Computational Logic

Introduction to Scientific Working

Cezary Kaliszyk

CL @ UIBK

SS 2017

Summary of last PS

1. **Meta-cognition**
   Reflect on your own learning process
2. **Syntactic-semantic analysis**
   Clarify/Understand the used terms
3. **Reduction**
   Reduce the text to its main statements
4. **Reconstruction**
   Reconstruct the main features of the text using non-verbal methods
5. **Elaboration**
   Confront the text in a critical way

Homework (for March 31)

1. Read "Responsible and Efficient Literature Search" by R. Lewis and S. Sarli
   `https://becker.wustl.edu/sites/default/files/RespLitSearch.pdf`

2. List sources (at least 5) of scientific literature useful in computer science

3. Can you give examples of misquotations / misrepresentations from recent international politics? What about science?

4. What are the legal consequences of plagiarism for UIBK students?

Homework (for March 31)

1. Read "Responsible and Efficient Literature Search" by R. Lewis and S. Sarli
   `https://becker.wustl.edu/sites/default/files/RespLitSearch.pdf`

2. List sources (at least 5) of scientific literature useful in computer science

3. Can you give examples of misquotations / misrepresentations from recent international politics? What about science?

4. What are the legal consequences of plagiarism for UIBK students?
   `http://kurier.at/chronik/oesterreich/uni-innsbruck-plagt-sich-mit-plagiatsvorwuerfen/115.551.947`

Lecture Content

Research and Understanding

Understanding and summarizing of scientific text, Literature research, Internet search, Citing, Practical scientific work

Structuring Scientific Works

Kinds: Seminar, Bachelor and Master theses, Topic analysis and structuring

LaTeX

Interaction, Typesetting of text, Images/Diagrams, Mathematical formulae, Lists, Tables, Fonts, Special cases

Evaluation, Checking and Presentation

Evaluation of work of others, Review system in computer science, Introduction to presentation

Literature Research

Tools that simplify literature research:

1. General search engines
2. The DBLP Computer Science Bibliography
3. Online Library Catalogues
4. Electronic Libraries
5. Digital Archives
6. Publish or Perish

Google

Questions

- How do search engines it work?
- How does `google` order the results?

Google

Questions

- How do search engines it work?
- How does `google` order the results?

Answer

PageRank (eigenvector centrality of a graph) is a method that assigns weights to the nodes in an arbitrary directed graph based on the weights of the neighboring nodes ("incoming links"). In more detail, the weights are computed as the dominant eigenvector of the following set of equations:

$$PR_1(i) = \frac{1-f}{N} + f \sum_{i \in d(j)} \frac{PR_1(j)}{|d(j)|}$$

where N is the total number of nodes and f is a damping factor, typically set to 0.85.

The DBLP Computer Science Bibliography

DBLP

- DBLP gathers bibliography data for the imporant conferences and joirnals in computer science
- More than 2 mln articles indexed
- Originally a library service for DataBase) and Logic Programming
- DBLP offers:
  1. Electronic editions
  2. Citation statistics
  3. Bibliography
- Until 2011 administrated by Universität Trier, now combined project with Schloss Dagstuhl - Leibniz-Zentrum für Informatik GmbH

Publish or Perish

Definition

- The h-index is the higher number of articles h, which are all cited at least h-times
- The Index measures productivity (number or papers), as well as influence (number of citations
- The index is meaningful only in a particular domain

Publish or Perish

Definition

- The h-index is the higher number of articles h, which are all cited at least h-times
- The Index measures productivity (number or papers), as well as influence (number of citations
- The index is meaningful only in a particular domain

Example

- Google Scholar
- Microsoft Academic Search
- Scopus
- Web of Science

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

- Not available in Internet

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

- Not available in Internet
- Not avail in online libraries

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

- Not available in Internet
- Not avail in online libraries
- Not in DBLP

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

- Not available in Internet
- Not avail in online libraries
- Not in DBLP
- How to continue?

Does it always work?

Example

Search for:

- "Subrecursion and lambda representation over free algebra" by Daniel Leivant, Feasible mathematics (Ithaca, NY, 1989), 281–291, Progr. Comput. Sci. Appl. Logic, 9, Birkhäuser Boston, Boston, MA, 1990
- "Transformation of Machine-Found Proofs into Assertion Level Proofs" by Andreas Meier, Universität des Saarlandes, 2000

Example (cont.)

- Not available in Internet
- Not avail in online libraries
- Not in DBLP
- How to continue? Ask colleagues...

Accurate citations

Definition

- A quote (Zitat) is a word-for-word repetition
- A paraphrase communicates the idea of a text with own words
- Both require providing source (the work / article)

Accurate citations

Definition

- A quote (Zitat) is a word-for-word repetition
- A paraphrase communicates the idea of a text with own words
- Both require providing source (the work / article)

Definition

Quoting a word allows taking over terminology which is not yet established. The word should be in quotation marks.

Accurate citations

Definition

- A quote (Zitat) is a word-for-word repetition
- A paraphrase communicates the idea of a text with own words
- Both require providing source (the work / article)

Definition

Quoting a word allows taking over terminology which is not yet established. The word should be in quotation marks.

Example

The "multi-robot-paradigm" [1] provides...

Definition

Quoting a sentence allows to reuse the sentence in whole or in part. The citation should be in quotation marks and can be in the running text.

Definition

Quoting a sentence allows to reuse the sentence in whole or in part. The citation should be in quotation marks and can be in the running text.

Example

"The multi-robot paradigm brings a new dimension to these problems"[a]

[a] Alex Wright. The social life of robots. Commun. ACM 55(2), 2012, page 19

Definition

Quoting a sentence allows to reuse the sentence in whole or in part. The citation should be in quotation marks and can be in the running text.

Example

"The multi-robot paradigm brings a new dimension to these problems"[a]

[a] Alex Wright. The social life of robots. Commun. ACM 55(2), 2012, page 19

Definition

Quoting a paragraph is used for parts longer than a sentence. It is normally distinguished typographically.

Definition

Quoting a sentence allows to reuse the sentence in whole or in part. The citation should be in quotation marks and can be in the running text.

Example

"The multi-robot paradigm brings a new dimension to these problems"[a]

[a] Alex Wright. The social life of robots. Commun. ACM 55(2), 2012, page 19

Definition

Quoting a paragraph is used for parts longer than a sentence. It is normally distinguished typographically.

Example

"Simmons' work with NASA eventually gave rise to the Distributed Robot Architectures (DIRA) project [...]", cf. [1]

Definition

- A quote in a quote should be put in single quotes
- Left out parts must be marked with [...]
- Maintain highlight
- Translate languages other than English
- Mistakes can be marked with sic or !

Definition

- A quote in a quote should be put in single quotes
- Left out parts must be marked with [...]
- Maintain highlight
- Translate languages other than English
- Mistakes can be marked with sic or !

Pointing to websites

- Online-only sources can be given by web links
- Only stable website (and better as footnotes)
- For sites that change, add date

How to cite Wikipedia?

Short answer

Don't!

How to cite Wikipedia?

Short answer

Don't!

Example

- Wikipedia[a] says "Ist $G = (V, E)$ ein Graph, dann heißt ein Weg $(v_1, \ldots, v_n)$ mit $v_i \in V$ für $i = 1, \ldots, n$ Zyklus, wenn $v_1 = v_n$ gilt."
- Discrete Mathematics says (see [1]) "Ein Tupel $(k_0, k_1, \ldots, k_{\ell-1}) \in E^\ell$ heißt ein Weg von c nach d der Länge ℓ, wenn es Ecken $e_0, e_1, \ldots, e_\ell \in V$ gibt mit $e_0 = c$, $e_\ell = d$, und $q(k_i) = e_i$, sowie $z(k_i) = e_{i+1}$ [...]. Ein nichtleerer geschlossener Weg mit paarweise verschiedenen Kanten wird ein Zykel genannt."

[a] https://de.wikipedia.org/w/index.php?title=Zyklus_(Graphentheorie)&oldid=153183698

How to cite Wikipedia?

Answer

1. as little as possible
2. only if after careful consideration other sources are less appropriate
3. always with a citation

How to cite Wikipedia?

Answer

1. as little as possible
2. only if after careful consideration other sources are less appropriate
3. always with a citation

Again

URLs should be cited in footnotes, not in the bibliography

Quotation systems

Definition

- In the "anglo-american system" short note in the text and more complete literature reference in the footnote
- Whole works cited in the bibliography
- Most common in natural sciences and computer science
- Sometimes citations in footnotes ("Communications of the ACM")
- Different styles in the text and in the bibliography

Precise indication of sources

Bibliography

Alex Wright.
The social life of robots.
Commun. ACM, 55(2):19–21, 2012.

Source Database

```
@article{DBLP:journals/cacm/Wright12a,
  author     = {Alex Wright},
  title      = {The social life of robots},
  journal    = {Commun. ACM},
  volume     = {55},
  number     = {2},
  year       = {2012},
  pages      = {19-21},
  ee         = {http://doi.acm.org/10.1145/2076450.2076457},
  bibsource = {DBLP, http://dblp.uni-trier.de}
}
```

Proseminaraufgabe (für den 7. April)

1. Finden Sie weitere Beispiel von groben Plagiatsfällen; nennen Sie zumindest zwei weitere.
2. Lesen Sie das Kapitel "Lust statt Last: Wissenschaftliche Texte schreiben" von Norbert Frank, Sektionen 1–3
3. Nennen Sie zumindest 3 Schreibhürden