Semantic PDF Segmentation for Legacy Documents in Technical Documentation

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Technical Documentation

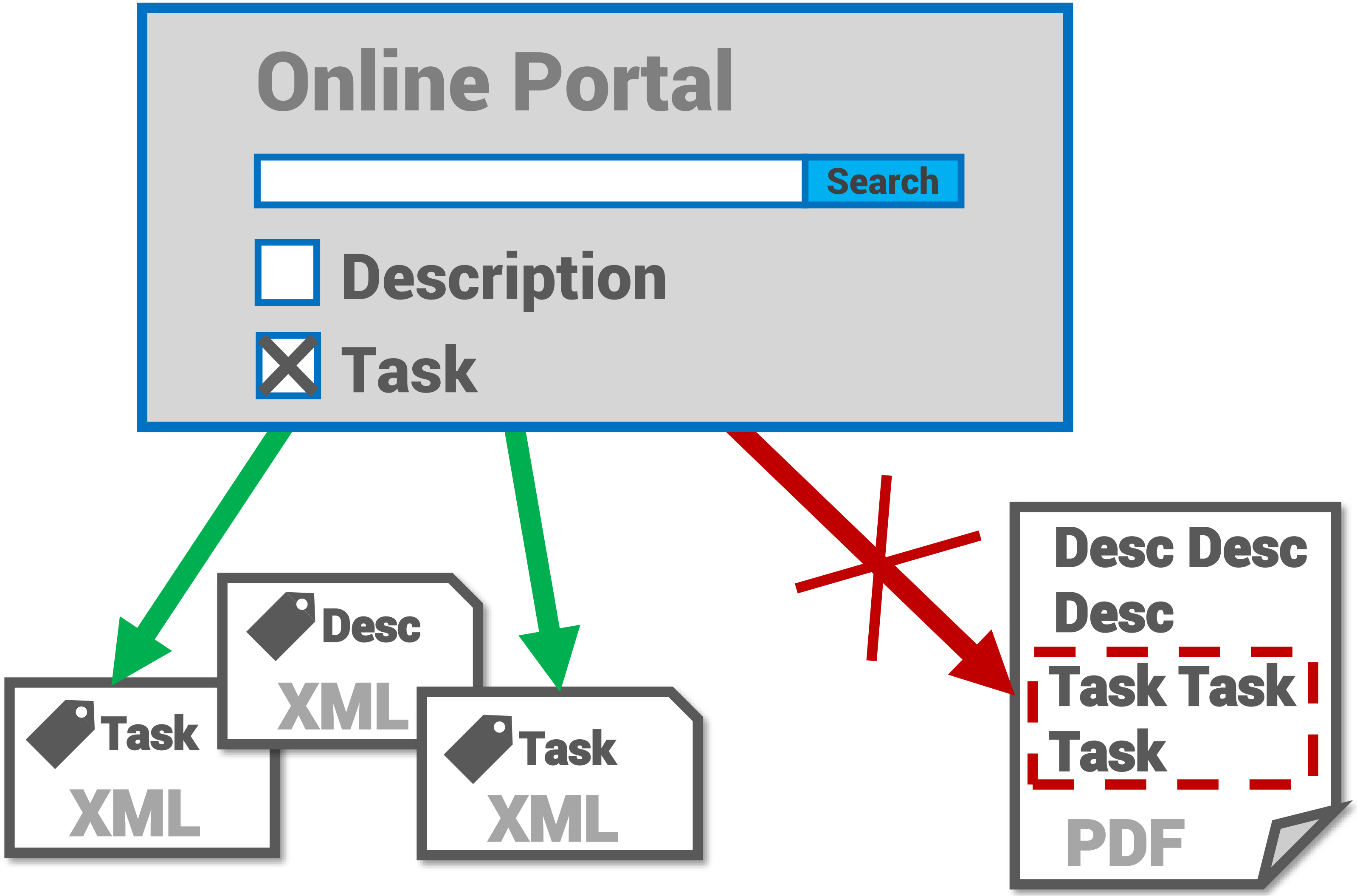
Most common: **PDF** documents

- “Digital Paper”, archival & distribution
- ISO Standard, guaranteed reproduction, ubiquitous support

Best practice: **XML** content components

- Self-contained building blocks, e.g. chapter-sized, ~150-500 words
- Reuse, translation, aggregation, delivery

Motivation


Online Portal
Search
□ Description
☒ Task
Desc
XML
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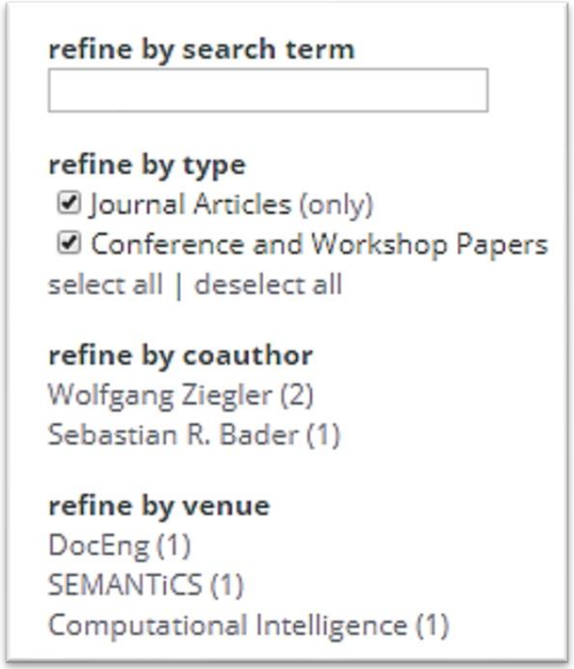
PDF

Motivation



refine by search term

refine by type

☑ Journal Articles (only)

☑ Conference and Workshop Papers

select all | deselect all

refine by coauthor

Wolfgang Ziegler (2)

Sebastian R. Bader (1)

refine by venue

DocEng (1)

SEMANTiCS (1)

Computational Intelligence (1)

Only **safety information** of the document

I need **maintenance information** about the **fuel injection**

Everything about the **hydraulic pump** in **technical overview** or **technical data**

Faceted search

Information request with semantic concepts which can be used as facets

Motivation

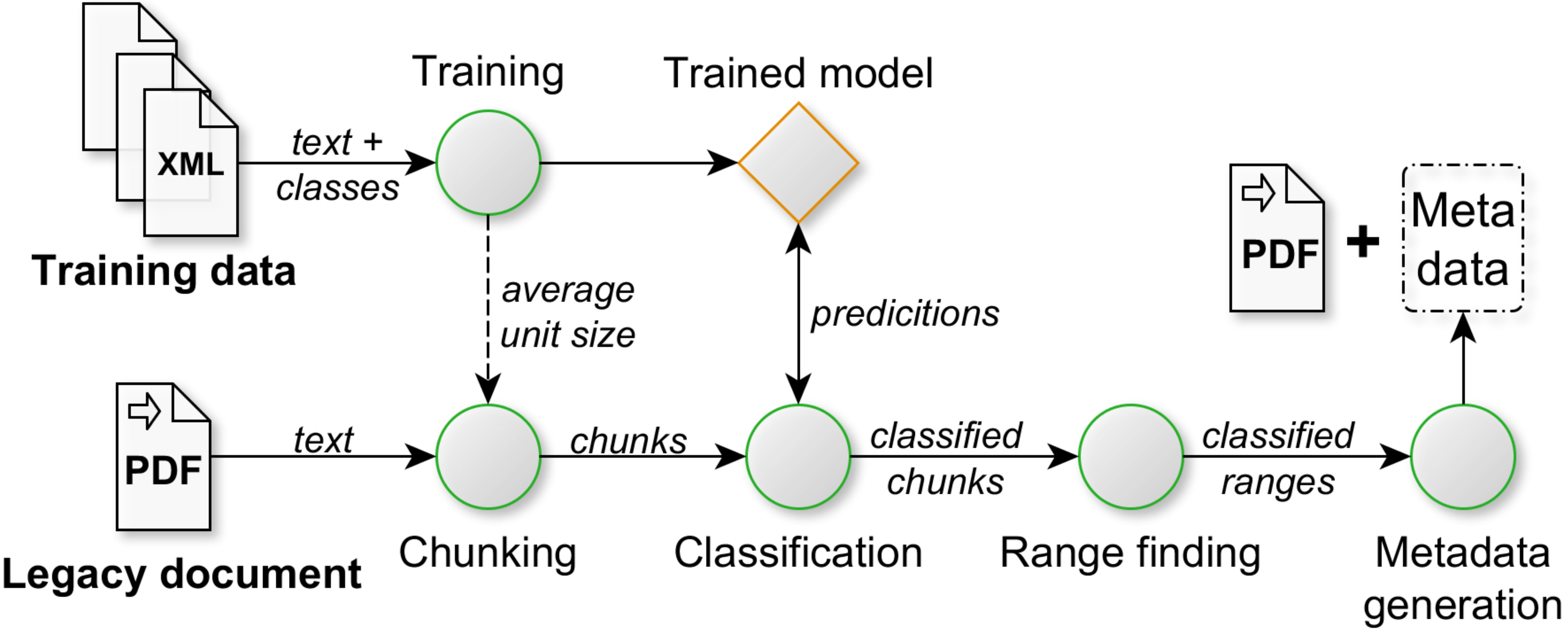
Limitations of PDF

- Semantic structure gets lost
- No metadata for (overlapping) segments
- Large documents (>200p) only accessible via full text search

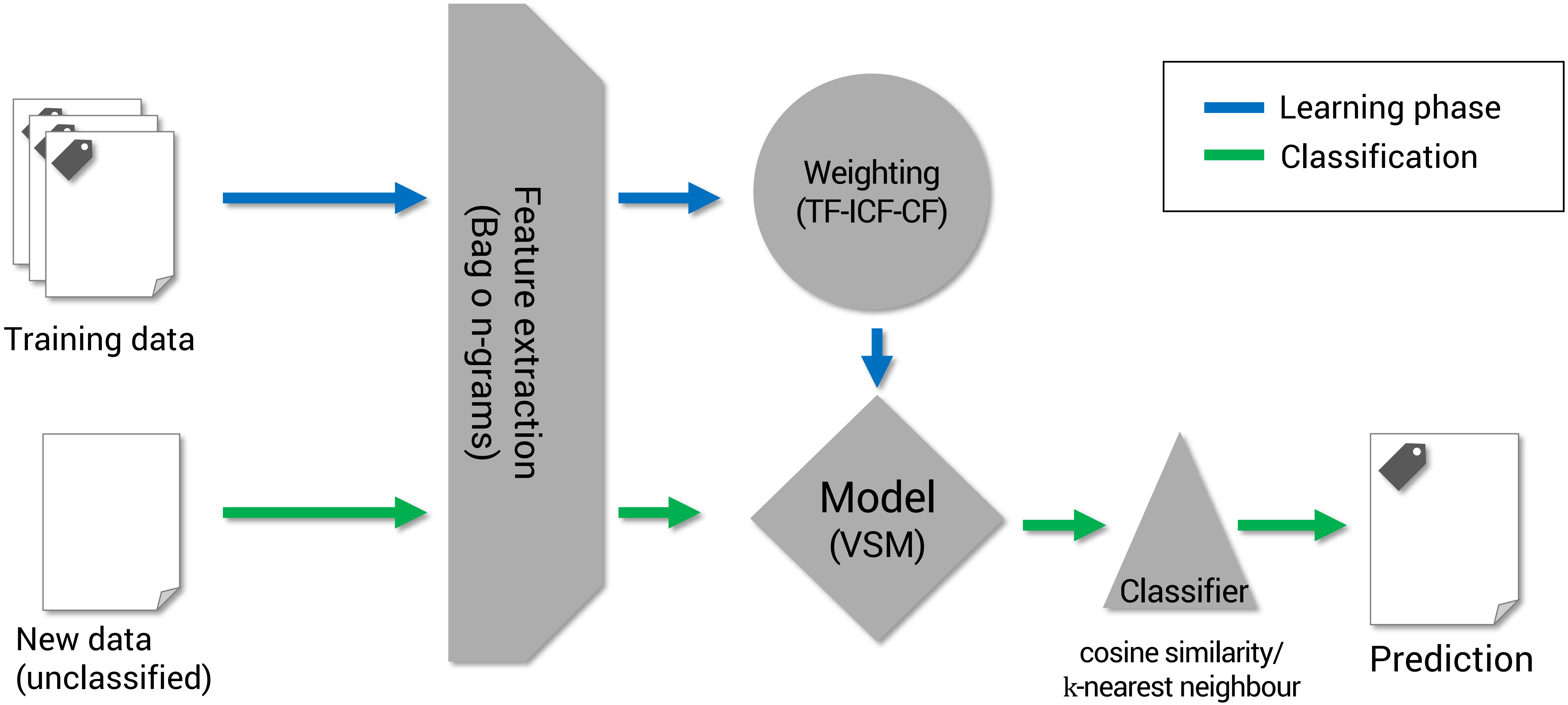
Idea

- Use knowledge from structured XML content components
  - Manually annotated semantic concepts / metadata
- Apply trained model on text extracted from PDF
- Find segments which are semantically relevant

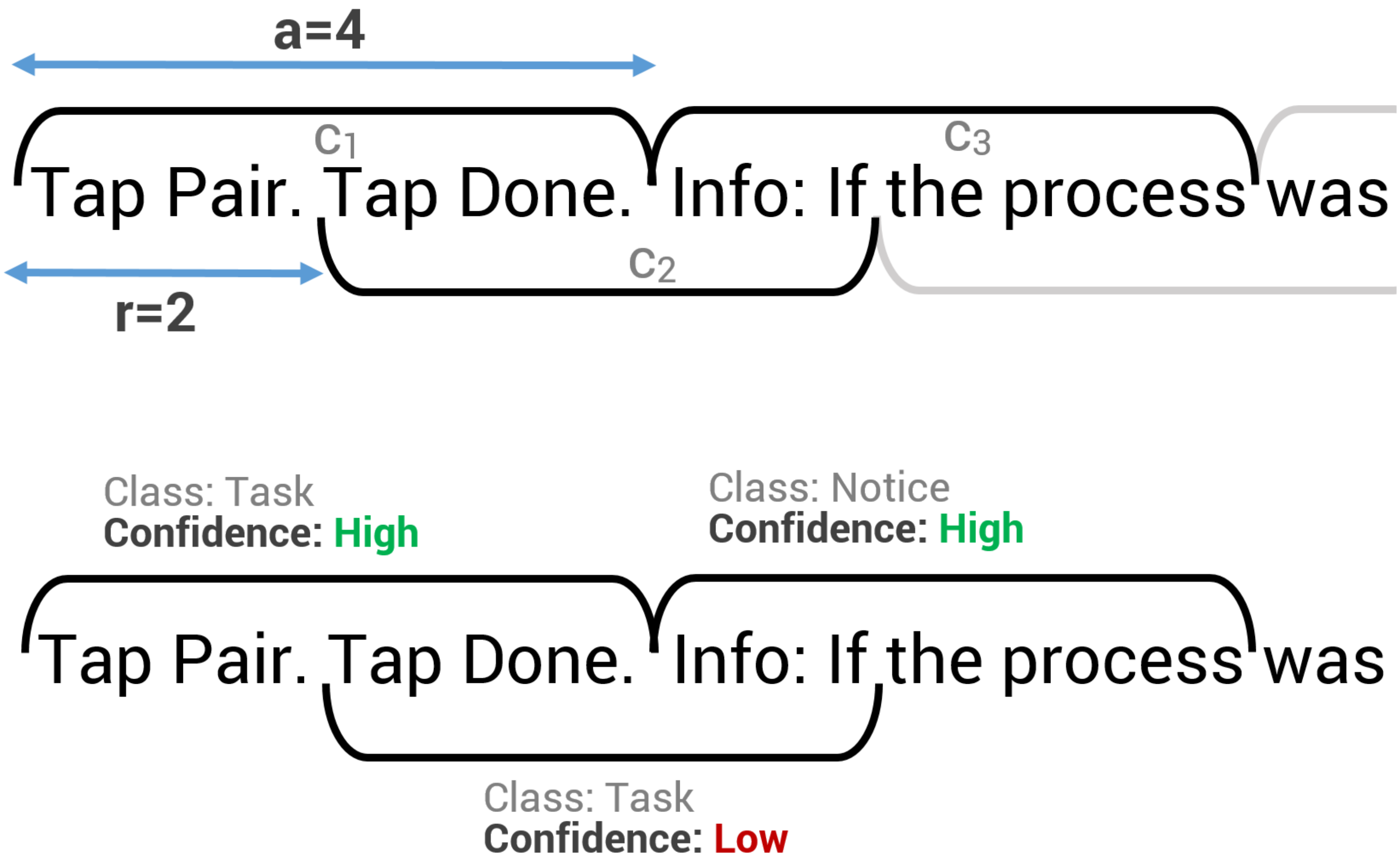
Procedure model



Training / Classification



Chunking



a=4

c_1 c_3

Tap Pair. Tap Done. Info: If the process was

c_2

r=2

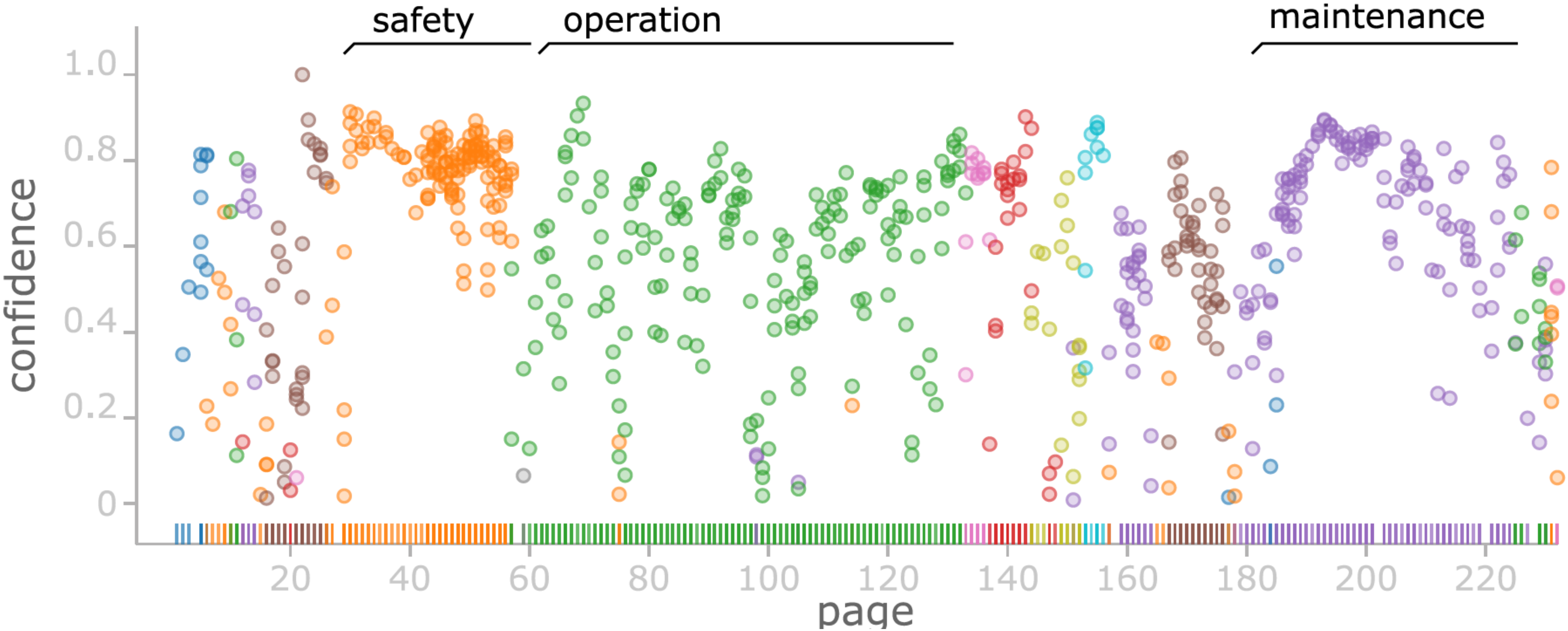
Class: Task
Confidence: High

Class: Notice
Confidence: High

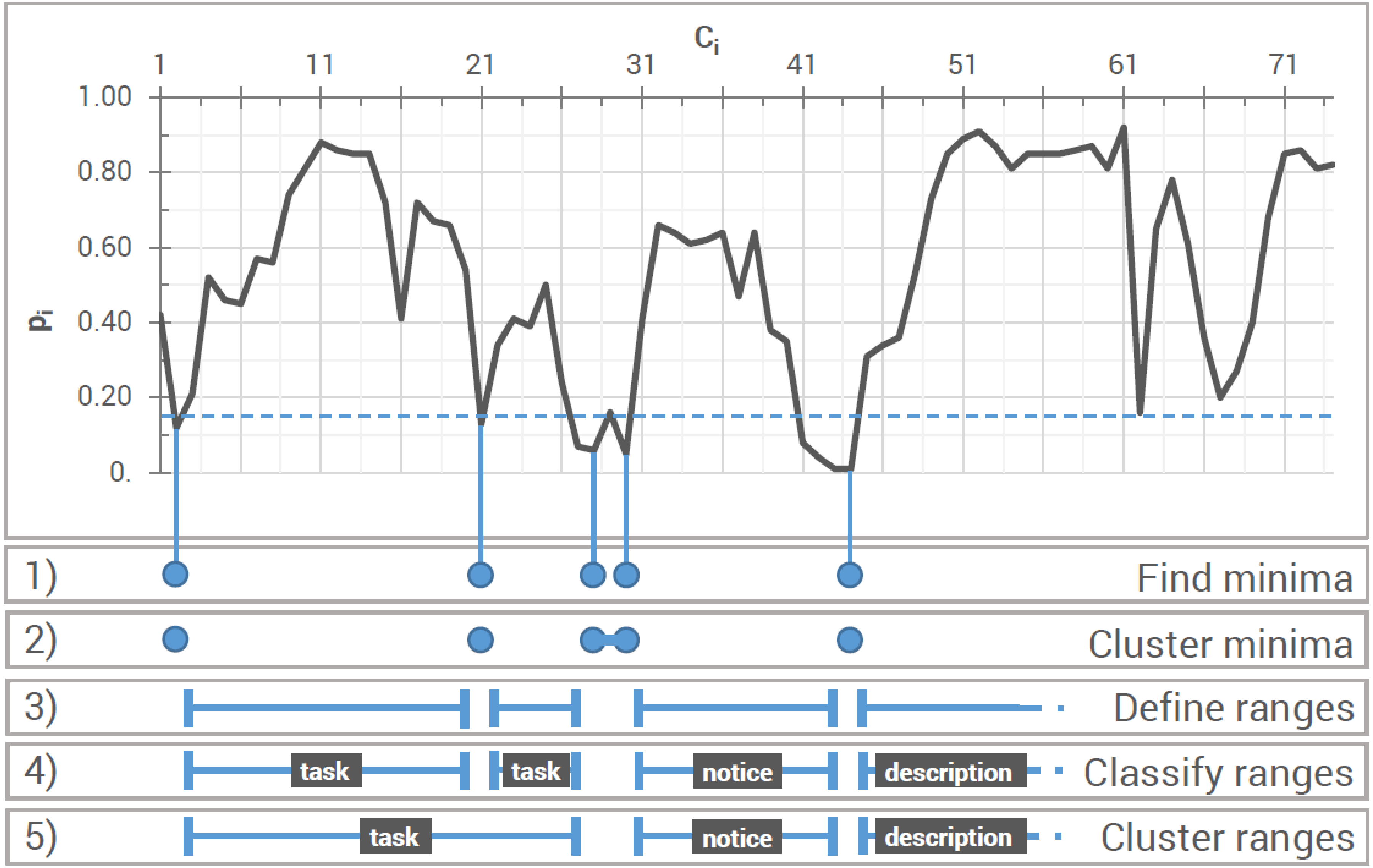
Tap Pair. Tap Done. Info: If the process was

Class: Task
Confidence: Low

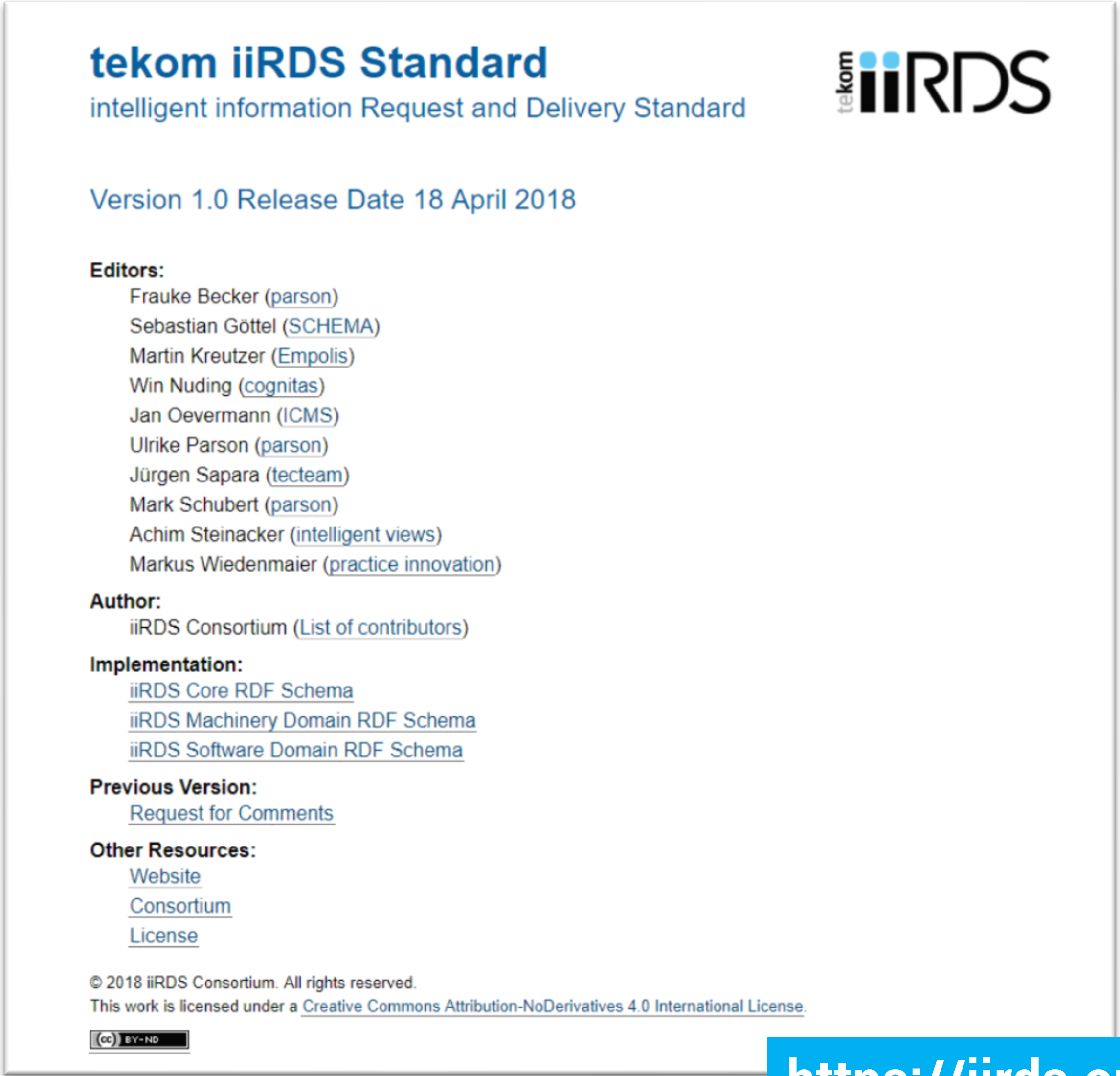
Chunking / Classification



Range finding



Metadata generation



tekom iiRDS Standard

intelligent information Request and Delivery Standard

Version 1.0 Release Date 18 April 2018

Editors:

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Sebastian Göttel (SCHEMA)
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Achim Steinacker (intelligent views)
Markus Wiedenmaier (practice innovation)

Author:

iiRDS Consortium (List of contributors)

Implementation:

iiRDS Core RDF Schema
iiRDS Machinery Domain RDF Schema
iiRDS Software Domain RDF Schema

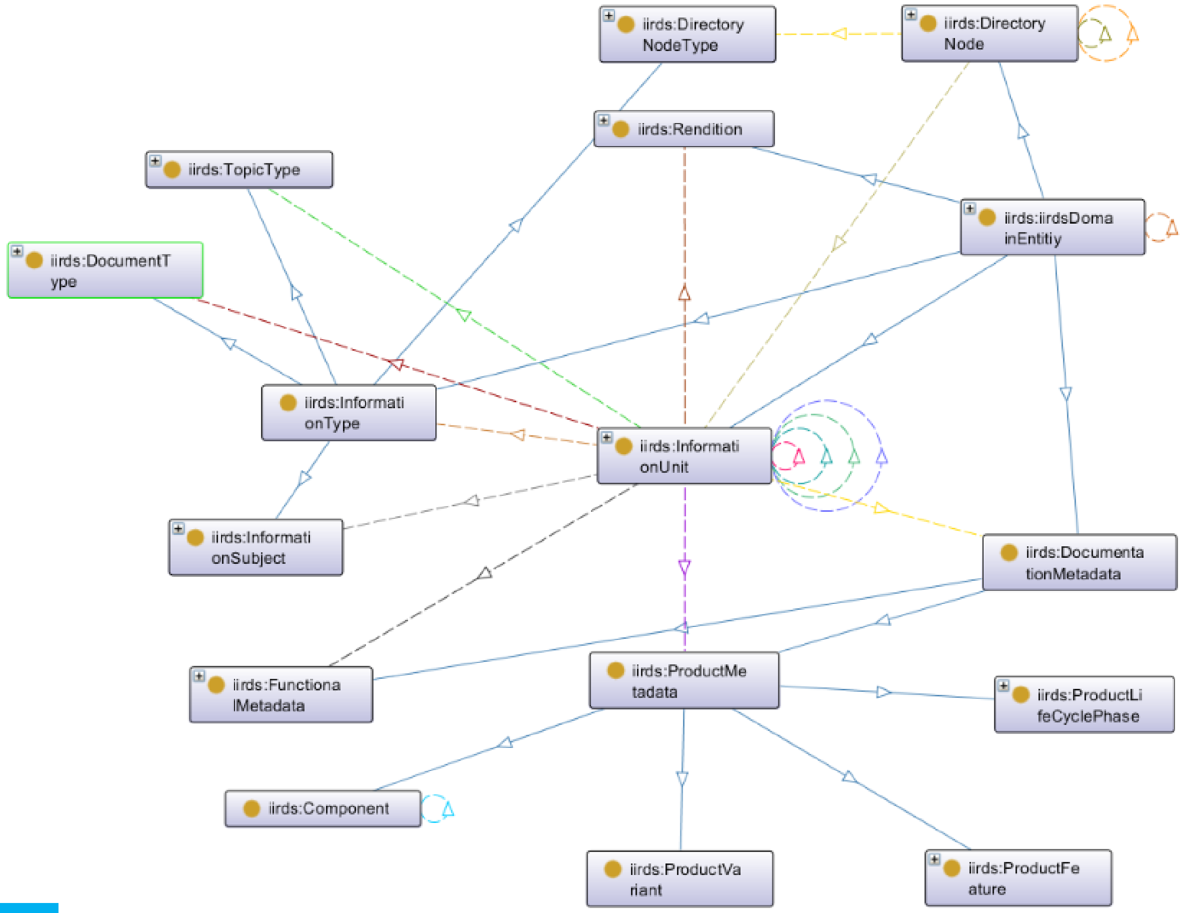
Previous Version:

Request for Comments

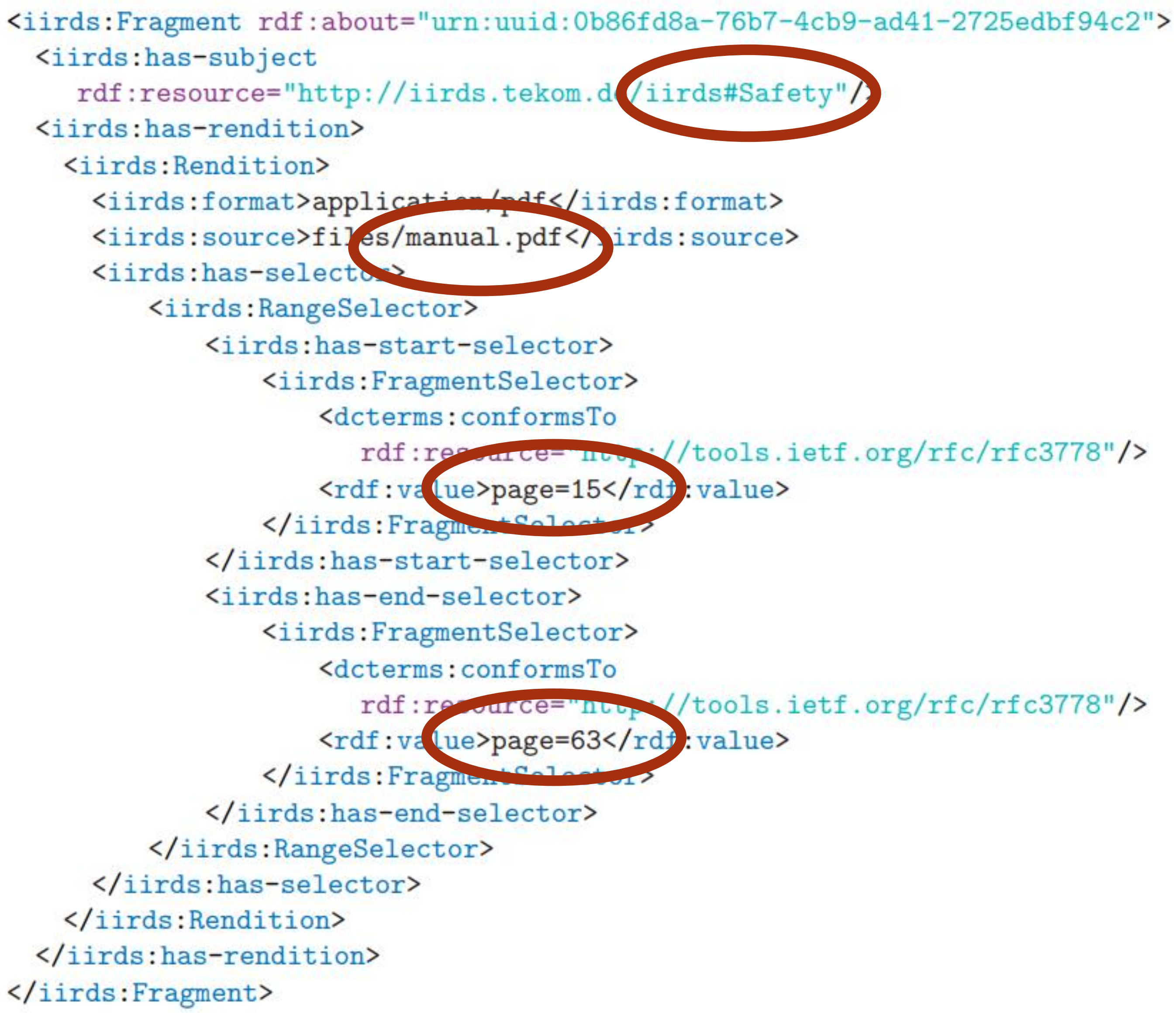
Other Resources:

Website
Consortium
License

https://iirds.org/



Metadata generation



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     <iirds:RangeSelector>
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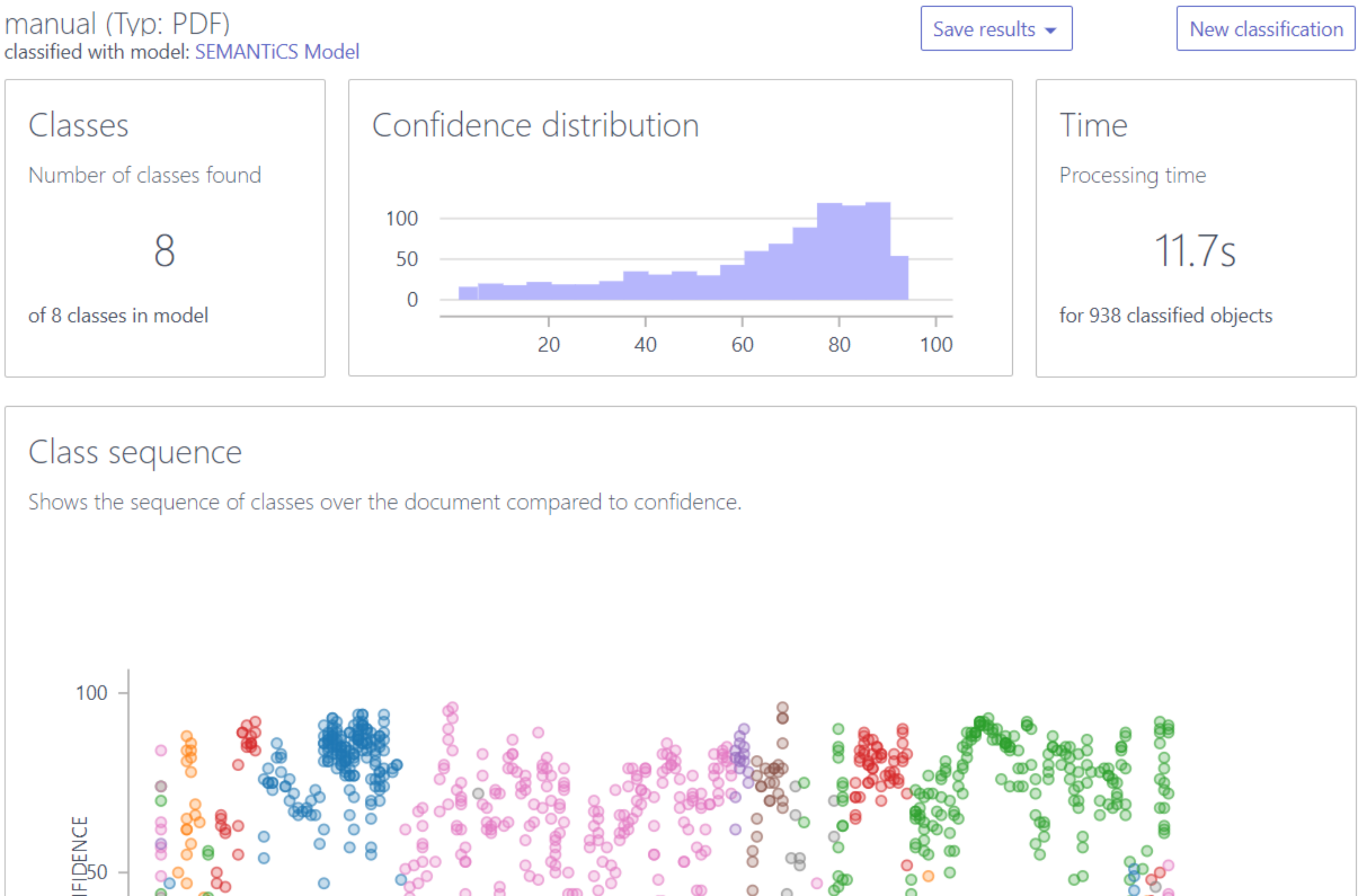
Live demo



manual (Typ: PDF)
classified with model: SEMANTiCS Model

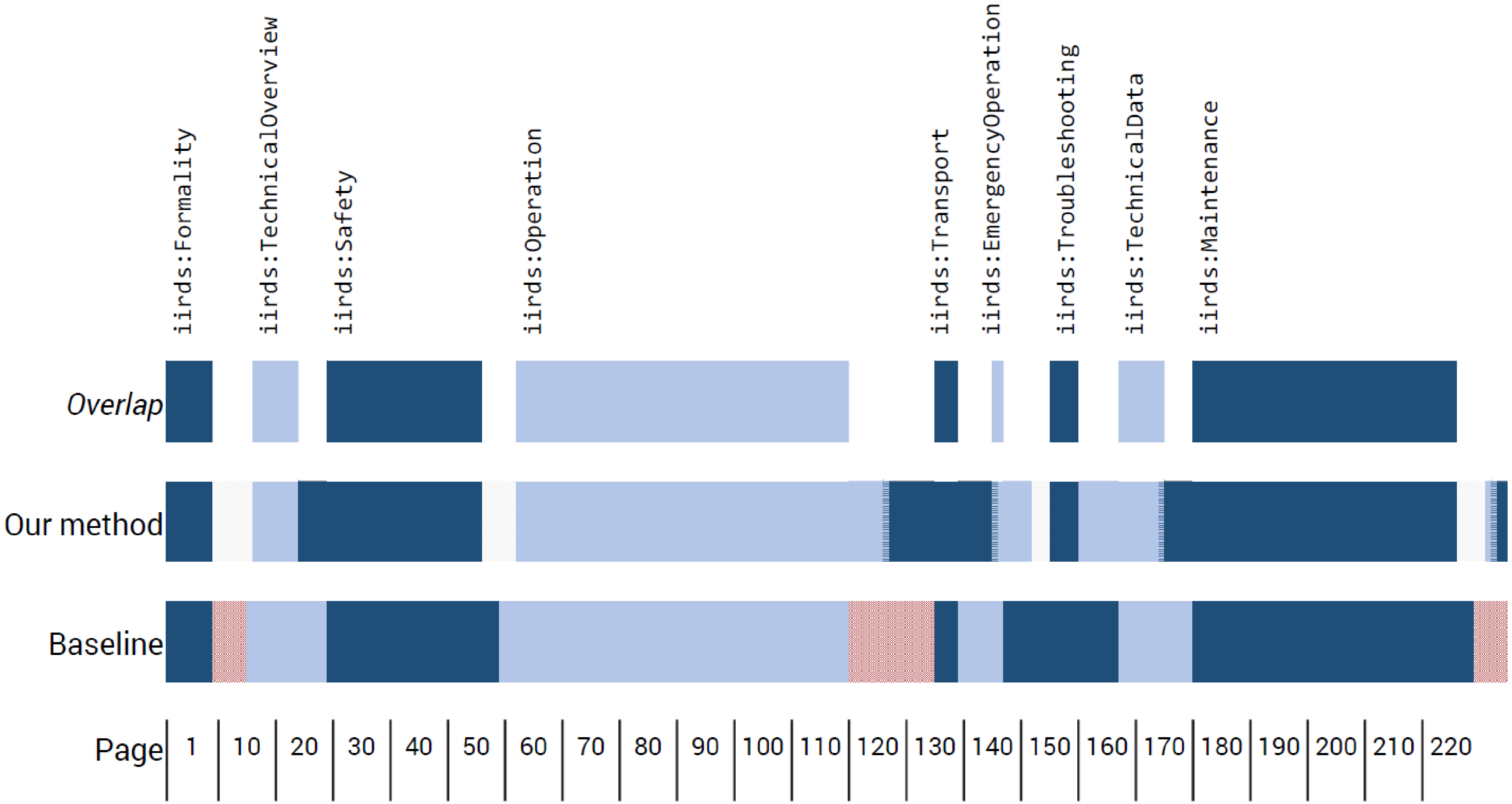
Classes
Number of classes found
8
of 8 classes in model

Confidence distribution

Time
Processing time
11.7s
for 938 classified objects

Class sequence
Shows the sequence of classes over the document compared to confidence.

Results


iirds:Formality
iirds:TechnicalOverview
iirds:Safety
iirds:Operation
iirds:Transport
iirds:EmergencyOperation
iirds:Troubleshooting
iirds:TechnicalData
iirds:Maintenance
Overlap
Our method
Baseline
Page
1
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Outlook & Conclusion

Outlook

- Other text sorts (e.g. patents) or document types (e.g. Word)
- Combination with other techniques (formatting / heuristics)

Conclusion

- Method relies on text and is formatting-independent
- No splitting of PDF, just additional metadata
- Good results in detecting semantic segments
- Identified ranges can be provided in a standardized format

Contact

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Code & Demo

github.com/j-oe/segments

segments.fastclass.de