Literature Review & Information Gathering

Kwang In Kim

Overview

- What's a literature review and why do one?
- Framing a literature review.
- Searching literature – what literature?
- Analysis/synthesis – evaluation and interpretation of the data.
- Writing – presenting the review.

What's a literature review

- Uses **primary literature** as its data: **reports of original research**
  - Original research can be of any type: empirical, theoretical, methodological, analytical, critical.
  - Does not report new primary research itself.
- Seeks to describe, summarize, evaluate and/or integrate the content of primary literature
  - **More than a list of separate reviews** of individual articles.
  - Should compare and relate different contributions/findings.
- Has to have a **focus** and should be comprehensive
  - Discussing all of the more significant literature for a given focus.

Why do a lit review? (and when)

- Find out what to do (**before** your research can start)
  - Identify gaps or inconsistencies in the literature.
- Find out where to start (**first step** in your research)
  - Identify what exactly has already been achieved.
  - Identify information, methods, ideas that may be relevant for your work .
  - Avoid reinventing the wheel .
- Put your work into perspective (**final step**)
  - Relate what you achieved to existing knowledge .

Types of Literature Review

- Stand-alone
  - Survey.
  - Systematic review.
- Part of report
  - Proposals: discussing “state of the art” as baseline for the proposed research.
  - Research report: “related work” discussion.

Surveys

- Generic aim
  - Provide **comprehensive overview** on a topic of interest.
  - Establish what's been done / what is known.
- What surveys contribute
  - Capturing all significant work/results achieved until then
    - Save others the search, filtering and collation.
  - Providing structure: e.g. **taxonomy, classification**
    - Help others a research area more systematically.
    - Minimally a structure for the presentation, e.g. themes.
    - But sometimes more, e.g. "frameworks" that help with comparison/classification of (future) research in the field.

Surveys

- Some journals are dedicated to publishing surveys
  - e.g., ACM Computing Surveys.
- Also published in regular journals, but distinctly as survey.
- “Chapter 2” in many Masters & PhD dissertations
  - Aspiring to capture complete overview as foundation for further research on the topic.
- Great resource for getting started in a new topic area.

Systematic Review

- Specific aim
  - Focus on a **research question**.
  - Survey is more like groundwork before the research.
  - Systematic review is more like research in itself “to prove a point”.
- Concerned with rigor
  - Systematic identification, selection and analysis of literature (SRs have a method section, surveys usually don’t).
  - Aspiring to provide evidence (not “just” an overview).

Stages of a Review

- Framing
  - Formulating the problem.
- Searching and selecting literature.
- Analysis and synthesis.
- Writing.

Framing a Literature Review

- Formulating the problem
  - As with any research, be clear about the purpose of a literature review.
- Topic
  - What subject the review will cover.
- Type of review
  - Integrative, methodological, theoretical.
- Breadth versus depth
  - The range of subjects that are covered.
  - The level of detail at which the literature is reviewed.

Topic

- Exploratory review (before the research)
  - Topic doesn't need to be too specific to start with.
  - But make sure to develop focus (narrow the scope).
- Be prepared to alter the scope
  - As you find out more about a topic, be prepared to revise goals for the review.
  - Adapt breadth and depth depending on the literature and your own constraints.

Type of Review

- Integrative
  - Drawing conclusions from many separate studies.
- Theoretical
  - Discussing different theories (explanations of a certain phenomenon), e.g. comparing breadth, consistency and predictions.
- Methodological
  - Examining methods that have been applied to a problem (solutions that have been proposed).
  - e.g. comparing properties of systems, or algorithms.

Searching and selecting literature

- What is “the Literature”?
  - Primary sources.
  - Written by researchers for researchers.
  - **Peer-reviewed**.
- Secondary sources
  - Reference sources that might help in the search.
  - Not subject of the review itself.
- Controversial sources
  - Wikipedia, web sites, blog posts, popular science magazines, etc.

Scholarly peer-review

- Peer review
  - Subjecting an author's research and ideas to the scrutiny of **others who are experts** in the same field.
  - Gate-keeping and revision before archival publication.
  - Aims to maintain standards, and provide credibility.
- Limitations
  - Peer review standards vary hugely.
  - Publication economics: there are always more journals and conferences than good work.

Finding papers

- Search process
  1. Start with some relevant literature.
  2. Find all references.
  3. Screen papers, select only those that are **relevant** and **high quality**.
  4. Repeat 1-3.
- Remember to adapt the scope of the review, depending on the literature you find.

Finding papers

- Use Google Scholar, ACM DL, IEEE Explore.
- Heuristic for finding the “real literature”
  - Start with any paper.
  - Follow the references, and look up those papers’ references.
  - The papers that are referenced most are probably the real literature.
  - Use “cited by” to look up work that followed.
- Citations
  - Can help identify key literature.
  - But not necessarily a measure of quality or importance.

Collation: what to keep

- Critical analysis of the available literature
  - Is it going to be useful?
    - Relevant for your purpose?
    - Significant in the information provided?
  - Is it any good?
    - Quality of the research reported
    - Credibility and validity
- Keep track of all the stuff: **Make notes**
  - Keep full text copies of everything you include in the review.
  - Use a system to manage your bibliography.
  - Annotate your bibliography with your own paper summaries.

Analysis and Synthesis

- Structuring by concepts and themes
  - Concept- versus author-centric (Webster & Watson).
- Develop a clear framework for your analysis
  - What data to extract from individual articles.
- Might only emerge in the process of the review
  - Categories for whatever is being reviewed -> Classification.
  - Relationships between categories -> Taxonomies.
  - Properties, attributes of whatever is being reviewed -> qualitative and quantitative comparison.

Writing

- Introduction
  - Define topic: make it crystal-clear to the reader what the focus is.
  - Define terms: literature isn't consistent in use of terms and you have to make clear how you use terms.
  - Introduce the concepts around which the review is organized, and the parameters you use in your analysis.
- Body, where the review proceeds
  - Find a logical structure, e.g. by themes, approaches, categories, or chronologically.
- Conclusions

Writing Hints

- Don’t confuse lit review with an annotated bibliography
  - Discuss themes, referencing many sources simultaneously.
- You are reviewing, not summarizing
  - e.g., report on findings, not on specifics of how they were obtained.
  - if the reader wants to know more they can follow your reference.

Slides originally prepared by
Prof. Hans Gellersen, Lancaster University.