

Writing Survey Papers

Roman Kern

706.015 - Introduction to Scientific Working

Literature Review

How to write a survey?

Where is it needed?

- Background section of a publication
 - Often part of introduction or directly after (background section)
 - Sometimes before conclusions
- Expose (for thesis)
- Thesis (Bachelor / Master / PhD)
 - Often as separate chapter
 - (but references should be use throughout the thesis)
- Review/survey paper
- Excellence section of proposals
- Entering a new research field

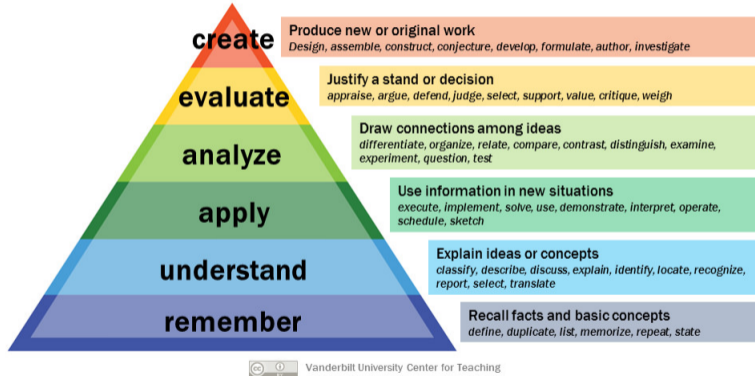
Motivation

A substantive, thorough, sophisticated literature review is a pre-condition for doing substantive, thorough, sophisticated research.

"Good" research is good because it advances our collective understanding

Blooms Taxonomy

Bloom's Taxonomy



Vanderbilt University Center for Teaching

Overview

- Not just a collections of citations
- Requires a guiding theory
 - Set of competing method
 - Synthesize related literature it in a way that permits a new perspectives
- Up-to-date
- Complete

Types of Reviews

Types of literature reviews

- Summarise a mature field
- Explore a emerging field

Process

Start a literature review

- Start with top journal / conferences in the domain
- Go backwards in time
- Go forward in time

Documentation

Document you literature search, e.g., which search terms are being used

Define Your Search Terms

Those keywords were combined in several ways to improve the search results regarding hits, topicality and quality. Following combinations were used to search in databases like *Pubmed*, *Google Scholar* and *IEEE Explorer*.

1. **classification AND gene AND cancer AND feature selection AND (filter OR wrapper)**
2. **supervised learning AND classification AND cross validation AND microarray AND cancer**
3. **classification AND (ensemble OR rank aggregation) AND cross validation AND cancer**

Source: Master thesis Gerald Cuder (2018).

Identify concepts and terms

- What are the main concepts in a field?
 - Ideas
 - Algorithms
 - Methodology
 - Including evaluation methodology
- What are the main terms?

Suggestion

Prepare a table of concepts (columns) and articles (rows).

Table for Mapping between Terms/Concepts and Papers

Table 2. Concept Matrix

Articles	Concepts				
	A	B	C	D	...
1		✗	✗		✗
2	✗	✗			
...			✗	✗	

Source: Webster, J., quarterly, R. W.-M., 2002. Analyzing the past to prepare for the future: Writing a literature review. Jstor, 26(2).

Collect a Timeline of Papers

System	Year	Input	Pattern Creation	Trained Languages
TextRunner	2007	PoS, NP-chunks	Naive Bayes classifier	✓ English
StatSnowball	2009	PoS	Markov logic networks	✓ English
Wanderlust	2009	link grammar	pattern learner	✓ English
WOE ^{posrc}	2010	dependencies	pattern learner	✓ English
WOE ^{pos}	2010	PoS, NP-chunks	CRF	✓ English
SRL-IE	2010	SRL	rule-based conversion	English
ReVerb	2011	PoS, NP-chunks	syntactic and lexical constraints + logistic regression classifier	✓ English
<i>DepOE</i>	2012	dependencies	hand-crafted rules	English, Romance languages
Kraken	2012	dependencies	hand-crafted rules	English
OLLIE	2012	dependencies	Open Pattern Learning	English
Patty	2012	dependencies	frequent itemset mining	✓ English
ClauseIE	2013	dependencies, constituents	hand-crafted rules	English
LSOE	2013	PoS	Qualia Structure Based Patterns	English
CSD-IE	2013	constituents	hand-crafted rules	English
TK	2013	dependencies	SVM tree kernels	✓ English
<i>ExtrHech</i>	2013	PoS	hand-crafted rules	Spanish
ReNoun	2014	dependencies, NP-chunks, NER	pattern learner	English
<i>SCOERE</i>	2014	dependencies, constituents, NER	CRF	✓ Chinese
BoostingOIE	2014	PoS, NP-chunks	hand-crafted rules	English
<i>ArgOE</i>	2015	dependencies	hand-crafted rules	English, Portuguese, Spanish, German
<i>PropsDE</i>	2016	dependencies	(transferred) hand-crafted rules	Spanish, German
<i>GerIE</i>	2018	dependencies	hand-crafted rules	German

Table 1: Overview of existing OIE systems together with their characteristics, i.e. the expected input, how the patterns are created, whether they require annotated training data as well as the designated language - Non-English parsers are in italics.

Source: Bassa, A., Kroll, M., & Kern, R. (2018). GerIE - An Open Information Extraction System for the German Language. *Journal of Universal Computer Science*, 24(1), 22–34.

Identify Communities

- Different communities may contribute to the same field
- They may use different terminology
- They may have different types of methodology
- Ways to structure publications

Documentation

Prepare a list of relevant conferences, workshops and journals.

Identify Communities and Concepts

- Different communities may tackle different aspects
- May use same approaches

Documentation

Prepare a table of communities (rows) and concepts (columns). Cells could be the number of relevant publications.

Identify Communities and Concepts

	Information Quality	Fact Finding	Question Answering	Information Extraction	General Credibility Assessment	Sum
Believability	9	1			1	11
Certainty	2	5			5	12
Correctness	7	8	6	1	2	24
Credability	5				23	28
Fidelity						0
Reliability	10	3	3		7	23
Trustworthiness	4	14			13	31
Truthfulness		3			2	5
Validity	8		2		4	14
Veracity		3			8	11
Total Number of Papers per Domain	33	29	27	9	57	155

Figure 2.2: Amount of papers in a domain which use a term at least three times

Columns: communities/domains, rows: key terms, source: Master thesis Kevin Bassa (2016).

Guidelines for Review Papers

1. **Motivates** the research topic and explains the review's contributions
2. Describes the **key concepts**
3. Delineates the **boundaries** of the research
4. Reviews relevant **prior literature** in main and related areas
5. Develops a model to guide **future research** (optional)
6. **Justifies** propositions by presenting theoretical explanations, past empirical findings, and practical examples
7. Presents concluding **implications** (for researchers and managers)

Tone of the Review

- **Neutral** tone
- Not overly critical
 - ... but point out errors

Tenses of the Review

- **Present tense**
 - Greater sense of immediacy
 - Concept do not change
- If refer to a statement of a person
 - **Past tense**
 - As the opinion might change

Signs of a Good Literature Review

- **Coverage**
 - Is all relevant literature cited?
- **Synthesis**
 - How well is the relevant literature summarised, analysed and synthesised (put in context)?
 - Clarify scope and limitation of ideas
- **Methodology**
 - Are the research strategies explained (advantages/disadvantages)?
 - Impact on findings?
- **Significance**
 - Discuss both practical and scholarly impact
- **Rhetoric**
 - Coherent structure

Worst case: haphazard collection of disjoint literature

Checklists

Synthesis

- Criteria for inclusion / exclusion given
 - ➖ No criteria given
 - ▶ Discussed inclusion / exclusion
 - ➕ Justification given

- Criteria for was has been done vs. what needs to be done
 - ➖ No distinction given
 - ▶ Discussion what has been done
 - ➕ Critical assessment of what is missing

Checklists

Synthesis

- Placed the topic in the broader scholarly literature
 - ➖ No placement
 - ▶ Some discussion
 - ➕ Topic clearly placed
- Placed the topic in the historical context
 - ➖ History not discussed
 - ▶ Some discussion
 - ➕ Critically examined historical context

Checklists

Synthesis

- Acquired and enhanced the topic vocabulary
 - ❌ Vocabulary not discussed
 - ▶ Key vocabulary discussed
 - ✅ Resolved all dis-ambiguities

- Important variables and phenomenon relevant to topic
 - ❌ Not discussed
 - ▶ Some discussion on key variables
 - ✅ Identified ambiguities in literature and proposed ways of resolving

Checklists

Synthesis

- Synthesis of new perspective
 - ❌ Plain presentation
 - ▶ Some synthesis
 - ✅ Synthesis of new perspective

Checklists

Methodology

- Main methodology identified and discussed
 - ⊖ Research methods not discussed
 - ▶ Some discussion
 - ⊕ Critiqued research methods
 - ⊕⊕ Proposed new methodology (as reaction on identified problems)
- Related ideas and theories
 - ⊖ Not discussed
 - ▶ Some discussion of research methods
 - ⊕ Critiqued appropriateness of research methods to warrant claims

Checklists

Significance

- Practical significance of topic
 - ➖ Not discussed
 - ▶ Basic discussion
 - ➕ In depth discussion and examples
- Scholarly significance of topic
 - ➖ Not discussed
 - ▶ Some discussion
 - ➕ Clear demonstration of scholarly significance

Checklists

Rhetoric

- Coherent, clear structure
 - ❖ Poorly conceptualised
 - ▶ Somewhat coherent
 - ⊕ Coherent structure

Literature Review

Literature

- Webster, J., quarterly, R. W.-M., (2010). Analyzing the past to prepare for the future: Writing a literature review. *Jstor*, 26(2).
- Boote, D. N., & Beile, P. (2005). Scholars Before Researchers: On the Centrality of the Dissertation Literature Review in Research Preparation. *Educational Researcher*, 34(6), 3â€15. <http://doi.org/10.3102/0013189X034006003>

Thank You

For your attention!