(Writing a)

Literature Review

This set of slides was
edited from previous slides
used for this subject. --LeongHW

Highlights of Lecture

❑ Writing a Literature Review

❑ A Sample Literature Review

❑ Some General Guidance

❑ Additional Information

Highlights of Lecture: Writing a Literature Review

1. *Definition of literature review*
2. *Structure of a literature review*
3. *Process of writing a literature review*
4. *Evaluating primary research*
5. *Writing and presenting a literature review*
6. *General guidance*
7. *Additional information*

Required Core Capacities
for Researchers in Computer Science

- Critically reading papers
- Reviewing papers
- Writing papers
- Publishing papers
- Presenting papers
- Writing proposals
- Implementing algorithms

Research Steps

1. Choose a **question to investigate**
2. Identify a hypothesis related to the question
3. Make testable predictions in the hypothesis
4. Design an experiment to answer hypothesis question
5. Collect data in experiment
6. Determine results and assess their validity
7. Determine if results support or refute your hypothesis

A Research Journey
(Protein-Complex Detection)

(see different file)

Writing a
Literature Review

Writing a Literature Review

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2. *Structure of a literature review*
3. *Process of writing a literature review*
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Part 1:
Definition Of Literature Review
(What and Why)

Literature Review (WHAT)

A **literature review** (LR) is a text of a scholarly paper, which includes the **current knowledge** including substantive findings, as well as theoretical and methodological contributions to a particular topic.

LRs are secondary sources, and do not usually report new or original experimental work.

Literature Review (Where)

- LRs are not to be confused with book reviews

- A narrow-scope LR may be included as part of a peer-reviewed journal article presenting new research, serving to situate the current study within the body of the relevant literature and to provide context for the reader.

- LRs may also be part of graduate and post-graduate student work, including in the preparation of a thesis, dissertation, or a journal article.

- LRs are also common in a research proposal or prospectus .

Literature Review (What)

- A presentation of a collective critical reading of references

- A description of your topic area, supported by references

- A summary, discussion and critical analysis of academic work related to your research question

Literature Reviews (Why)

- Ideas about which approaches are likely to work, and which are the best
- If you find something similar, you can get
  - Ideas for how to implement your deliverable
  - Ideas for how to evaluate your deliverable
- The best ways to do things
  - E.g. identify the fastest search algorithm
- Justification for the approach that you are taking

Literature Reviews (Why)

- Knowledge of what everyone else has done so that you don't exactly replicate it
  - Without a literature review, you risk "reinventing the wheel"
  - If you find something similar you may have to slightly change what you are doing to make it novel, or build upon what you found

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Part 2:
Structure of a Literature Review
(What and How)

Structure of review articles

- Literature review is a type of research article
- Should conform to the **anatomy of a typical scholarly article**
  - Abstract
  - Introduction
  - Methods
  - Results
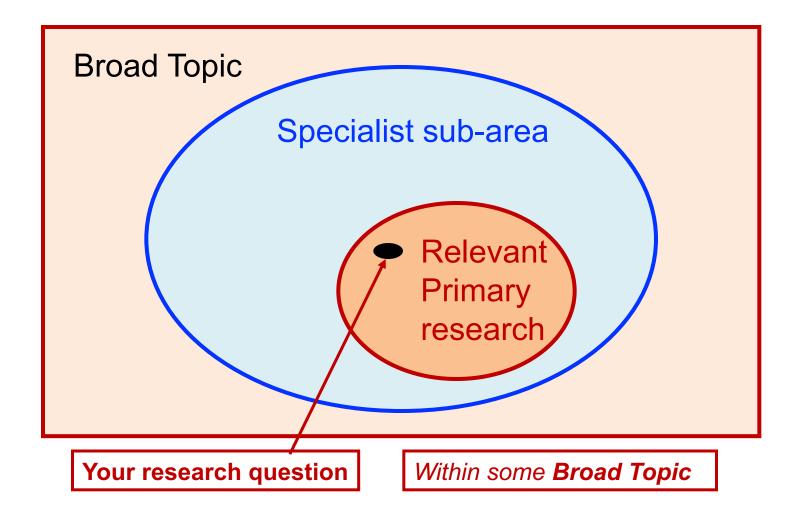 - Discussion
  - Conclusion
  - References

Recall IMRD?

Overall Structure [VIP]

- In this module, **we insist on a 3-part approach**
- **Part 1: Overview of your chosen broad topic**
  - The field that contains your research question
- **Part 2: Explanation of your sub-area**
  - The area containing your research question
- Part 3: In-depth analysis of research relevant to your research question
  - Critical evaluation of the *primary research papers* directly related to your research question

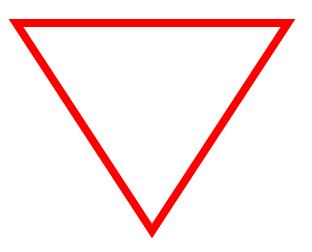Here, **VIP** mean Very Important in a Paper

Overall Structure (How)

Broad Topic

Specialist sub-area

Relevant Primary research

Your research question

*Within some **Broad Topic***

Organization of literature review

- A general organization looks like a funnel

  - **Broad topic**
  - **Sub-topics of interest**
  - **Your detailed
    research question**

How to *organize* past studies

- **Chronological**
  - By publication date
  - By trend
- **Thematic**
  - A structure which considers different themes
- **Methodological**
  - Focuses on the methods of the researcher, e.g., qualitative versus quantitative approaches

Making links between studies

Agreements

- *Similarly*, author B points to…

- *Likewise*, author C makes the case that…

- Author D *also* makes this point…

- *Again*, it is possible to see how author E agrees with author D…

Disagreements

- *However*, author B points to…

- *On the other hand*, author C makes the case that…

- *Conversely*, Author D argues…

- *Nevertheless*, what author E suggests…

Organizing Your Literature Review

- <u>Topical Order</u>—organize by main topics or issues; emphasize the relationship of the issues to the main "problem"

- <u>Chronological Order</u>—organize the literature by the dates the research was published

- <u>Problem-Cause-Solution Order</u>—Organize the review so that it moves from the problem to the solution

Organizing Your Literature Review

- <u>General-to-Specific Order</u>—(Also called the funnel approach) Examine broad-based research first and then focus on specific studies that relate to the topic

- <u>Specific-to-General Order</u>—Try to make discuss specific research studies so conclusions can be drawn

Organizing Your Literature Review

- <u>Known-to-Unknown Order</u>—Examine the current literature about the problem and then identify at the end what still is not known

- <u>Comparison-and-Contrast Order</u>—Show how research studies are similar to and different from each other

Conceptual models
(to help understanding)

- Conceptual models can help you understand how the different research fits together
  - Helps you decide upon an appropriate structure
- Choose a technique that you are comfortable with
  - Spider diagram of the different papers?
  - Research territory map?
  - List of keywords?
  - Write and repeatedly rewrite the review (rapid prototyping)

Summary table of literature
Atmospherics in service environments

Citation	Sample	Environment	Method	Conclusions
Colour				
Bellizzi, Crowley and Hasty (1983)	125 Adults	Furniture store	Laboratory experiment Photographic slide simulations	Warm and cool colours created different emotional responses. Customers view red retail environments as more negative and unpleasant than blue.
Bellizzi, & Hite (1992)	70 Adult women 107 Students	Televisions shown with different colour backgrounds Furniture stores	Laboratory experiments Photographic slide simulations	Study based on PAD affect measures and approach-avoidance behaviours. More positive retail outcomes occurred in blue environments than red.
Music				
Smith and Curnow (1966)	1100 Supermarket shoppers	Retail store	Field experiment	Time in store reduced with loud music but level of sales did not.
Milliman (1982)	216 Shoppers	Supermarket	Field experiment	The tempo of background music influenced the pace at which customers shopped. Slow tempo music slowed customers down but resulted in increased volume of sales.
Hui, Dubé and Chebat (1997)	116 Students	Bank branch - waiting for service.	Laboratory experiment Video simulation	The positive impact of music on approach behaviours is mediated by an emotional evaluation of the environment and the emotional response to waiting. Pleasurable music produced longer perceived waiting times.
Lighting				
Areni and Kim (1994)	171 Shoppers	Wine store	Field experiment	The investigation found that brighter in-store lighting influenced shoppers to examine and handle more of the merchandise in the store
Summers and Hebert (2001)	2367 Customers	Hardware store Apparel store	Field experiment	Confirmed Areni and Kims (1994) results. Increased levels of lighting will produce arousal and pleasure and increase the approach behaviours of customers.

Sample LS
By Sriganesh Srihari, NUS

(see different file)

Writing a Literature Review

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3. *Process of writing a literature review*
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Part 3.

Process of Writing a Literature Review

Start from Secondary Research

- Books, literature reviews and web pages can give an overview of a research area

- These can help you to learn what a research area is about before having to read primary research

- Literature reviews should always start with reading secondary research, if possible
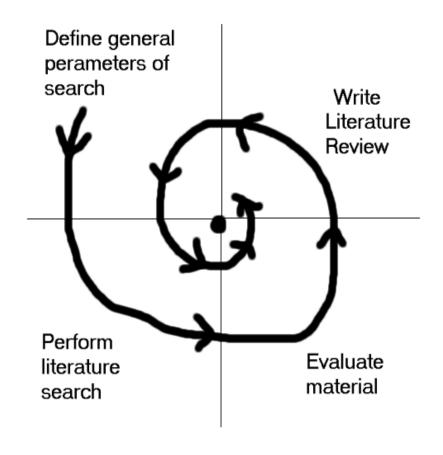
Reading books

- Not enough time to read many books all the way through
  - Can still use as a reference source, just read relevant chapters/sections
- Books tend to be less controversial and may also summarise the pros and cons of topics discussed (i.e. like a mini-literature review)
- The introduction of a relevant book should summarize the research area

The literature review process

- The literature review process should help shape
  - what you do, and
  - how you do it
- You should be prepared to change your mind or alter your approach in response to what you discover
- Always write up the literature review soon after reading the papers – otherwise you may forget what you have read
- The finished review should also shape how others perceive the quality/value of your work

The literature review process

The first role of
a literature review
is often to learn
the topic.

Will continue to edit
the remainder of the slides
from here onwards.

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Part 4:
Evaluating Primary Research

Primary research is research papers containing new findings - not a literature review

Your evaluation 1

- Read the abstract and conclusions first
  - Is it really relevant and useful to you?
  - Summarise how it is useful
- Read the whole paper
  - Are the methods correct?
  - **[BOUNDARIES]** Is the scope of the study appropriate for your use?
  - Make sure that you understand the findings
- **[CONCLUSIONS]** Read the abstract and conclusions again
  - To make sure that you have understood the results and their context

Your evaluation 2

- [**LIMITATIONS**] The discussion of limitations
  - Should be near the end of the paper
  - Read to make sure that the findings really apply to the situation in which you are using them
- How significant is the work?
  - Does it make a major contribution?
  - How does it complement other papers?

BOUNDARIES, LIMITATIONS, CONCLUSIONS

Multiple Papers

- Need more than one paper about important points
- Discuss points of agreement
- Discuss points of difference
  - In computing there can be differences of opinion, but should not be big differences of fact
  - The papers may try different techniques to solve the same problem
  - Must use your own opinion on differences, but try to argue your case

Selective reading

- What to do if you do not understand the paper
  - Too complex maths
  - Too much terminology
  - >>Consider reviewing the outcomes of the research and not the technical details [black box approach]
- When to just read the abstract
  - If it is clear that the paper is not relevant.
  - Can still cite the paper in the literature review if it is near to being relevant and explain briefly why it is not relevant
    - This shows that you have done a better literature review
    - Sometimes clarify the difference from the exiting concepts, methods, results, etc

Common mistakes 1

- Your own opinions without backup, no matter how strongly you believe them (it does not count!)
  - E.g. Microsoft is good/rubbish
- Discussing irrelevant literature
- Short literature reviews
  - Have not demonstrated the literature review skill
  - Have not shown that you understand the context of your work
- Not targeting the review at an appropriate audience

Common mistakes 2

- Not joining the literature together into a coherent whole
- Using chronological order, unless necessary
- Including poor reference sources without comment
- Too small
- *Not targeting the review to the research question*
- Missing an important reference
  - Your work is seriously undermined if you write about something as though you are the first, but someone else has already published on the subject

Swales' perspective for advices

- "not sufficiently theme-based"
- "not structured according to the issues"
- "insufficiently informed by the research hypotheses"
- "boringly chronological"
- "just describe each piece of research one by one without adequate linkage"

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Part 5:
Writing and Presenting a Literature Review

Citation styles

- **Information prominent citation**

  Example:
  - *For viscoelastic fluids, the behaviour of the time-dependent stresses in the transient shear flows is also very important (Boger et al., 1974).*

- **Author prominent citation**

  Examples:
  - *Close (1983) developed a simplified theory using an analogy between heat and mass transfer and the equivalent heat transfer only case.*
  - *Several authors have suggested that automated testing should be more readily accepted (Balcer, 1989; Stahl, 1989; Carver & Tai, 1991).*

Active or passive voice

- You should use, where appropriate, both active and passive voices

- As a general rule, use active voice unless there is good reason not to

Making links between studies

Agreements

- *Similarly*, author B points to…

- *Likewise*, author C makes the case that…

- Author D *also* makes this point…

- *Again*, it is possible to see how author E agrees with author D…

Disagreements

- *However*, author B points to…

- *On the other hand*, author C makes the case that…

- *Conversely*, Author D argues…

- *Nevertheless*, what author E suggests…

Reporting verbs

- **Argue**
- **Assert**
- **Assume**
- **Challenge**
- **Claim**
- **Contend**
- **Contradict**
- **Describe**
- **Dispute**
- **Emphasize**
- **Establish**
- **Examine**
- **Find**
- **Maintain**

- **Note**
- **Object**
- **Observe**
- **Persuade**
- **Propose**
- **Prove**
- **Purport**
- **Recommend**
- **Refute**
- **Reject**
- **Remark**
- **Suggest**
- **Support**

Verb tenses – Present

- **A statement about what the thesis, chapter or section does**

  Examples:

  – *This thesis presents a report of an investigation into …….*

  – *This chapter thus provides a basis for the next.*

  – *In this section, the results from the first set of experiments are reported.*

- **A statement of a generally accepted scientific fact**

  Examples:

  – *There are three factors that control the concentration of aluminum in seawater.*

  – *The finite rate coefficients have an effect on heat transfer through a horizontal porous layer.*

Verb tenses – Present

- **A review of current research work, or research work of immediate relevance to your study.**

  Example:

  – *Schulze (2002) concludes that hydraulic rate has a significant effect on future performance.*

- **Comments, explanations and evaluative statements made by you when you are reviewing previous studies.**

  Examples:

  – *Therefore, this sequential approach is impractical in the real world where projects are typically large and the activities from one stage may be carried out in parallel with the activities of another stage.*

  – *The reason for this anomalous result is that the tests were done at low hydraulic rates at which the plastic packing was not completely wetted.*

Verb tenses – Past

- **Report the contents, findings or conclusions of past research**

Examples:

– *Haberfield (1998) showed that the velocity of many enzyme reactions was slowed down if the end product had an increased paramagnetism.*

– *Allington (1999) found that the temperatures varied significantly over time.*

Verb tenses – Present perfect

- **In citations where the focus is on the research area of several authors**

Examples:

– *Several studies* **have provided** *support for the suggestion that the amount of phonological recoding that is carried out depends on orthographic depth (Frost, 1994; Smart et al, 1997; Katz & Feldman, 2001, 2002).*

– *Joint roughness has been characterized by a number of authors (Renger, 1990; Feker & Rengers, 1997; Wu & Ali, 2000).*

- **To generalize about the extent of the previous research**

Examples:

– *Many studies* have been conducted *in this field.*

– *Few researchers* have examined *this technique.*

– *There* has been *extensive research into.........*

The Writing Process

- Rough Draft
- Final Draft
- Edit
- Edit Again

IMPORTANT!
This is a plan.
Give approx. dates
Review this plan often

Show others

Have someone else look at your literature review for

- **Clarity**
  - Can they understand what you're trying say?
- **Flow**
  - Does the organization make sense?
- **Completeness**
  - Are there areas left out?
  - Questions left unanswered?
  - Statements without citations?
  - Are there any logic flaw?

A Good Literature Review is:

- **Focused** - The topic should be narrow. You should only present ideas and only report on studies that are closely related to topic.

- **Concise** - Ideas should be presented economically. Don't take any more space than you need to present your ideas.

- **Logical** - The flow within and among paragraphs should be a smooth, logical progression from one idea to the next

- **Developed** - Don't leave the story half told.

- **Integrative** - Your paper should stress how the ideas in the studies are related. Focus on the big picture. What commonality do all the studies share? How are some studies different than others? Your paper should stress how all the studies reviewed contribute to your topic.

- **Current** - Your review should focus on work being done on the cutting edge of your topic.

Summary table

- It is useful to prepare.

- Such a table provides a quick overview that allows the reviewer to make sense of a large mass of information.

- The tables could include columns with headings such as
  - Author
  - type of study
  - Sample
  - Design
  - data collection approach
  - key findings

Pitfalls

- Vagueness due to too much or inappropriate generalizations
- Limited range
- Insufficient information
- Irrelevant material
- Omission of contrasting view
- Omission of recent work

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Part 6:

General Guidance for Writing a Literature Review

General Guidelines to Writing a Literature Review

- Introduce the literature review by pointing out the major research topic that will be discussed
- Identify the broad problem area but don't be too global (for example, discussing the history of education when the topic is on specific instructional strategy)
- Discuss the general importance of your topic for those in your field

General Guidelines to Writing a Literature Review

- Do not attempt to cover everything written on your topic

- You will need to pick out the research most relevant to the topic you are studying

- You will use the studies in your literature review as "evidence" that your research question is an important one

General Guidelines to Writing a Literature Review

- It is important to cover research relevant to all the variables being studied.

- Research that explains the relationship between these variables is a top priority.

- You will need to plan how you will structure your literature review and write from this plan.

Literature Review

- After reviewing the literature, summarize what has been done, what has not been done, and what needs to be done

- Remember you are arguing your point of why your study is important!

- Then pose a formal research question or state a hypothesis—be sure this is clearly linked to your literature review

Literature Review

- All sources cited in the literature review should be listed in the references

- To sum, a literature review should include introduction, summary and critique of journal articles, justifications for your research project and the hypothesis for your research project

Common Errors Made in Lit Reviews

- Review isn't logically organized
- Review isn't focused on most important facets of the study
- Review doesn't relate literature to the study
- Too few references or outdated references cited
- Review isn't written in author's own words
- Review reads like a series of disjointed summaries
- Review doesn't argue a point
- Recent references are omitted

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Part 7:
Additional information

Plagiarism

- Plagiarism is passing off somebody else's work as your own

- In a literature review you are discussing other people's work so must clearly reference it

- In this module you must **NEVER** copy an entire phrase or sentence even if it is in quotes and properly referenced
  - If you cannot describe something in your own words then you must not include it in your literature review.

- If you paraphrase other people's ideas you still need to reference them

Plagiarism includes (Galvan, pg. 89):

1. Using another writer's words without proper citation
2. Using another writer's ideas without proper citation
3. Citing a source but reproducing the exact word without quotation marks
4. Borrowing the structure of another author's phrases/sentences without giving the source
5. Borrowing all or part of another student's paper
6. Using paper-writing service or having a friend write the paper

Referencing your work

- You MUST reference your work
- This means giving the author name and publication date for all ideas and facts you have used (Harvard format)
- List the sources at the end (Harvard format)
- Failure to reference your work is Plagiarism and is an automatic fail.

Harvard reference style

- You must follow the university Harvard style
- http://asp.wlv.ac.uk/Level5.asp?UserType=6&Level5=3165 (OR Google *Harvard site:wlv.ac.uk)*
- Smith (1999) says that C++ is faster than Java.
- C++ is faster than Java (Smith 1999).

SMITH, T. (1999) Programming. *Programming Journal,* 21(5), pp. 61-73.

SMITH, R. (1999) *Programming*. London: Birkett Computing.

Do not use numbers in brackets [1] – this is not Harvard.

Writing tips

- Structure to present an argument, discussing similar papers together
  - Do not list the papers and write separate reviews
- Explain the useful information that each paper gives and compare and contrast to other similar papers
- Build an argument that will support the main aim of your thesis (or papers, proposals)
  - What you are doing/How you are going to do it/Why you are doing it
- Show how what you are doing is different to what has been done before

References and Bibliography

- Reference list
  - List of books, articles etc. that you have cited in your thesis
- Bibliography
  - List of books, articles etc. that you have not cited but have used in some way

End with Case Study

The research process
for research in
protein complex detection