How to Effectively Conduct a Literature Review

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Motivation

There are three primary reasons to conduct a thorough literature review.

1) Avoid reinventing the wheel

One day you wake up with a great idea. You're so excited about your idea that you spend the majority of your time the next several weeks or months implementing it. Upon completion, you proudly submit an article to publish your accomplishment. Unfortunately, the reviewers inform you that you reinvented the wheel and reject your work for publication.

Conducting a thorough literature review can help avoid this situation. Check the literature to see if someone else has already implemented your great idea.

2) Identify gaps in prior knowledge

You know you want to conduct research on the effects of fidelity for virtual reality applications, but you also know that hundreds of papers have already been published on the topic. Do you have to give up on your research interest? No. Instead, you can identify questions to research by determining what questions have not been answered or even asked.

Conducting a thorough literature review can help identify gaps in prior knowledge. Check the literature to see what questions have been left unanswered or even asked.

3) Better understand a topic

You like new technologies like the Oculus Rift and the Leap Motion, but you don't know how they work or what they can be used for outside of their commercial purposes.

Conducting a literature review pertaining to a particular technology or topic can help you better understand it and to answer your own questions. The literature will usually provide insight into the evolution of state-of-the-art technology.

Types of Literature

There are many types of literature and "publications" available, especially due to the internet, but not all of these types are credible.

Credible Types of Literature
- Journal articles (e.g., American Educational Research Journal)
- Periodical articles (e.g., Communications of the ACM)
- Conference papers (e.g., IEEE Virtual Reality)
- Books (e.g., 3D User Interfaces: Theory and Practice)
- Book chapters
- Dissertations

Questionable Types of Literature
- Internet articles (e.g., CNN.com)
- Technical reports
- Academic posters

Non-credible Types of Literature
- Websites
- Wikis
- Blogs
- Twitter

Strategies for Searching Literature

There are a number of strategies for searching the literature. Here, we discuss a variety.

1) Keyword-based Search

Many resources for finding literature offer a search feature. By searching for keywords pertaining to your research, you can find many publications potentially related, though you'll need to process the publications to verify if they're relevant.

Strengths: Good for starting a literature review
Weaknesses: Requires processing several results that may be irrelevant; success is dependent on choice of keywords and terminology

2) Author-based Search

Often researchers will publish multiple articles pertaining to a single research focus. If you find a relevant article, you can search for other potential publications by the author of the relevant article.

Strengths: Usually yields other highly relevant publications
Weaknesses: Requires a highly relevant article to start with; requires searching by each author of a multi-author article

3) References-based Browsing

In addition to searching by authors, if you have a highly relevant article, you can browse its references for other potentially relevant publications. Usually, the article will provide some indication to the nature of each reference when it cites them.

Strengths: Usually yields other highly relevant publications
Weaknesses: Requires a highly relevant article to start with; yields older (sometimes significantly older) publications

4) Citations-based Browsing

Many digital libraries allow for you to view other articles that have cited the publication you have selected. By browsing these, you can usually find one or two relevant publications.

Strengths: Yields newer publications
Weaknesses: Requires a highly relevant article to start with; requires processing results that may be irrelevant; newer articles will likely not be cited yet

5) Venue-based Browsing

There are many journals and conferences geared toward specific topics. If you find a venue that publishes papers highly relevant to your research, you can browse the venue's volumes or proceedings to find other relevant publications.

Strengths: Yields highly relevant publications; affords a more-thorough review
Weaknesses: Requires processing a lot of publications and many will be irrelevant

Resources

There are many resources available to help you conduct a literature review. Both general and Computer Science specific resources are discussed here.

1) Google Scholar (http://scholar.google.com)

Google Scholar allows for general publications and patents to be searched.

Strengths: Good for topic-based searches and citations-based browsing; covers all topic areas
Weaknesses: Not every result links to a full-text version due to copyright issues

2) IEEE Xplore (http://ieeexplore.ieee.org/Xplore/guesthome.jsp)

IEEE Xplore is the digital library of the IEEE Computer Society.

Strengths: Good for topic-based searches, author-based searches, references-based browsing, citations-based browsing, and venue-based browsing
Weaknesses: Not good for research areas outside of Computer Science; only links to full-text versions of papers published by IEEE

3) ACM Portal (http://dl.acm.org)

ACM Portal is the digital library of the ACM.

Strengths: Good for topic-based searches, author-based searches, references-based browsing, citations-based browsing, and venue-based browsing
Weaknesses: Not good for research areas outside of Computer Science; only links to full-text versions of papers published by the ACM

4) Eugene McDermott Library
(http://www.utdallas.edu/library/resources/databases/database.php)

Provides access to databases arranged by title or even subject.

Strengths: Covers all topic areas
Weaknesses: Not every database is as good as IEEE Xplore or ACM Portal

5) Google (https://www.google.com)

The classic search engine.

Strengths: Covers all topic areas; can find full-text versions of publications on personal websites not indexed in databases and digital libraries
Weaknesses: Requires processing several irrelevant results

Best Approach to Processing Publications

Reading academic papers can be time-consuming, especially articles with ten or more pages. Hence, you need to be efficient in processing publications. Below is the best approach to effectively processing publications encountered during a literature review.

1) Read the title and abstract. If potentially relevant, proceed.
2) Read the introduction section. If still potentially relevant, proceed.
3) Read the conclusions section. If still potentially relevant, proceed.
4) Read each section header. If potentially relevant, **skim the section**. If you skim one section and it is relevant, **read the entire paper** from start to finish.