Literature Research in Computer Science

Martin Byrenheid
Chair of Privacy and Data Security
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes

2. Identify open problems and limitations of existing solutions
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes

2. Identify open problems and limitations of existing solutions

3. Learn about related research community
   - Common vocabulary
   - Established scientific methods
   - Preferred venues for scientific discourse
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes

2. Identify open problems and limitations of existing solutions

3. Learn about related research community
   - Common vocabulary
   - Established scientific methods
   - Preferred venues for scientific discourse

In the following:
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes

2. Identify open problems and limitations of existing solutions

3. Learn about related research community
   - Common vocabulary
   - Established scientific methods
   - Preferred venues for scientific discourse

In the following:
   - Methods for efficient searching for relevant scientific literature
Goals

1. Gather and understand existing knowledge and solutions
   - Avoid re-inventing the wheel
   - Avoid making the same mistakes

2. Identify open problems and limitations of existing solutions

3. Learn about related research community
   - Common vocabulary
   - Established scientific methods
   - Preferred venues for scientific discourse

In the following:
   - Methods for efficient *searching* for relevant scientific literature
   - Methods for efficient *reading* of scientific literature
Scientific literature

- Conference proceedings
  - Published once a year
  - Typically between 10 and 18 pages without references
  - Results have been presented at scientific conference

- Journals
  - Published bi-monthly
  - Typically between 12 and 28 pages without references
  - May be extended version of a conference publication
Search engines for scientific literature

- Google scholar
- DBLP computer science bibliography
- ACM digital library
- Springer Link
- IEEE Xplore
Search engines for scientific literature

- Google scholar
- DBLP computer science bibliography
- ACM digital library
- Springer Link
- IEEE Xplore

- **Keyword search**
  - Research groups may use different vocabulary → be creative!
  - Add “survey”, “systematization of knowledge” (SoK) or “state of” to find summaries
  - Use keywords from previously found papers
  - Use filtering mechanisms (e.g. year)
Efficient searching

New directions in cryptography
W Diffie, M Hellman - IEEE transactions on Information Theory, 1976 - ieeexplore.ieee.org

Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the ...

Cited by 18941  Related articles  All 153 versions
Efficient searching

– Look for papers with promising titles
– Use literature management tools
  – Zotero, JabRef, Citavi, Mendeley, etc.
  – Provide plugins for automatic import
– Perform searching and reading separately

New directions in cryptography
W Diffie, M Hellman - IEEE transactions on Information Theory, 1976 - ieeexplore.ieee.org
Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the …
☆ 99° Cited by 18941  Related articles  All 153 versions
Efficient searching

- Look for papers with promising titles
- Use literature management tools
  - Zotero, JabRef, Citavi, Mendeley, etc.
  - Provide plugins for automatic import
- Perform searching and reading separately

New directions in cryptography
W Diffie, M Hellman - IEEE transactions on Information Theory, 1976 - ieeexplore.ieee.org
Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the …

Cited by 18941  Related articles  All 153 versions
Efficient searching

- Look for papers with promising titles
- Use literature management tools: Zotero, JabRef, Citavi, Mendeley, etc.
- Provide plugins for automatic import
- Perform searching and reading separately

**New directions in cryptography**
W. Diffie, M. Hellman
IEEE transactions on Information Theory, 1976 - ieeexplore.ieee.org

Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the ...
Efficient searching

- Look for papers with promising titles
- Use literature management tools
  - Zotero, JabRef, Citavi, Mendeley, etc.
- Perform searching and reading separately

**New directions in cryptography**

W Diffie, M Hellman

**IEEE transactions on Information Theory** 1976 - ieexplore.ieee.org

Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the ...
Efficient searching

- Look for papers with promising titles
- Use literature management tools
  - Zotero, JabRef, Citavi, Mendeley, etc.
  - Provide plugins for automatic import
- Perform searching and reading separately
Efficient searching

- Look for papers with promising titles

author list

publication venue

year of publication

citation count

title

New directions in cryptography
W Diffie, M Hellman
IEEE transactions on Information Theory 1976 - ieeexplore.ieee.org

Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the ...

Cited by 18941 Related articles All 153 versions
Efficient searching

- Look for papers with promising titles
- Use literature management tools
  - Zotero, JabRef, Citavi, Mendeley, etc.
  - Provide plugins for automatic import
Efficient searching

- Look for papers with promising titles
- Use literature management tools
  - Zotero, JabRef, Citavi, Mendeley, etc.
  - Provide plugins for automatic import
- Perform searching and reading separately
Efficient searching

- Forward search
  - Provided by Google Scholar and IEEE Xplore
  - Combined with filtering by year helps to identify most recent works

C. Wright, S. Coull, F. Monrose - NDSS, 2009 - Citeseer

Recent work has shown that properties of network traffic that remain observable after encryption, namely packet sizes and timing, can reveal surprising information about the traffic's contents (e.g., the language of a VoIP call [29], passwords in secure shell logins [20]...
Efficient searching

- Forward search
  - Provided by Google Scholar and IEEE Xplore
  - Combined with filtering by year helps to identify most recent works
Efficient searching

- Forward search
  - Provided by Google Scholar and IEEE Xplore
  - Combined with filtering by year helps to identify most recent works

- Check publication venue
  - Conference websites typically have an “accepted papers” section
  - You can also find the list of accepted papers on DBLP or IEEE Xplore
  - “Proceedings” usually indicates conference
  - “Transactions” usually indicates journals
Efficient searching

- Check authors to identify research groups
  - Research group websites typically contain a list of recent publications
  - Check if these groups are still active
Reading papers

- Author list
- Title
- Publication venue
- Year of publication
- Citation count

New directions in cryptography
W. Diffie, M. Hellman, IEEE Transactions on Information Theory, 1976

Two kinds of contemporary developments in cryptography are examined. Widening applications of teleprocessing have given rise to a need for new types of cryptographic systems, which minimize the need for secure key distribution channels and supply the ...

Cited by 18041
Related articles
All 153 versions
Prioritization

- Title
- Number of citations
- Ranking of venue
- Year of publication

Prioritization of papers can be based on:

- Title
- Number of citations
- Ranking of venue
- Year of publication

Older papers with a high number of citations might be milestone papers or particularly controversial.

Publication venue indicates quality of work.
Reading papers

- Prioritization
  - Title
  - Number of citations
  - Ranking of venue
  - Year of publication

- Older papers with a high number of citations might be milestone papers or particularly controversial
- Publication venue indicates quality of work
Reading papers

- Peer-review is common to all scientific conferences and journals
- Platforms like arXiv and the IACR ePrint archive do not require peer-review
- Commonly used indicator for quality of venue: rankings
Reading papers

- Peer-review is common to all scientific conferences and journals
- Platforms like arXiv and the IACR ePrint archive do not require peer-review
- Commonly used indicator for quality of venue: rankings

CORE ranking

- A* - flagship conference, a leading venue in a discipline area
- A - excellent conference, and highly respected in a discipline area
- B - good conference, and well regarded in a discipline area
- C - other ranked conference venues that meet minimum standards
Reading papers

- Peer-review is common to all scientific conferences and journals
- Platforms like arXiv and the IACR ePrint archive do not require peer-review
- Commonly used indicator for quality of venue: rankings

CORE ranking

- A* - flagship conference, a leading venue in a discipline area
- A - excellent conference, and highly respected in a discipline area
- B - good conference, and well regarded in a discipline area
- C - other ranked conference venues that meet minimum standards

Microsoft Academic

- Provides fine-grained ranking by citations, prestige etc.
Reading papers

Three-pass approach by S. Keshav

- **First pass**: Get a general idea about the paper
- **Second pass**: Grasp the paper’s content, but not its details
- **Third pass**: Understand the paper in depth
Reading papers

Three-pass approach by S. Keshav

- **First pass:** Get a general idea about the paper
- **Second pass:** Grasp the paper’s content, but not its details
- **Third pass:** Understand the paper in depth → not needed for literature survey
Reading papers

First pass

1. Carefully read abstract, introduction and conclusion
2. Read the section and sub-section headings, ignore everything else
Reading papers

**First pass**

1. Carefully read abstract, introduction and conclusion
2. Read the section and sub-section headings, ignore everything else

**Goal:** Answering the following questions:

1. **Context:** Which problem/question does it address? Which other papers is it related to?
2. **Contributions:** What are the paper’s main contributions? Does it improve an existing solution or present a completely novel approach?
3. **Category:** What type of paper is this? (e.g. measurement, theory, survey)
4. **Clarity:** Is the paper well-written?
Reading papers

- Note down your answers and thoughts regarding the aforementioned questions
- Use your own words instead of copying text passages from the paper
- Decide if paper is still relevant → keep notes even if it is irrelevant
- Include yet unknown related papers in your literature research


Reading papers

Second pass

- Read other paper sections, but ignore details such as proofs
Reading papers

Second pass

- Read other paper sections, but ignore details such as proofs

Goals:

- Grasping the content of the paper
- Summarize the main thrust of the paper, with supporting evidence
- Identify relevant references for further literature search

Literature Research in Computer Science
Martin Byrenheid
Reading papers

Second pass
- Read other paper sections, but ignore details such as proofs

Goals:
- Grasping the content of the paper
- Summarize the main thrust of the paper, with supporting evidence
- Identify relevant references for further literature search

- While reading, write a short summary of the paper in your own words
- Note down open questions or doubts about the paper → discuss them with your supervisor
- Use insights from reading and from related work section to guide literature search (backward search)
Further recommendations

- Before and during your literature research, think about how you would approach the topic
- Note down questions that come up and actively try to answer them with your research
- Think about what properties an ideal solution to a security problem should have
- Do not underestimate the effort required to read papers and their relation to the bigger picture
Summary

- Scientific discourse via conferences and journals
- Search techniques
  - Keyword search
  - Forward search
  - Backward search
  - Conference/Journal/Research group websites
- Conference/journal rankings can be used for prioritization
- Three-pass reading can be used to avoid wasting time with irrelevant papers
- Read actively by focusing on specific questions
- Keep notes and write summaries of what you read
  - Avoid copying text from the paper
Further reading I


