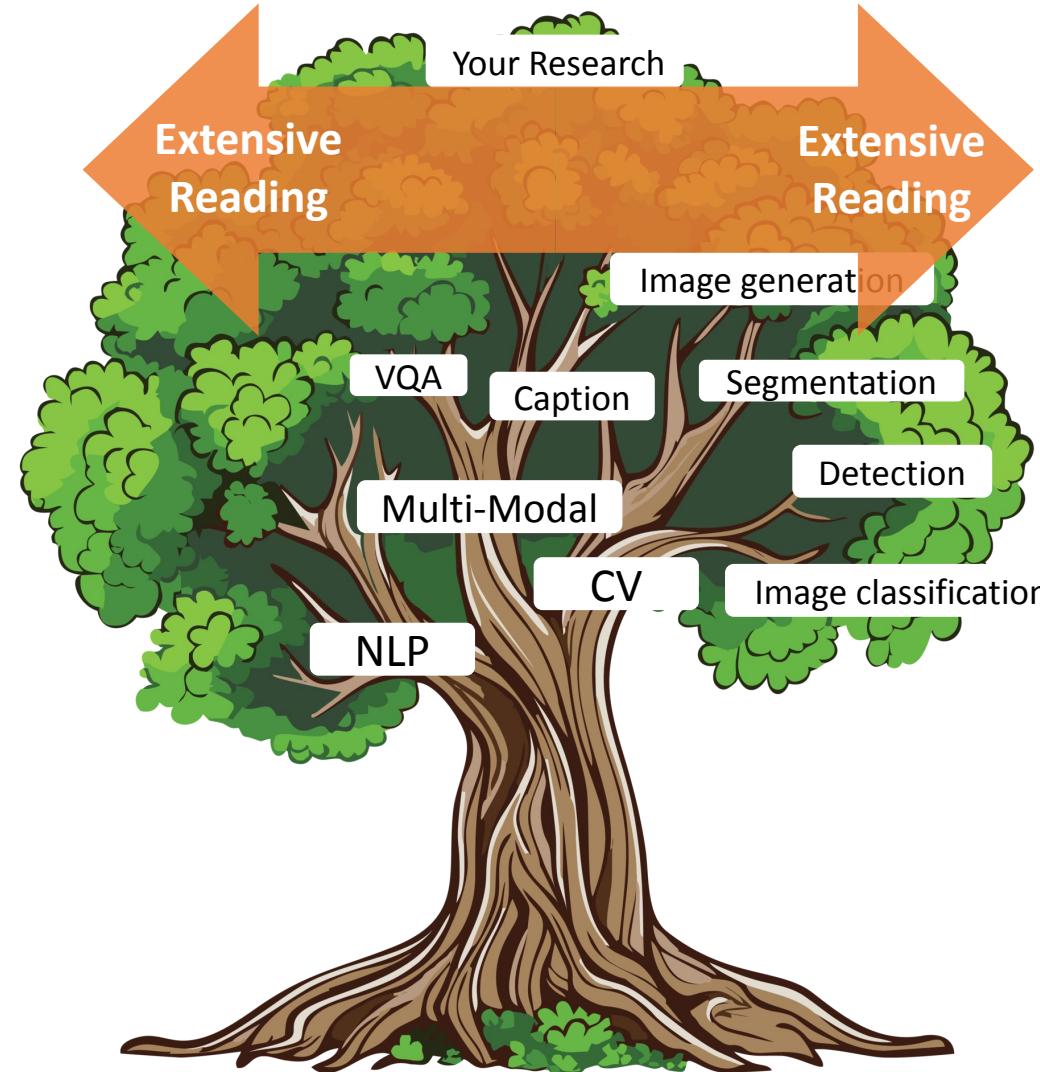
Introduction

- ❑ Locate your research



Introduction

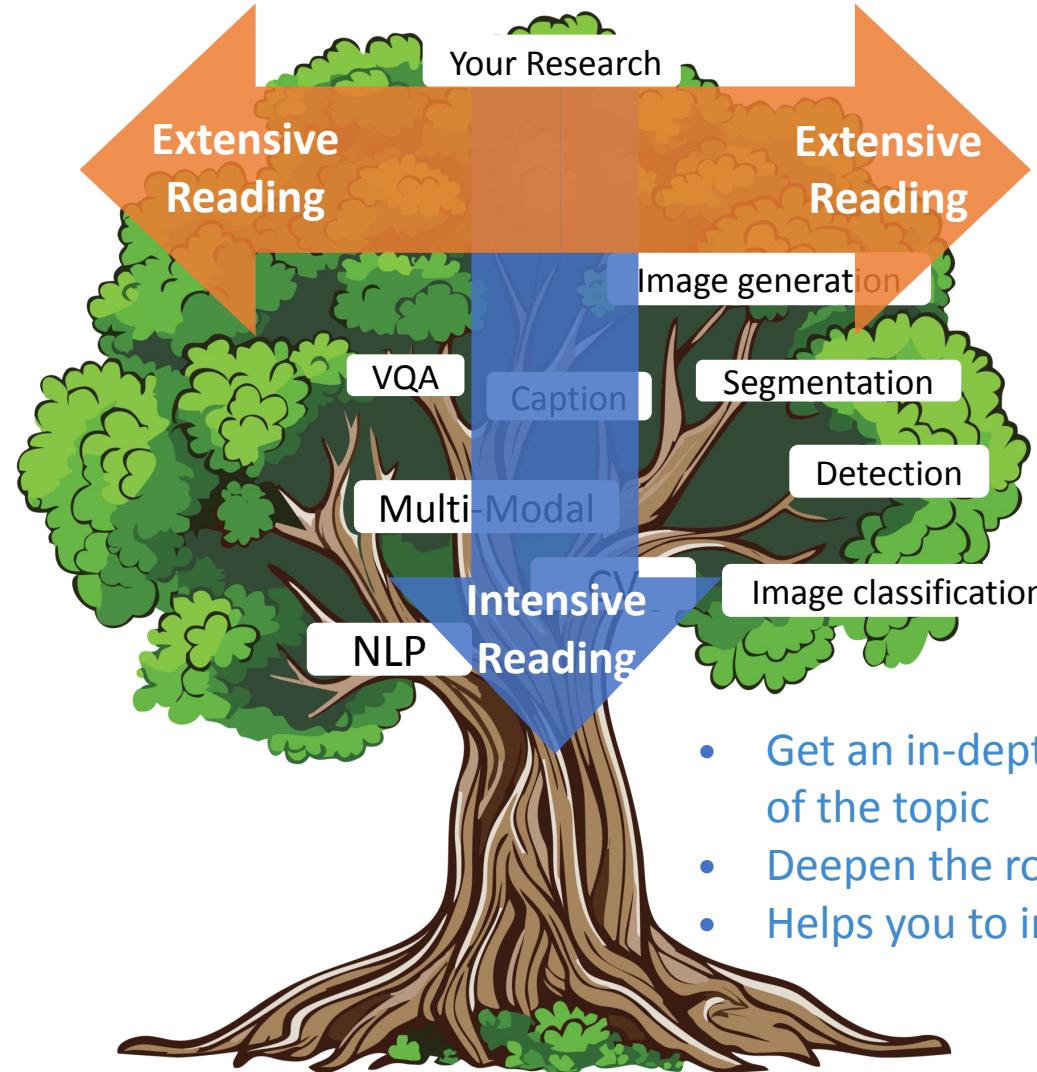
- Locate your research
- Extensive reading



- Build your knowledge graph.
- Efficiently inspire new ideas.
- Trend of related research fields.

Introduction

- Locate your research
- Extensive reading
- Intensive reading



- Build your knowledge graph.
 - Efficiently inspire new ideas.
 - Trend of related research fields.
-
- Get an in-depth and concentrated understanding of the topic
 - Deepen the root of you knowledge tree
 - Helps you to implement your ideas

Outline

- Introduction
- Extensive Reading
- Intensive Reading
- Take-away messages

Extensive Reading

❑ Why to read extensively?

Build your knowledge graph.

Efficiently inspire new ideas.

Trend of related research fields.

❑ When to read extensively?

When you start your projects.

When you stuck in your projects and needs new ideas.

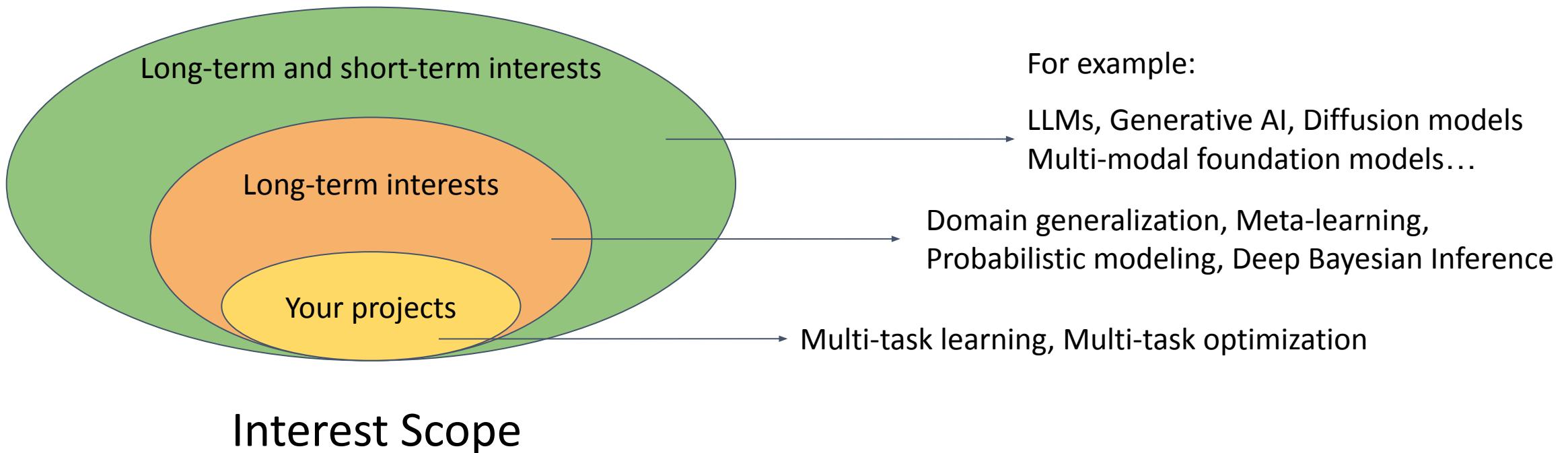
When you write related work for your papers.



Extensive Reading

❑ What to read extensively?

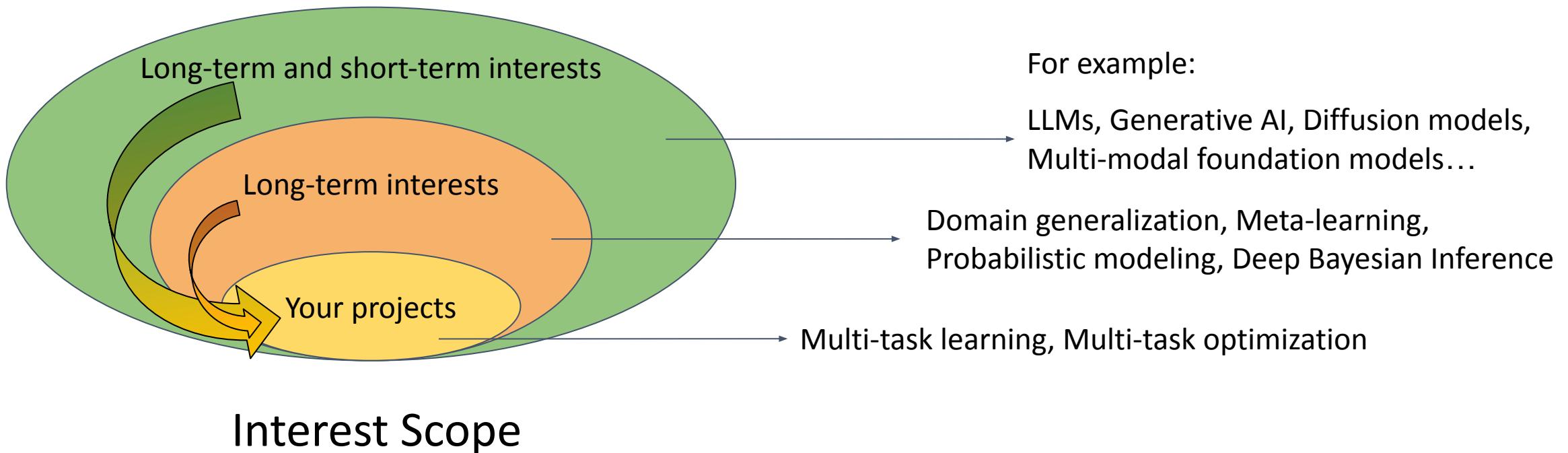
1. Choose your topics.



Extensive Reading

❑ What to read extensively?

1. Choose your topics.



Extensive Reading

What to read extensively?

1. Choose your topics.
2. “Safari” papers based on your topics.



Extensive Reading

What to read extensively?

1. Choose your topics.
2. “Safari” papers based on your topics.

Extensive reading
on your project

Extensive reading
on long-term interests

Extensive reading
on short-term interests



Survey papers (2~4)

High-citation papers (40+, last 7~8 years)

Recent papers on top-tier conferences
(20+, last 2~3 years)

Extensive reading
on your project

Build your knowledge graph
when you start a new project
and write related works.



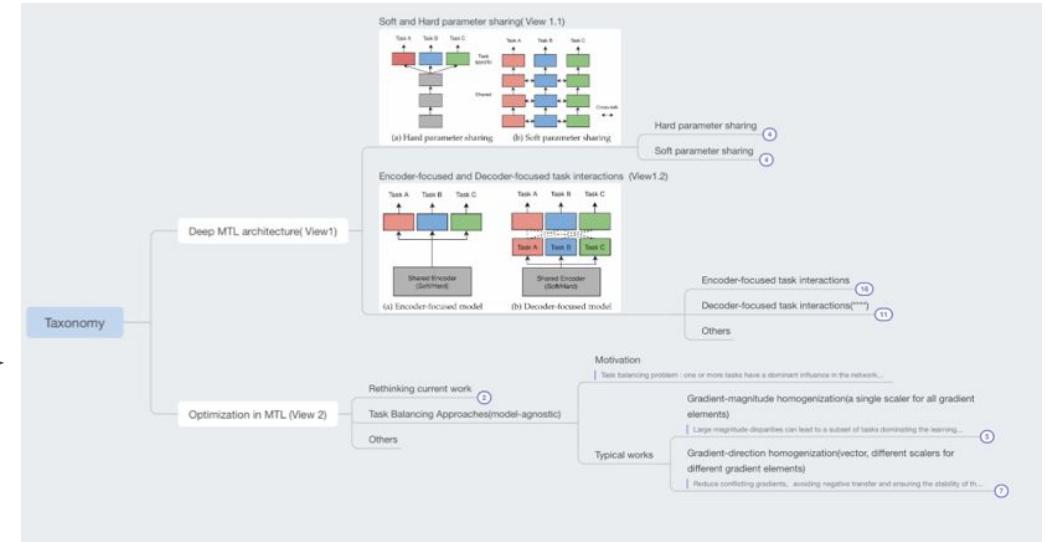
The screenshot shows a search interface with a sidebar on the left containing a list of categories and their counts. The main area displays a list of search results with titles, dates, and abstracts. The abstract for the survey paper is partially visible, discussing the advent of deep learning and its impact on dense prediction tasks. The paper is from IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 44, NO. 7, JULY 2022.

Categories:

- Gaussian processes: 12
- Transformer: 14
- Fundamental: 1
- Domain generalization: 4
- 融会贯通: 4
- Bayes models: 14
- Neural processes: 14
- Energy-based model: 7
- Probabilistic modelling: 1
- MTL: 57
- Efficient learning: 3
- Optimization: 19
- SIMO: 57
- Multi-task learning: 31
- Foundation models: 10
- Applied stable Diffusion: 5
- Flow matching: 2
- CoT: 6
- VisualLanguage: 13
- probabilistic inference: 0

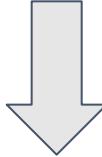
Search Results:

- Title Matches: 1
- Multi-Task Learning for... 12 Dec 2022 at 10:50
- Content Matches: 34
- Efficient and Effective M... 20 Jan 2024 at 16:35
- neurips23_Revisiting Sc... 23 Jan 2024 at 17:44
- Pareto Multi-Task Learning 13 Dec 2022 at 14:49
- Neurips22_In Defense of... 16 Dec 2022 at 15:20
- Reasonable Effectiveness... 19 Jan 2024 at 20:33
- Neurips22-M3ViT- Mixt... 16 Dec 2022 at 15:20
- Liu-TMLR22-Auto- λ - Di... 30 May 2023 at 13:14
- neurips23_FAMO- Fast... 15 Jan 2024 at 17:50
- TMLR22-Dropped Schedu... 26 May 2023 at 14:48

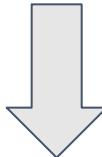


High-citation papers (20+, last 7~8 years)
Recent papers on top-tier conferences
(10+, last 2~3 years)

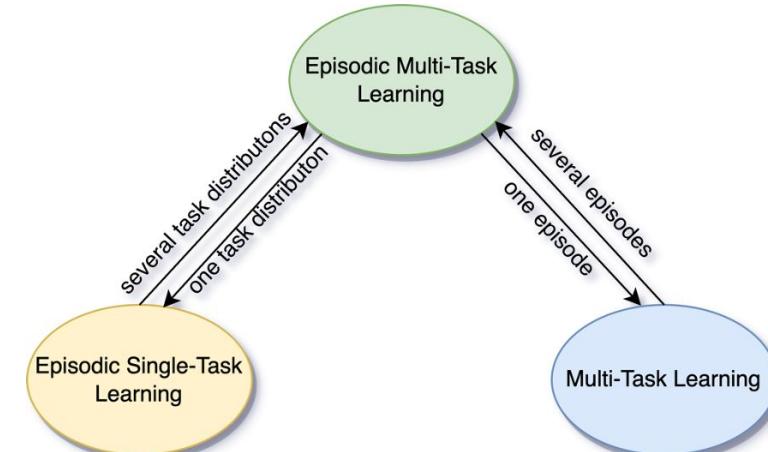
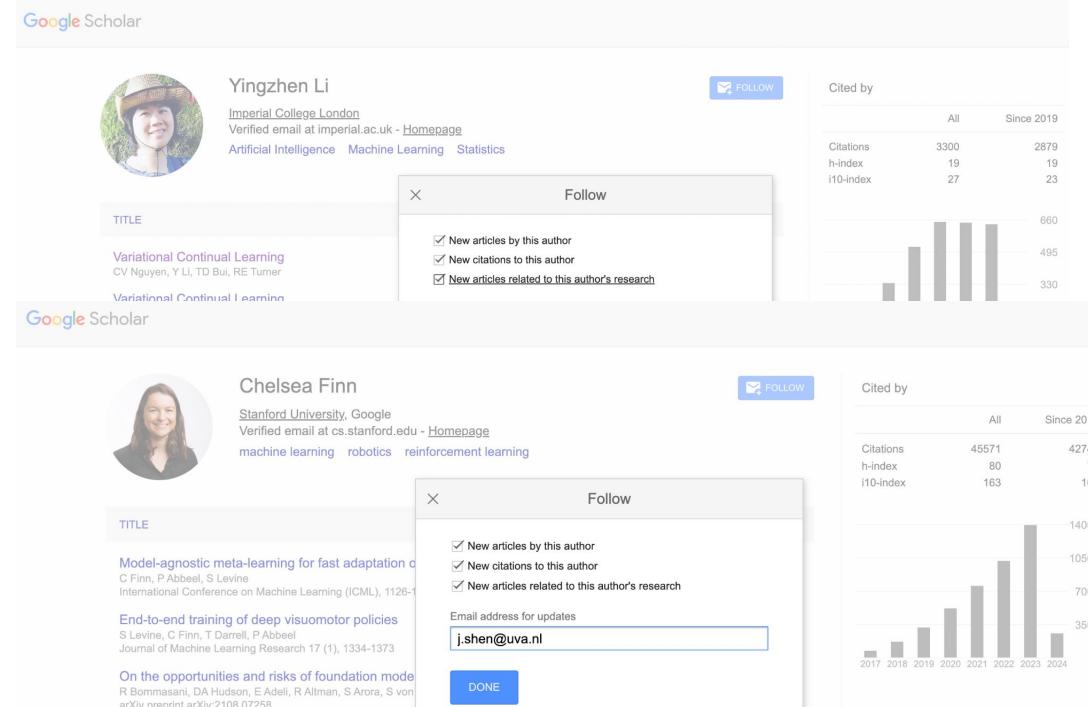
Google Scholar

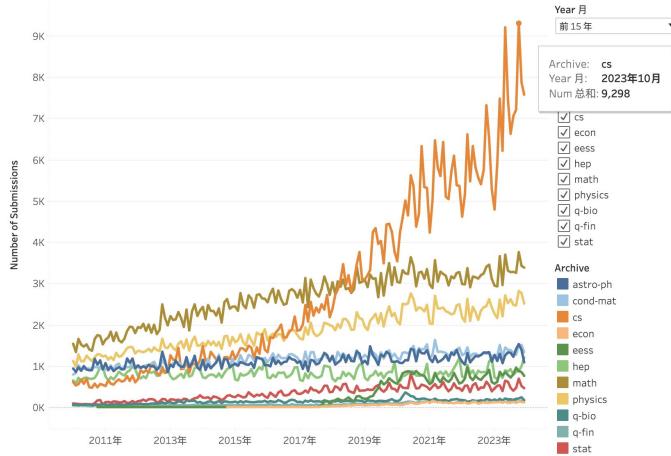


Extensive reading
on long-term interests



Efficiently inspire new ideas
when you stuck in your projects.





AK @_akhaliq · 1h ·
Here is my selection of papers for today (19 Feb) on Hugging Face

Universal Manipulation Interface: In-The-Wild Robot Teaching Without In-The-Wild Robots

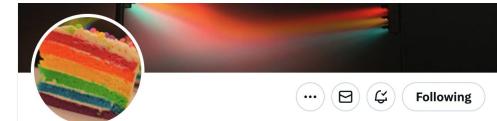
GaussianObject: Just Taking Four Images to Get A High-Quality 3D Object with Gaussian Splatting

PaLM2-VAdapter...
Show more

fly51fly @fly51fly · 7h
[LG] RLVF: Learning from Verbal Feedback without Overgeneralization
M Stephan, A Khazatsky, E Mitchell, A S Chen, S Hsu, A Sharma, C Finn [Stanford University] (2024)
arxiv.org/abs/2402.10893

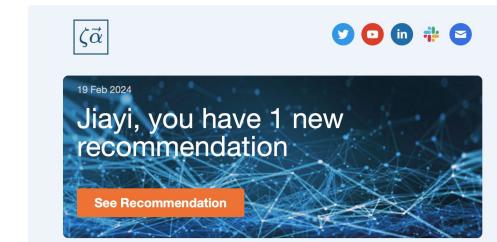
- The paper studies how to incorporate high-level verbal feedback into large language...
Show more

back (RLHF), we find that simply prompting a isolation of the feedback to contexts where it is not relevant. We study the problem of incorporating verbal feedback without such overgeneralization, inspiring a new method Contextualized Critique with Constrained Preference Optimization (C3PO). C3PO uses a piece of high-level feedback to generate a small synthetic preference dataset specifying how the feedback should (and



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BUPT prof | Sharing latest AI papers & insights | Join me in embracing the AI revolution! #MachineLearning #AI #Innovation
github.com/fly51fly Joined February 2009

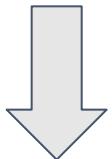
Hi Jiayi, you have new recommendations
ZA Zeta Alpha <no-reply@zeta-alpha.com>
To: Jiayi Shen
Today at 07:00



Top ML Papers of the Week
DAIR AI via LinkedIn <newsletters-noreply@linkedin.com>
To: Jiayi Shen
Yesterday at 17:18

LinkedIn
NEWSLETTER ON LINKEDIN
ML Papers Top ML Papers of the Week
Highlighting the top trending ML papers of the week.
by DAIR AI

Extensive reading
on short-term interests



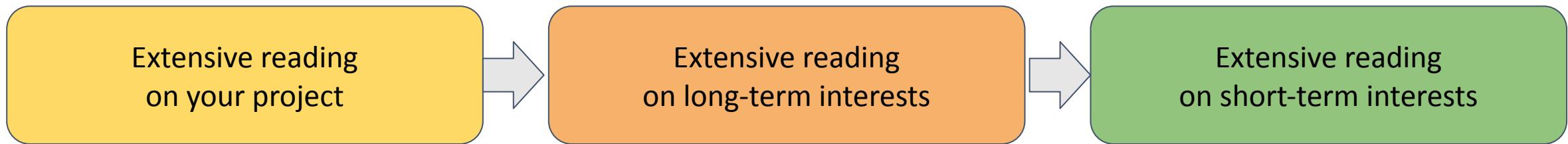
Trend of related research fields,
preparations for your future work

Building habits (once a week, about ten papers)
Job hunting, Social impacts, Potential collaborations.

Extensive Reading

❑ What to read extensively?

1. Choose your topics.
2. “Safari” papers based on your topics.

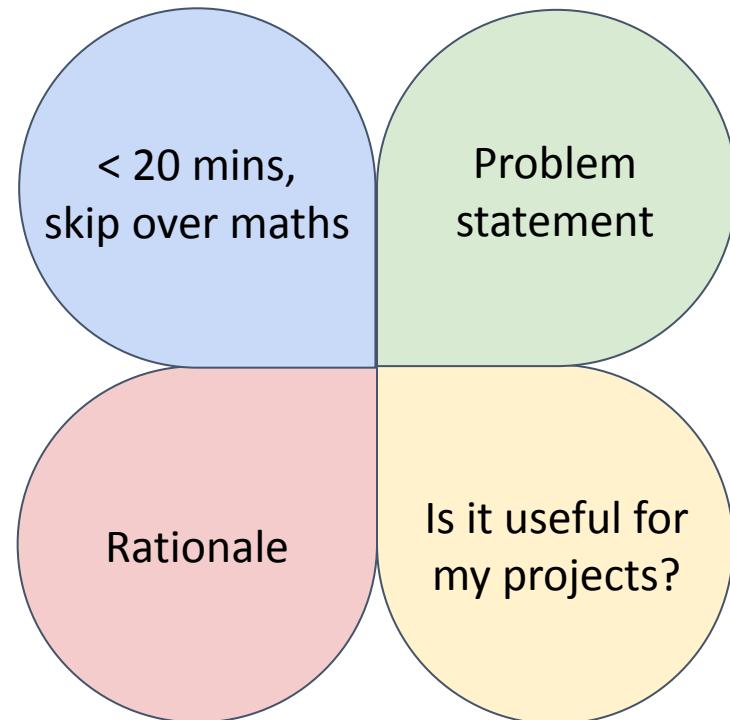


❑ How to read extensively?

Extensive Reading

❑ How to read extensively?

After the paper “safari”, you probably know its title/abstract/main figures.



Outline

- Introduction
- Extensive Reading
- Intensive Reading
- Summary



Tom and Jerry Reading – if only scientific journals were as fun!

Intensive Reading

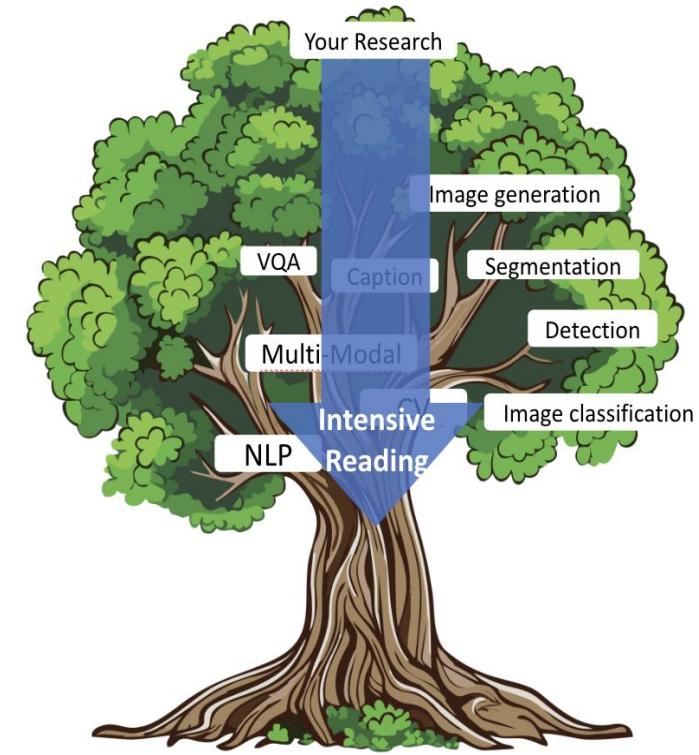
- reading in detail with specific learning aims and tasks

❑ Why to read intensively?

get an in-depth and concentrated understanding of the topic
deepen the root of your knowledge tree
helps you to implement your ideas

❑ When to read intensively?

when you have gained an overall understanding of the topic
when you narrowed down your research topic
when you want to re-implement other's research or improve their results



How to read Intensively



The key idea:

read the paper in
three passes

How to Read a Paper

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ABSTRACT

Researchers spend a great deal of time reading research papers. However, this skill is rarely taught, leading to much wasted effort. This article outlines a practical and efficient *three-pass method* for reading research papers. I also describe how to use this method to do a literature survey.

Categories and Subject Descriptors: A.1 [Introductory and Survey]

General Terms: Documentation.

Keywords: Paper, Reading, Hints.

1. INTRODUCTION

Researchers must read papers for several reasons: to review them for a conference or a class, to keep current in their field, or for a literature survey of a new field. A typical researcher will likely spend hundreds of hours every year reading papers.

Learning to efficiently read a paper is a critical but rarely taught skill. Beginning graduate students, therefore, must learn on their own using trial and error. Students waste much effort in the process and are frequently driven to frustration.

For many years I have used a simple approach to efficiently

4. Glance over the references, mentally ticking off the ones you've already read

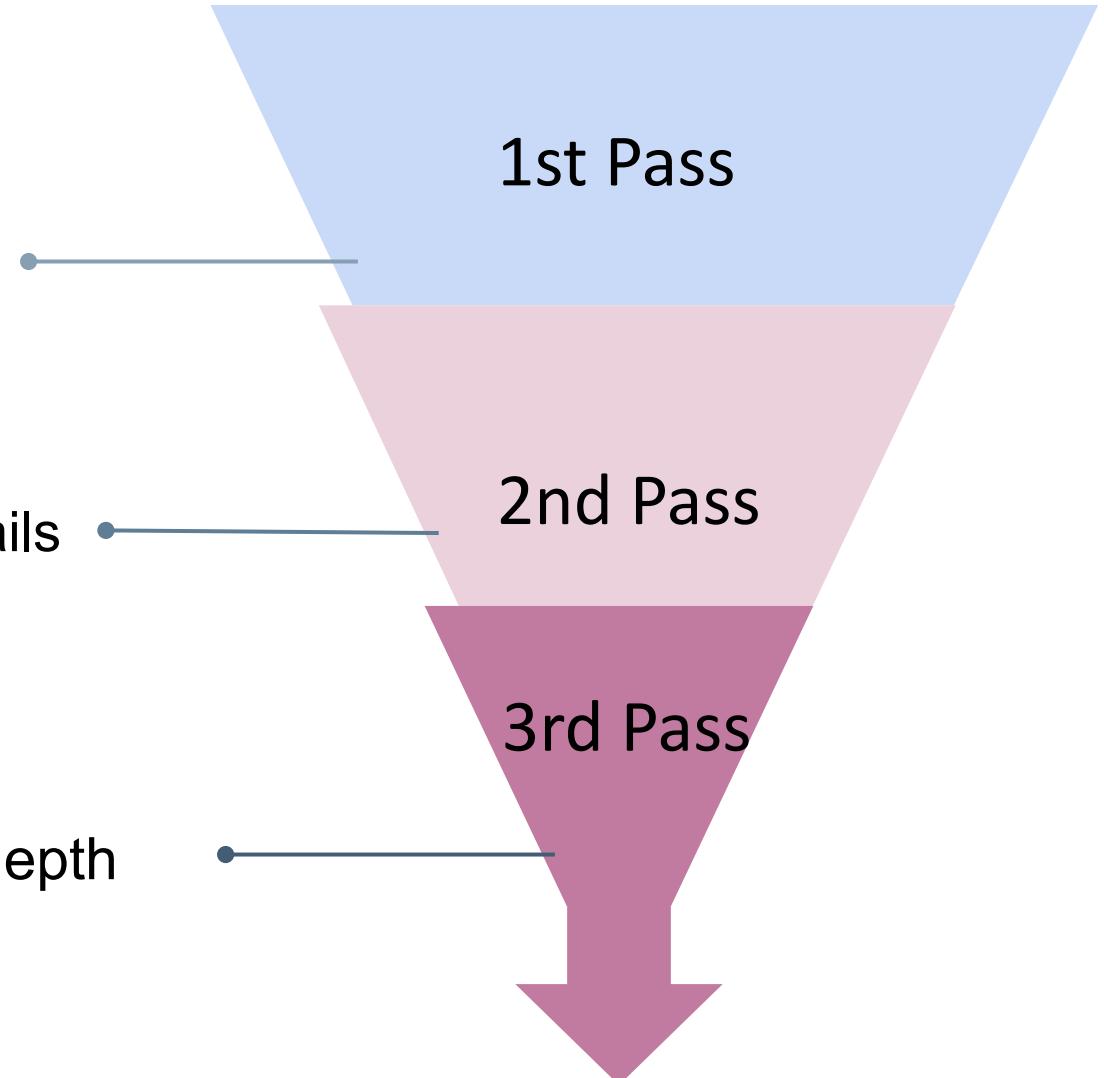
At the end of the first pass, you should be able to answer the *five Cs*:

1. *Category*: What type of paper is this? A measurement paper? An analysis of an existing system? A description of a research prototype?
2. *Context*: Which other papers is it related to? Which theoretical bases were used to analyze the problem?
3. *Correctness*: Do the assumptions appear to be valid?
4. *Contributions*: What are the paper's main contributions?
5. *Clarity*: Is the paper well written?

Using this information, you may choose not to read further. This could be because the paper doesn't interest you, or you don't know enough about the area to understand the paper, or that the authors make invalid assumptions. The first pass is adequate for papers that aren't in your research area, but may someday prove relevant.

The Three Pass Approach

gives you a general idea about the paper



lets you grasp the paper's content, but not its details

helps you understand the paper in depth

First Pass

title, abstract, and introduction

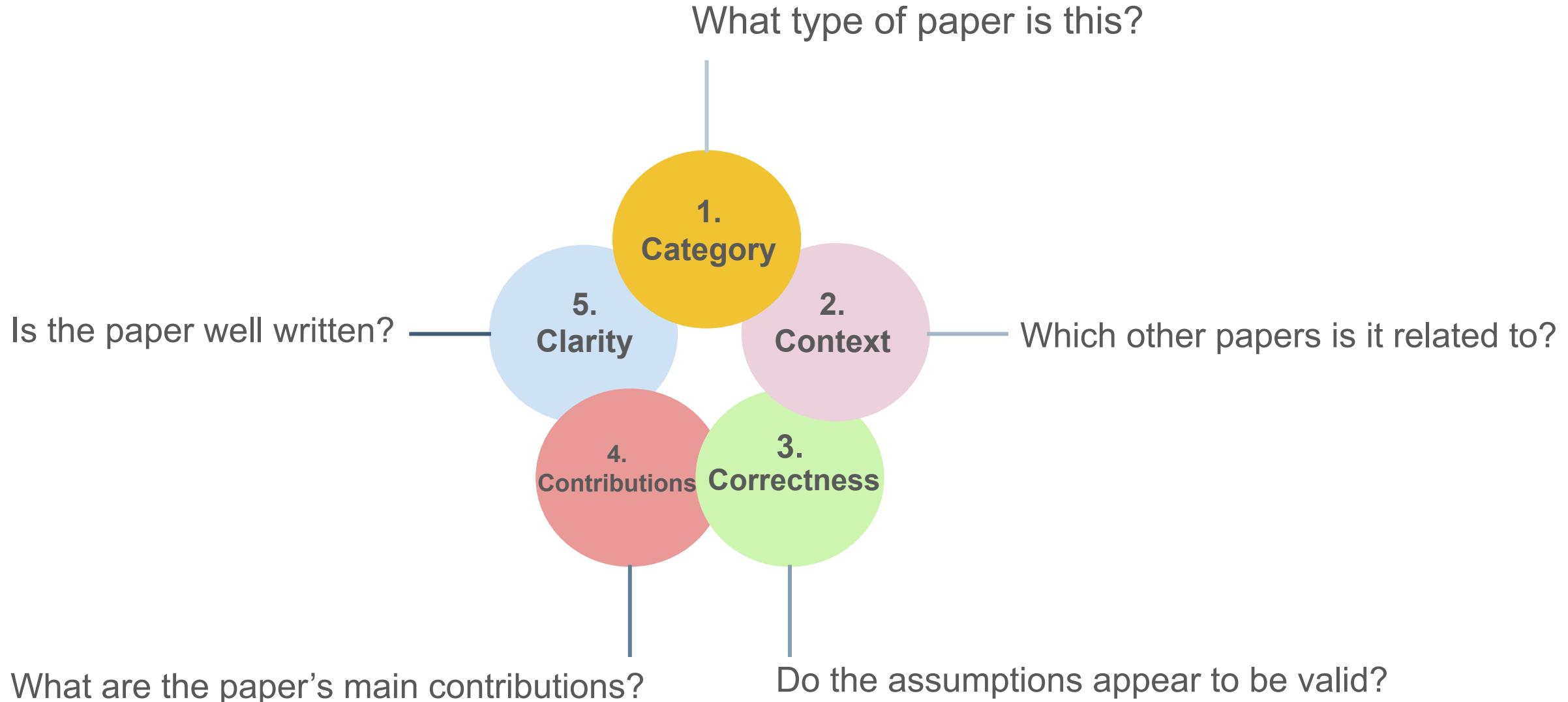
conclusions



section and sub-section headings, but ignore everything else

Glance over the references
mentally ticking off the ones you've
already read

End of first pass: 5 Cs



First Pass Key Points



You may choose **not to read further**



Enough for **non research area papers**



Most reviewers make **one** pass over papers



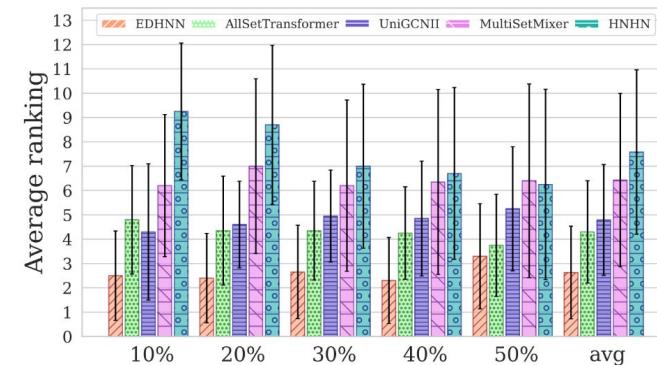
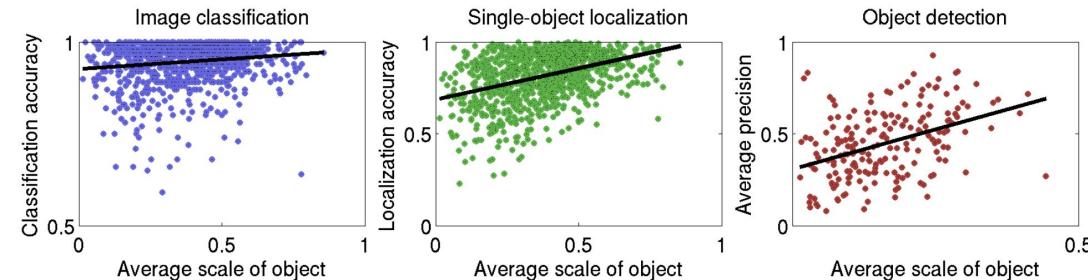
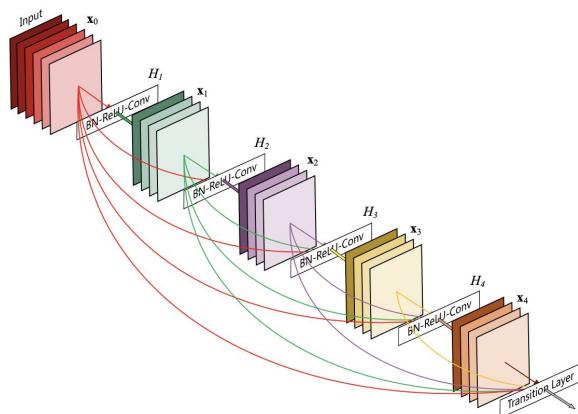
Choose **coherent** section and subsection titles and write comprehensive abstracts



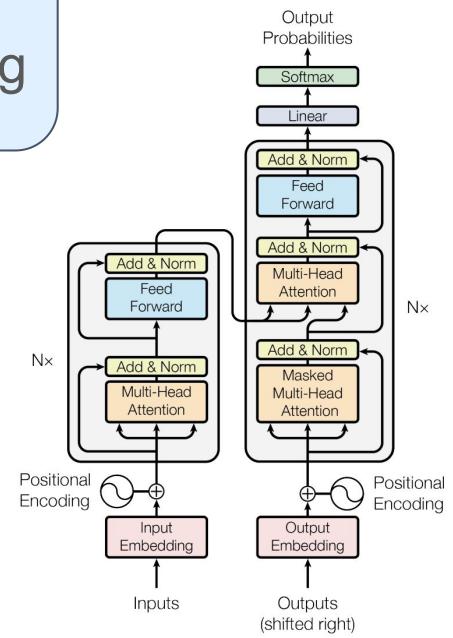
Second Pass

Read the paper with greater care, but ignore details such as proofs

1. Look carefully at the figures, diagrams and other illustrations in the paper.



2. Remember to mark relevant unread references for further reading



Second Pass Key Points



should take up to an hour



- you should be able to grasp the content of the paper

appropriate for a paper in which you are interested, but does not lie in your research speciality

Second Pass Key Points

If you don't understand paper:

1

Set the paper aside, hoping you don't need to understand the material

2

Return to the paper later, perhaps after reading background material

3

Persevere and go on to the third pass.

Third Pass

- To fully understand a paper
- The key: attempt to **virtually re-implement** the paper
- Attention to the algorithms and pseudo codes
- Requires great attention to detail
- challenge every assumption

Algorithm 1: ASA-GNN Approach

Input: TG $\mathcal{G} = (\mathcal{V}, \mathcal{R}, \mathcal{P}, \text{Weight}, \mathcal{E})$,
number of layers K ,
neighbourhood sample size \hat{z} ,
 $\text{Weight} : \{w_1, \dots, w_m\}$,
non-linear activation function σ .

Output: embedding representation h_v^K of each node v

```
1  $h_v^0 \leftarrow r_v, \forall v \in \mathcal{V}$ ; // Initialization
2 for each layer  $k = 1, 2, \dots, K$  do
3   for each  $i = 1, 2, \dots, \hat{z}_k$  do
4     // Neighbor sampling
5      $\mathcal{N}_v^i \leftarrow$  select neighbors from  $\mathcal{N}_v$  according to Eq. (7);
6     if  $c_v = 1$  then
7       | over-sample neighbors according to Eq. (8);
8     end
9   end
10  for each node  $v \in \mathcal{V}$  do
11    // Aggregation
12     $\alpha_{v,v'}^k \leftarrow$  Eq. (11) ;
13     $h_{\mathcal{N}_v}^k \leftarrow$  Eq. (18) ;
14     $g_v^k \leftarrow$  Eq. (14) ;
15     $h_v^k \leftarrow$  Eq. (15) ;
16  end
17   $h_v^k \leftarrow h_v^k / \|h_v^k\|_2, \forall v \in \mathcal{V}$  ;
18 end
```

Third Pass

you should think about how you yourself would present a particular idea

jot down ideas for future work

can take about four or five hours for beginners, and about an hour for an experienced reader



Third pass checklist

-  Be able to reconstruct the entire structure of the paper from memory
-  Be able to identify its strong and weak points
-  Be able to pinpoint implicit assumptions, missing citations to relevant work, and potential issues with experimental or analytical techniques.

Summary

- Two strategies: extensive reading and intensive reading
- **When** and **why** and **how** to read Extensively/Intensivly
- Intensive reading: Three pass approach

Thanks!

