2110607

Reading Scientific Articles

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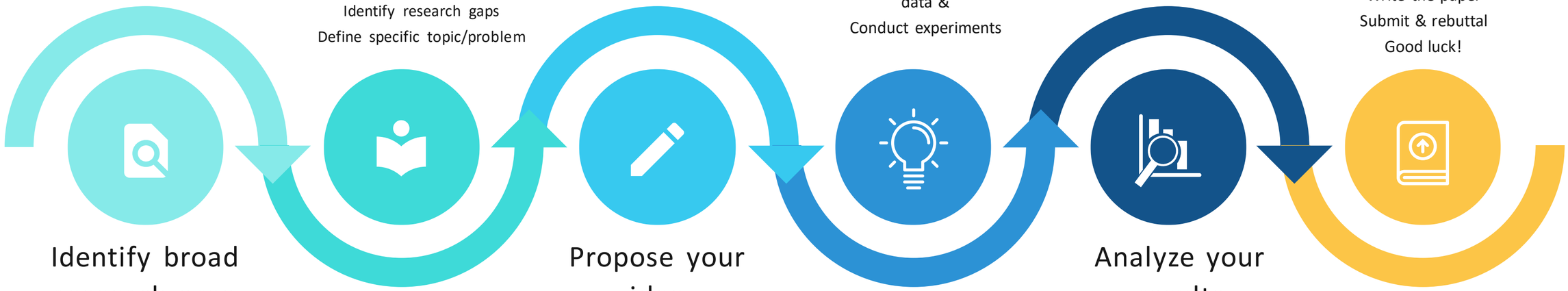
AGENDA

1. Research Process
2. Research vs Review articles
3. Structure of Research articles
4. How to read papers
5. Motivation, Research question, Contribution
6. Dr. Proadpran’s table

Research Process

modified from https://www.site.uottawa.ca/~bochmann/Projects/how-to-do-good-research/index.html
& https://www.cs.auckland.ac.nz/~cristian/i2rcs/ian_lecture02.PDF



Identify broad research area

Review state of the art
Understand the field

Identify research topic

Conduct literature review
Identify research gaps
Define specific topic/problem

Propose your idea

Propose your own methods to solve the problems

Show that your idea works

Choose methodologies Collect data &
Conduct experiments

Analyze your results

Interpret data &
Analyze the results

Publish your work

Choose conference/journal
Write the paper
Submit & rebuttal
Good luck!

modified from https://doi.org/10.34193/EI-IG-5920

Research Articles

- To conduct and report a detailed, original research study. It presents the authors unique investigation of a specific research question.
- It is based on original research that has been conducted by the paper's authors. This is known as primary literature.
- The authors formulate a research question, collect data, and conduct an original study.
- It reports each step of the study in detail. This includes an abstract, motivation, research question, methodology, results, discussions, contributions, and suggestions for further research.
- Word count varies. Usually ranges between 3,000-6,000 words. Some journals allows up to 12,000 words.

Review/Survey Articles

- To critically analyze previously published literature on a specific topic.
- It is based on existing published articles. It does not report any original research. This is known as secondary literature.
- The authors select a specific topic and then summarize existing literatures on that topic to present an overview of the topic's current state of understanding.
- It identifies and reports commonalities between the results of the chosen studies. If there are discrepancies then the authors try to provide reasons for conflicting results. They also report problems and analyze gaps.
- Word limit usually ranges between 3,000-5,000 words

WHAT ARE THE KEYWORDS FOR SURVEY PAPERS?

Structure of Scientific Research Articles

modified from https://libguides.usc.edu/evaluate/scholarlyarticles

Abstract	Introduction	Literature Review	Methodology	Results	Discussion	Conclusion	References
The abstract, generally written by the author(s) of the article, provides a concise summary of the whole article. Usually it highlights the focus, study results and conclusion(s) of the article.	In this section, the authors introduce their topic, explain the purpose of the study, and present why it is important, unique or how it adds to existing knowledge in their field. Look for the author's hypothesis or thesis here.	Many scholarly articles include a summary of previous research or discussions published on this topic, called a "Literature Review". This section outlines what others have found and what questions still remain.	Find the details of how the study was performed in this section. There should be enough specifics so that you could repeat the study if you wanted.	This section includes the findings from the study. Look for the data and statistical results in the form of tables, charts, and graphs. Some papers include an analysis here.	This section should tell you what the authors felt was significant about their results. The authors analyze their data and describe what they believe it means.	Here the authors offer their final thoughts and conclusions and may include: how the study addressed their hypothesis, how it contributes to the field, the strengths and weaknesses of the study, and recommendations for future research. Some papers combine the discussion and conclusion.	

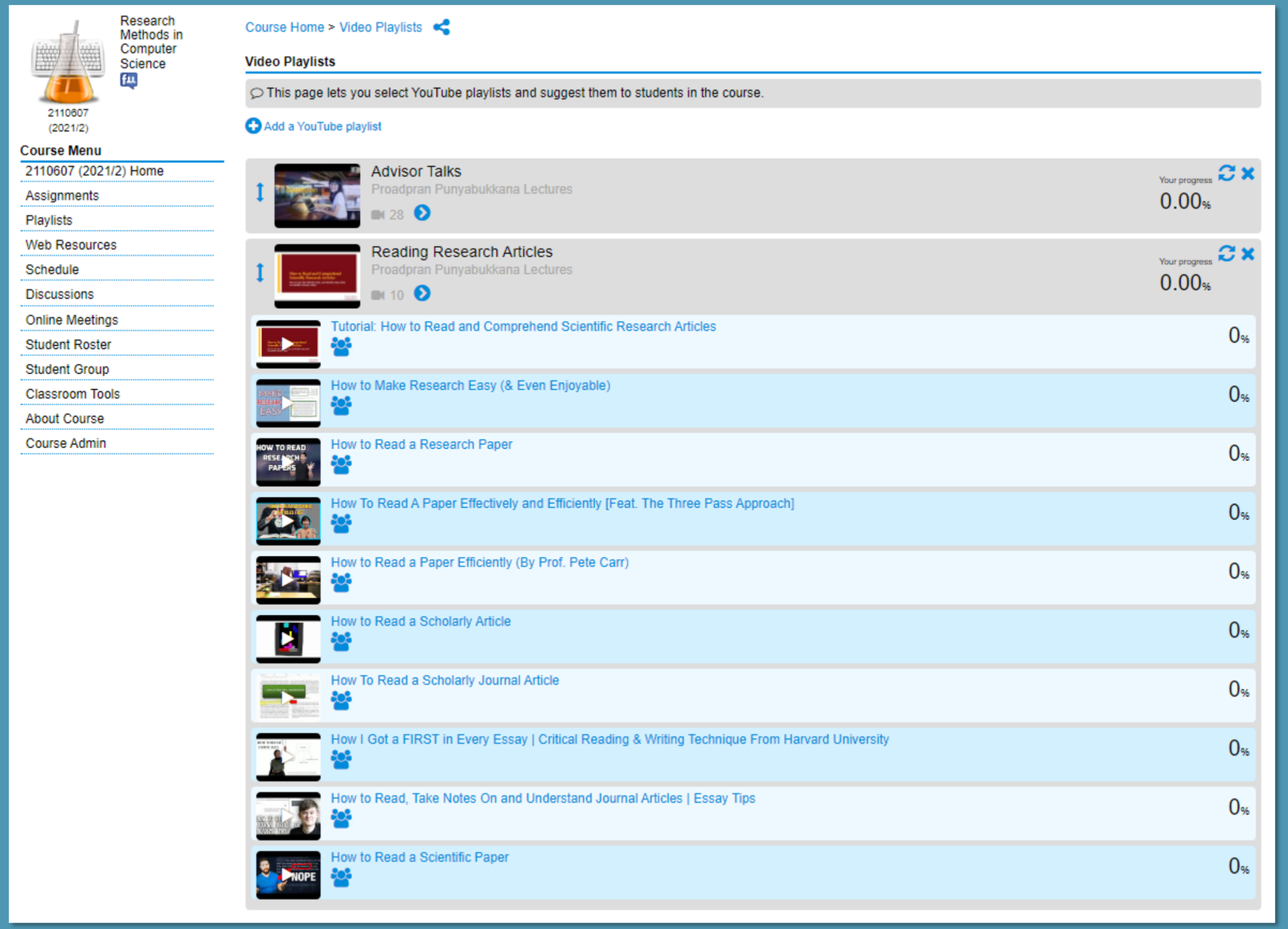
WHAT IS THE SEQUENCE WHEN YOU READ THE PAPERS?

Do you need to read every article when doing literature review?

https://gradcoach.com/how-to-read-journal-articles-quickly-efficiently/

- You don’t need to read every single journal article covering your topic – focus on the most popular, authoritative and recent ones.
- You don’t need to read every word of every article. To start, you just need to get a high-level understanding of the literature, which you can get by focusing on three key areas in each journal article. They are (1) the abstract, (2) the introduction and (3) the conclusion.
- Once you’ve narrowed down your focus and have a core set of highly relevant, highly authoritative articles, you can dive deeper into them, paying closer attention to the methodology and analysis findings.

How to Read a Paper



How to Read a Paper - The Three-Pass Approach

BY S. KESHAV

http://www.sigcomm.org/sites/default/files/ccr/papers/2007/July/1273445-1273458.pdf
Summarized by https://derekchia.com/how-to-read-a-research-paper-3-pass-approach/

First Pass

5-10 mins

Read the title, abstract, introduction, identify sections, sub-section headings and conclusion. Check the references to mentally tick off those that you have read.

Ignore everything else.

At the end of First Pass, you should be able to answer the five C's:

- Category: What is the category of this paper? Is it to provide measurement for experiments? Does it analyze an existing system? Or does it describe a research prototype?
- Context: What other papers did this paper cited? What are the theoretical bases used to analyze the problem?
- Correctness: Do the assumptions appear to be valid? Are the assumptions made similar to something you have come across?
- Contributions: What is new / novel about this paper that the researcher wants to put across?
- Clarity: Is the paper written succinctly?

Second Pass

1 hr

Read paper with greater care but ignore details such as math proofs.

As you read, have these questions in mind and try to answer them. Jot down and make comments in the paper.

- Are the figures, diagrams and illustrations making sense? Are the axes labelled properly? Were the conclusions statistically significant?
- Are there any new / unread references? Mark them down for future reference - you may want to read them.

You should be able to summarize the main objective of the paper with supporting evidence to someone else.

After the First and Second Pass, you can decide to (i) set the paper aside, (ii) return to the paper later after reading some background materials or (iii) continue with the Third Pass and spend more time in the details.

Third Pass

1-5 hrs

To fully understand a paper, you need to be able to fully implement the paper by going through the math proof, examining/running their codes or running the experiments .

A good paper should be reproducible. You may email the authors for clarifications. During this pass, You should gain a deeper understanding in the paper's innovation, identify assumptions and missing details.

This pass requires great attention to detail and you should be challenging every assumption in every statement. At the end of this pass, you should be able to identify its strong and weak points.

Sometimes, there might be missing assumptions or prior relevant work that the author missed out. There could also be potential issues with the experimental techniques or even faulty data sources or inherent bias in the data.

Motivation

Why do they want to work on this? What are the problems they wish to solve?

Research question/Thesis statement

What is their goal? What to do?

Proposed method

How are they going to solve it?

Evaluation

How to measure the success?

Contribution

What are the effects or benefits to Computer Science and more?

Dr. Proadpran's Table

HTTPS://DOCS.GOOGLE.COM/SPREADSHEETS/D/1HDSP4MWUKBUBM50UM0WI9UMZKSVLJGTCXF1V56ETDQC/EDIT?USP=SHARING

Title	Authors	Year	Source	Ranking (SJR)	Domain	Motivation	Research question	Proposed methods/ Techniques	Evaluation	Contribution	Data
Design of mobile garbage collection robot based on visual recognition	Zhoulin Chang, Linzhao Hao, Hanhong Tan, Wenjing Li	2020	2020 IEEE 3rd International Conference on Automation, Electronics and Electrical Engineering	-	Visual recognition, Deep learning	Applying robots to various fields instead of manual operation can reduce production costs, improve work efficiency and improve the market competitiveness of enterprises. So, replace human workforce with robots can greatly save the manual of garbage cleaning and has a good application prospect.	Can we replace human workforce with robots in garbage collection, sorting and cleaning?	Robot with camera, robotic arm and laser scanner controlled with raspberry pi 4B, STM32 Main Control board and MobileNetv3-SSD deep learning algorithm will be used to detect and classify garbage.	The experiment verification is designed to test the main functions of the system which are the correctness of the design of the target recognition unit and the whole sorting system. The evaluation criteria used in the experiment are the false detection rate and the missed detection rate.	This robot improve on the normal garbage robots in being able to navigate the environment, thus allow it to patrol and collect garbage in an area which will lead to reduced wastes in environments.	Sensor's data, Road definition data
A Vision-based Robotic Grasping System Using Deep Learning for Garbage Sorting	Chen Zhihong, Zou Hebin, Wang Yanbo, Liang Binyan, Liao Yu	2017	Proceedings of the 36th Chinese Control Conference	-	Machine vision, Deep learning	The environment has continued to worsen with problems related to atmospheric pollution, ecological disasters, water pollution and cities besieged by garbage. The drawback of low efficiency for the manual sorting of garbage needs to be improved, being replaced by robotic grasping system.	Can we replace human workforce with garbage grasping machine in garbage sorting?	The grasping machine which has camera for image collection, conveyor belt for transporting and robotic arms for grasping the garbage will be used to sort garbage.	After the system were trained with 1990 pictures of wastes, it is tested with 199 pictures of them then evaluate it with accuracy of determining wastes and execution time.	With this machine, the garbage sorting system is improved from old garbage sorting system by being able to sort garbage more delicately.	1999 images of garbage captured from laboratory simulation.