

Literature Review

C of R Ch.3, Ch. 4

Research Methodology in Computer Science
CSCI 514

Literature review is much more than a list of separate reviews of articles.

- It defines and limits the problem you are working on.
- It helps with avoiding unnecessary duplication.
- Review should give an idea of the work that has been carried out in the subject area
- Prepares the reader for the study that is to follow

Literature Review Components

An effective review both analyses and synthesizes material:

- Comparison and contrast of different authors' views
- Groups authors who draw similar conclusions
- Criticizes methodology
- Notes areas in which authors disagree
- Highlights exemplary studies, Highlights gaps in research
- Shows how your study relates to previous studies
- Shows how your study relates to the literature in general
- Summarizes what the literature says

Planning Your Search

- Before you can use sources, you must find and evaluate them.

Reliable Sources

- Archived, peer-reviewed
- Conferences
 - Acceptance rate, ranking
- Journals
 - Impact factor (IF)
 - is a measure of the frequency with which the average article in a journal has been cited
- H-index
 - a number intended to represent both the productivity and the impact of a particular researcher, or a group of researchers

What are the limitations of these metrics?

Activity 1

- Find 3 conferences and 3 journals that are reputable in your field.
- List their name, metrics, and the sources of the metrics.

Planning Your Search

- Before you can use sources, you must find and evaluate them.
- Ask a librarian
 - CS librarian at WWU
 - “The only embarrassing question is the one you failed to ask but should have”
- Explore online databases
 - ACM
 - IEEE
 - Science Direct

Planning Your Search

- Follow bibliographical trails
 - The related work section in the publication
 - Bibliography or works cited (backward citation)
 - Citation indexing (forward citation)
 - The authors' publications
 - Scholar profiles, personal webpages

How to determine if a source is relevant?

- Read the abstract and conclusion
- Skim for section headings
 - Read the first and last paragraphs of those sections

“This speedy reading can guide your own writing and revision. If you do not structure your paper so your readers can skim it quickly, your paper has a problem.”

Reference Management Software

- Zotero, EndNote, Mendeley
- My favorite is Zotero (when it works)
 - Browser plugin to save citations
 - Integrates with Google doc, Overleaf, etc.
 - Collaborative
 - FOSS

Activity 2

- Select one of the 3 topics you submitted for homework 1
- For this topic, search for 5 full-length papers that are related to your topic
- Add them to a Zotero library – create one for CSCI-514
- Annotate each of the 5 papers with:
 - Search engine or database
 - Search terms
 - The rank/IF of the paper's venue
 - Summary of the paper and how it relates to your topic

Problems with Literature Reviews

- A common problem with literature reviews
- Writers present material from one author, followed by information from another, then another....
 - No synthesis of the literature
- What does it mean to synthesize something?

Synthesis of the Literature

- So, what is synthesis?
- The main idea is that you should have understood the literature you have read
- Should show that you understand the relationships between items of literature.
- So, what came first in your field, how it influenced later work, how each step forward in the research improved upon what came before it, and so on.

Synthesis of the Literature

- Will present your own view of the work you are describing.
- Should be critical of the literature
- Identify where the shortcomings of the work are,
- How the work could be improved upon
- In particular how your work will improve on the current state of the art

Problems with Lit Reviews

- Another major problem is
- Literature reviews are often written as if they stand alone
 - Few links to rest of thesis
- No clear relationship between literature review and hypothesis and methodology to follow
- At the end of your review ...
- Include a summary of what the literature implies and relate it to your work

Step 1: Reading Materials

- First step towards good literature review is comprehensive literature search
- Should get a good range of available literature in your area of study
- Keep in mind as you are searching
 - Age of material is relevant
- One recommendation, is to start from most recent sources and work backwards

Step 1: Reading and Asking Questions

- As you read literature, keep a list of questions in mind. Why do this?
- Helps you as you read your material
- Otherwise, you are not analyzing the papers as you read them
- Easy to become lost in what the authors are or are not saying

Step 1: Reading and Asking Questions

- Sample Questions

- What were the authors trying to discover?
- Why is this research important?
- What was measured? How was the data collected?
- What were the results?
- What do the authors conclude and to what do they attribute their findings?
- Can you accept the findings as true?
- How can you apply these findings to your own work?

Step 2: Take Notes on Your Reading

- Note taking should reflect your reading questions
 - Comment on methodology
 - Make connections between your project and what you are reading
 - Make a note of what you think about the material
 - Even comments like "These arguments are confusing" or "I don't understand this" may be useful

Step 2: Take Notes on Your Reading

It doesn't matter how you organize and write your notes as long as you:

- Keep track of difference between your ideas and those of other authors
- Make sure your notes are legible
- Need to be able to read them back!!!
- Remember to provide clear references including page numbers in case you want to look at the original material again, or cite it in your review ... This is important!!!

Step 3: Constructing Your Argument

- To write a cohesive literature review, must present a clear line of argument
- Take those critical comments you made in your reading notes and use them to express an opinion
- A well-argued literature review will demonstrate the following qualities:
 - A clear relationship between your arguments and the evidence
 - Your opinions are backed up with facts and theory in the literature

Step 3: Constructing Your Argument

- Differing opinions are accounted for, rather than ignored
 - Makes some attempt to acknowledge opposing viewpoints
 - Opposing viewpoints will be common for nearly all problems
 - Present preferences rather than 'sitting on the fence' or leaving it to the reader to draw conclusions
- The sections of the review are clearly connected

Literature Review Organization

- Develop an organization to the review
- Several ways to organize the review
 1. Chronological
 - From last to first or first to last by date
 - Can talk about the latest research and more historical or reference papers
 2. By Trend
 - If there are significant trends in a field can discuss the trends
 3. Methods Organized
 - by methods of research

Language

- Academic language attempts to be objective - criticisms of other author's works need to be fair
 - It is important to avoid a personalized tone
- Even if you think researcher's method was sloppy, his research appalling and his arguments ridiculous, it is not appropriate to say:
 - "this was terrible, sloppy research"
- Use more neutral language
 - If you say
 - "inconsistent sampling weakens the validity of the results", your readers will understand what you mean

Activity: Read the Sample Lit. Review and Answer the Following Questions:

1.Purpose and Structure

1. What is the purpose of the literature review in this paper?
2. How is the review organized? (e.g., chronologically, thematically, by method, etc.)

2.Connection to the Research Problem

1. How does the literature review help identify or motivate the research problem?
2. Are the gaps in the literature clearly explained?

3.Use of Sources

1. Are the sources current and relevant?
2. How effectively does the author summarize or critique past work?

4.Your Takeaways

1. What did you learn about writing a good literature review?
2. What techniques or strategies would you want to try in your own writing?