

CITATION FOR HISTORICAL TEXTS AND THE *CITED LOCI* PIPELINE

Matteo Romanello (UNIL)

Sunoikisis Digital Classics (Summer 2021) – 24 June 2021

Outline

Cited Loci is a citation mining pipeline to extract citations to classical authors and works contained in publications' full-texts.

1. Motivation and Goal

2. Technology

3. Applications

4. Outlook

first 'block' of arrival scenes in the Telemachy (*Odyssey* 1–4): the arrival of Athena-Mentes at Ithaca (Hom. Od. 1.103–324);⁹ the goddess appears on the threshold of the palace (1.103–4) where she finds the suitors engaged in their respective activities (1.106–12). She is then seen by Telemachus (1.113, 1.118), who rises to accommodate the disguised goddess (1.119–20), takes her by the hand (1.121), and makes her enter (1.125); he welcomes her (1.122–4), takes her spear (1.121 and 1.127–9), and invites her to sit down (1.130–2); the dinner is prepared (1.136–43), consumed (1.149), and concluded (1.150); the visitor's identity is finally revealed (1.169–93) and information is exchanged (1.194–305) before Athena escapes Telemachus' attempt to retain her (1.309–19). This 'classic' hospitality scene highlights Telemachus'

Cited sources in Classics



NOTES AND DISCUSSIONS/NOTES DE LECTURE

SHORT NOTES ON TWO COMIC FRAGMENTS (CALLIAS FR. 18 K.-A.; THEOPOMPUS COMICUS FR. 64 K.-A.)

MAURIZIO SONNINO

1

THE EXTREME PAUCITY OF FRAGMENTS derived from Callias' play *Pedetai* (Callias Com. frs. 14–23 K.-A.) does not permit us to formulate any convincing hypothesis about the content of this drama. The comedy was probably staged after the peace of 421 B.C.,¹ and not, as is commonly believed, during the 430s or the early 420s.² Despite the widely held view to the contrary,³ Callias' *Pedetai* was perhaps not a political play, but, as Raines (1934: 341) supposed, a comedy concerned with literary criticism. Indeed some fragments of the *Pedetai* (frs. 14, 15, and 17 K.-A.) do appear to make judgements about tragic poets and their art.

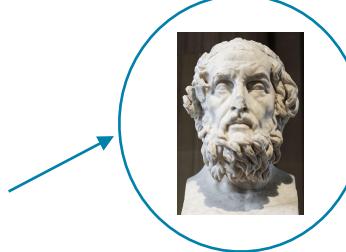
It is noteworthy that scholars have paid little attention to the following fragment from the play:⁴ ὅτι ἀμαλλεῖο παῖς ὁν ἐδέθην (fr. 18 K.-A.). The speaker is remembering the time of his childhood when "he was bound with a sheaf-binding." This fragment is cited in Photius' *Lexicon* under the item ἀμαλλεῖον (Phot. α 1110). Hesychius, under the item ἀμάλλιον (= ἀμαλλεῖον), explains this word with the term σχονίον, "rope" (Hesych. α 3416 = *Etym. Magn.* 76.6: ἀμάλλιον σχονίον, ἐν φ τάς ἀμάλλας δεσμένουσιν). It is significant that Callias, because of his father's job as a rope-maker, was also called Σχονίον, as the *Suda* attests (κ 213 = Callias Com. test. 1 K.-A.): Καλλίας Ἀθηναῖος, κομικός, υἱὸς Αυστημάχου, δὲ ἐπεκάθη Σχονίον διό τὸ σχονιπόκου εἶναι πατρός. Certainly, the origin of this nickname was some outrageous joke made

¹ See Storey (1988), who, on the basis of the κωμῳδίου mentioned in the fragments of the play, puts *Pedetai*'s staging after 421 B.C. See also Imperio 1998: 196–197.

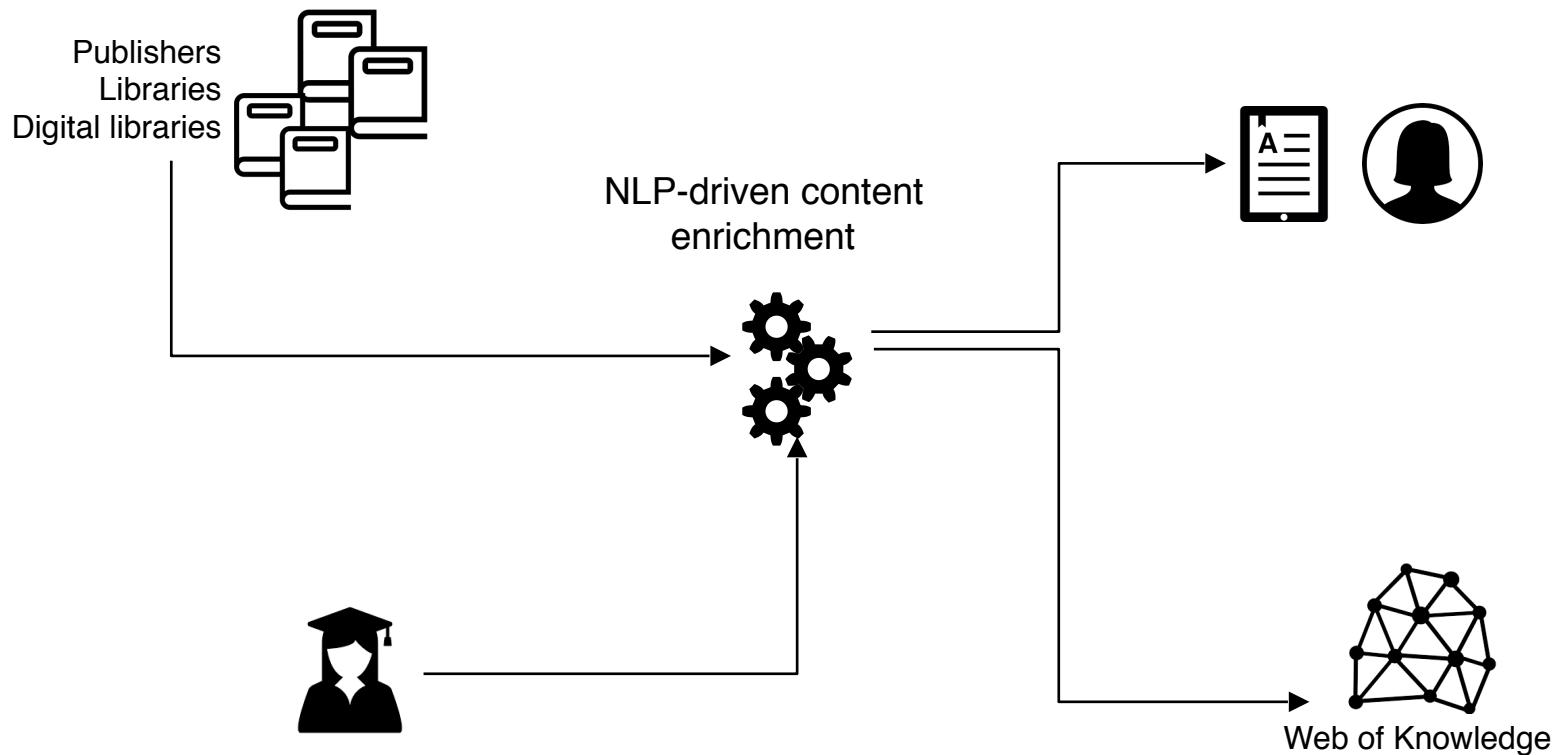
² Bergk (1838: 116), Kock (1880–89: 1,696), Körte (1919: 1627), Geisler (1949: 27), Edmonds (1957–61: 1,996), and Snell-Kannicht (1986: 143) supposed that Callias' play was staged in the late 430s owing to the mention of Pericles and Aspasia in fr. 21 K.-A. Muhl (1881: 108) proposed a date between 431 and 424. Capps (1906: 214), without giving any explanation, placed the date of performance in 432. Brändes (1886: 32) refers the title *Pedetai* to the Lacedaemonian captives taken on Sparta by Kleon in 424 and sets the *Pedetai* in 423/2. This view was first retained and later abandoned by Wiliamowitz (1906: 631; 1927: 10, n. 1). Finally Schwarze (1971: 92–93) chose a date between 430 and 425.

³ Particularly, see Brändes 1886: 32; Edmonds 1957–61: 1,175, note a; Schwarze 1971: 91–93.

⁴ Meincke, Kock, and Bothe did not know this fragment, which was edited for the first time by Demiańczuk (1912: 23).



Better indexed, easier to access, more interconnected



From indexes to knowledge graphs

Apollonius of Rhodes

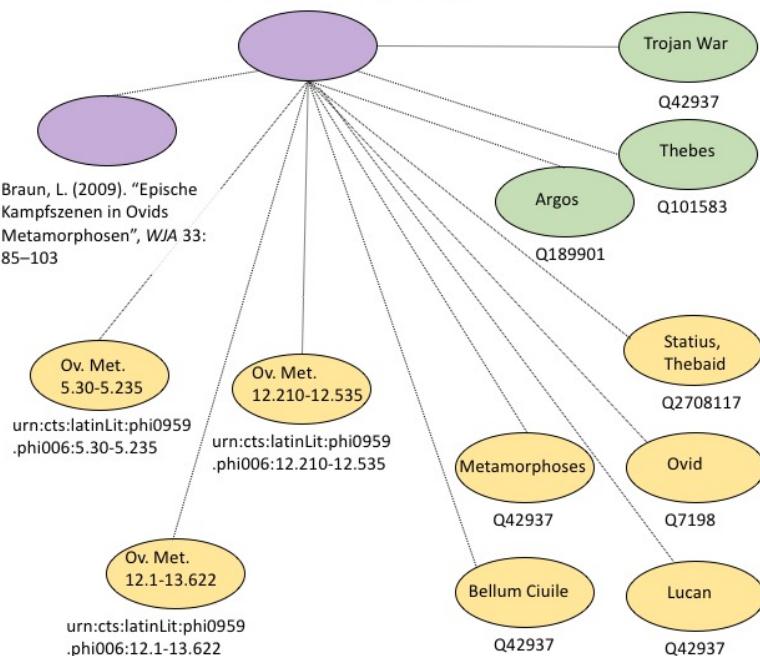
–*Argonautica* 1.2b–3a: 317 (note); 1.4: 373 (note); 1.9: 203; 1.18–19: 582; 1.26–31: 316 (note); 1.65–6: 603, 605; 1.84: 373 (note); 1.124–30: 375; 1.139–45: 603; 1.161: 375 (note); 1.261–306: 92; 1.315–17: 99; 1.338–47: 583; 1.366: 203; 1.436–49: 603; 1.450–518b: 56 (note); 1.450–518: 14, 65 (note); 1.462–95: 612 (note); 1.472–4: 78 (note), 79; 1.494–515: 79; 1.494b–511: 82 (note); 1.494–511: 83; 1.496–511: 410; 1.509: 410, 415; 1.519–58: 91, 95 (note); 1.519–35: 91; 1.519–20: 91; 1.519–23: 106; 1.520–1: 91, 106; 1.521: 92; 1.522–3: 91, 107, 116; 1.523: 93; 1.524–7: 92, 582; 1.525: 582; 1.527: 582; 1.528–30: 92; 1.528–34: 108; 1.533–4: 92; 1.534–6: 91; 1.534: 92, 116; 1.534–5: 92; 1.535.15: 94; 1.536–46: 91; 1.536–41: 91, 98; 1.537–46: 101; 1.540–3: 91; 1.540–1: 92; 1.541: 109; 1.544–5: 98; 1.545: 101;

With the exception of the Trojan War, the settings of martial epics do not focus on one city but can frequently shift between two cities, e.g. Thebes and Argos in the *Thebaid*, or they can even take on a global scale, as in Lucan's *Bellum Ciuite*. Ovid's *Metamorphoses*, of course, stands out from the rest of the epic poems under discussion in this volume as it combines a multitude of different narrative strands that are related by a shared topic, transformation, or the characters involved.

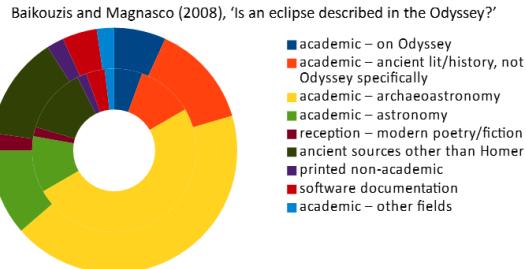
The poem nonetheless contains a variety of smaller, clearly structured fighting sequences, such as the fight between Perseus and Phineus for Andromeda (Ov. met. 5.30–235) or the battle between the Lapiths and the Centaurs (12.210–535), as well as a detailed account of the most famous battle of Ovid's epic predecessors, the Trojan War (12.1–13.622).⁷

7 Cf. Braun (2009, 94 and esp. 100–3 with an overview of Ovid's three main narrative patterns for the abovementioned battle scenes).

C. Reitz & S. Finkmann (2020). "Battle scenes in ancient epic – a short introduction". ...



The “citation problem”



“When non-classicists write about Homer, it seems they’re allergic to reading any actual research on Homer. This can be a problem.”

Peter Gainsford

kiwhellenist.blogspot.com/2018/09/the-citation-problem.html

Citation indexes for the Humanities

The screenshot shows a Google Scholar search results page for the query "odyssey homer". The results are filtered by "Artikel" (Articles). The first result is a book titled "[BUCH] The odyssey" by H Homer, published in 2015. The search bar at the top contains "giustizia vecchia". A sidebar on the left provides filtering options like "Beliebige Zeit" (Anytime), "Nach Relevanz sortieren" (Sort by relevance), and "Beliebige Sprache" (Any language). The main search results area includes a histogram showing citation counts over time from 1860 to 2019, and a table of 27 articles related to the topic.

Beliebige Zeit
Seit 2021
Seit 2020
Seit 2017
Zeitraum wählen...

Nach Relevanz sortieren
Nach Datum sortieren

Beliebige Sprache
Seiten auf Deutsch

Patente einschließen
 Zitate einschließen

Alert erstellen

odyssey homer

Venice Scholar

Giustizia vecchia, 1278 - 1797 SiASVe

Citing (N° of references:180)

[BUCH] The odyssey
H Homer - 2015 - books.google.com
Homer's Odyssey is a ancient Greek epic poem. Homer, the edition has been translated as the story of the Greek hero, Odysseus, and his return home after the Trojan War.

[BUCH] Homer and the Odyssey
S Saïd - 2011 - books.google.com
Who was Homer? This book takes us beyond the poet to explore an author about whom nothing is known. The reading of the ancient biographies as clues.

[BUCH] Homer and the resources of memory: some applications to the Iliad and the Odyssey
E Minchin - 2001 - pdfs.semanticscholar.org
The Iliad - Google Books Result How were the Homeric tales? This book is a study of Some Applications of Memory and the Resources of Memory: Some Applications to the Iliad and the Odyssey.

Articles - 27

Title	Links	Author	Journal	Year
Dalle memorie settecentesche del Magistrato alla Sanità, il complesso ruolo del Lido tra navigatori, pelli...	Show reference (1) VScholar Catalog	Studi veneziani	2013	
Apprendiste e maestre a Venezia tra Cinque e Seicento	Show references (5) VScholar Catalog	Archivio veneto	2012	
Lavoro e contrasti sociali nella Venezia secentesca	Show references (19) VScholar Catalog	Archivio veneto	2010	
Domenico e Giovambattista Guerra stampatori a Venezia nel Cinquecento	Show reference (1) VScholar Catalog	Studi veneziani	2009	
Bellunesi in Laguna (dal contratti di garzanton.sec. XVIII)	Show references (5) VScholar Catalog	Archivio veneto	2006	
I collegi dei medici fisici e dei medici chirurghi a Venezia nel Settecento	Show references (2) VScholar Catalog	Studi veneziani	2006	
La fraglia degli intagliatori e la costruzione di navi lusorie nel primo Settecento a Venezia	Show reference (1) VScholar Catalog	Studi veneziani	2006	
I giardini di cera della Serenissima. Gio. Batt. Talarmini, un originale ceroplasta nella Venezia del Sette...	Show reference (1) VScholar Catalog	Studi veneziani	2005	
Tra riformismo e conservazione: il rinnovamento delle corporazioni veneziane nel secondo Settecento	Show references (77) VScholar Catalog	Studi veneziani	2005	
Riflessi economici e implicazioni ideologiche della politica ecclesiastica veneziana nel secondo Settecen...	Show references (2) VScholar Catalog	Studi veneziani	2004	
La verità sul caso Gaspari	Show reference (1) VScholar Catalog	Studi veneziani	2003	
Riforme veneziane fra economia e finanza nel secondo Settecento	Show references (17) VScholar Catalog	Studi veneziani	2003	

Colavizza G. & Romanello, M. (2019). "Citation Mining of Humanities Journals: The Progress to Date and the Challenges Ahead". *Journal of European Periodical Studies*, 4(1). [10.21825/jeps.v4i1.10120](https://doi.org/10.21825/jeps.v4i1.10120)

The *CitedLoci* project

- **2009-2015** Conception (PhD dissertation)
- **2015-2017** Consolidation, development of first prototypes
- **2017-2020** Use in production for research and industry collaborations
- **2020-2024** Technological update, further research

<http://github.com/CitedLoci/>

<http://citedloci.org/>

The CitedLoci pipeline

TECHNOLOGY



Citation mining in a nutshell

honks to bees occurs in Aldhelm of Malmesbury 's « De uirginitate ».

s in their voluntary solidarity and obedience to leadership.

vn from other Christian and pagan literature.

y influenced by Pliny, nat. 11, 4, 11 and 11, 16, 46 and Vergil, georg. 4, 149-218.

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urn:cts:latinLit:phi0978.phi001.perseus-lat1:11.4.11

prefix	namespace	textgroup	work	version	passage
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work

honks to bees occurs in Aldhelm
n their voluntary solidarity and
from other Christian and pagan

REFAUWORK → Scope → REFSCOPE

ID:R1

"Pliny, nat." → "11, 4, 11"

Note: urn:cts:latinLit:phi0978.phi001:11.4.11

nfluenced by Pliny, nat. 11, 4, 11 and 11, 16, 46 and Vergil, georg. 4, 149-218.



Software

1 Citation Extractor

Lorem ipsum Verg. Aen. 12.10 f. sit
amet, consectetur adipiscing elit. Duis
facilisis lacinia ipsum id pharetra.

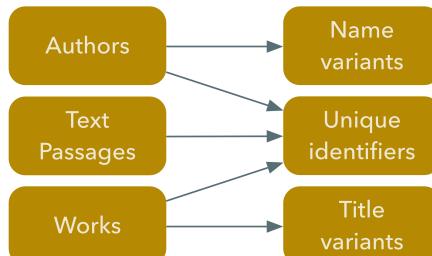
Verg. Aen. 12.10 f.

Verg. Aen. + 12.10 f.

2 Citation Matcher

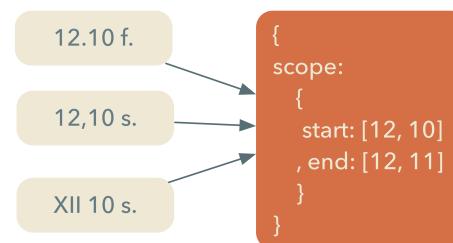


3 Knowledge Base



(1,500 authors; 5,500 works)

4 Citation Parser



(Context-Free Grammar)

<https://citedloci.org/>

<https://github.com/CitedLoci>

The *Cited Loci* pipeline

1 Citation Extractor

Lorem ipsum *Verg. Aen.* 12.10 f. sit
amet, consectetur adipiscing elit. Duis
facilisis lacinia ipsum id pharetra.

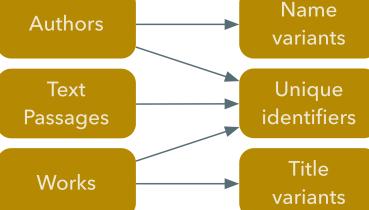
Verg. Aen. 12.10 f.

Verg. Aen. + 12.10 f.

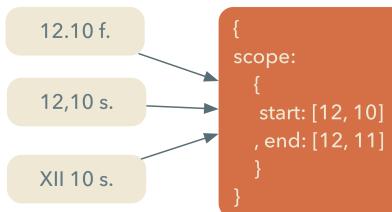
2 Citation Matcher



3 Knowledge Base



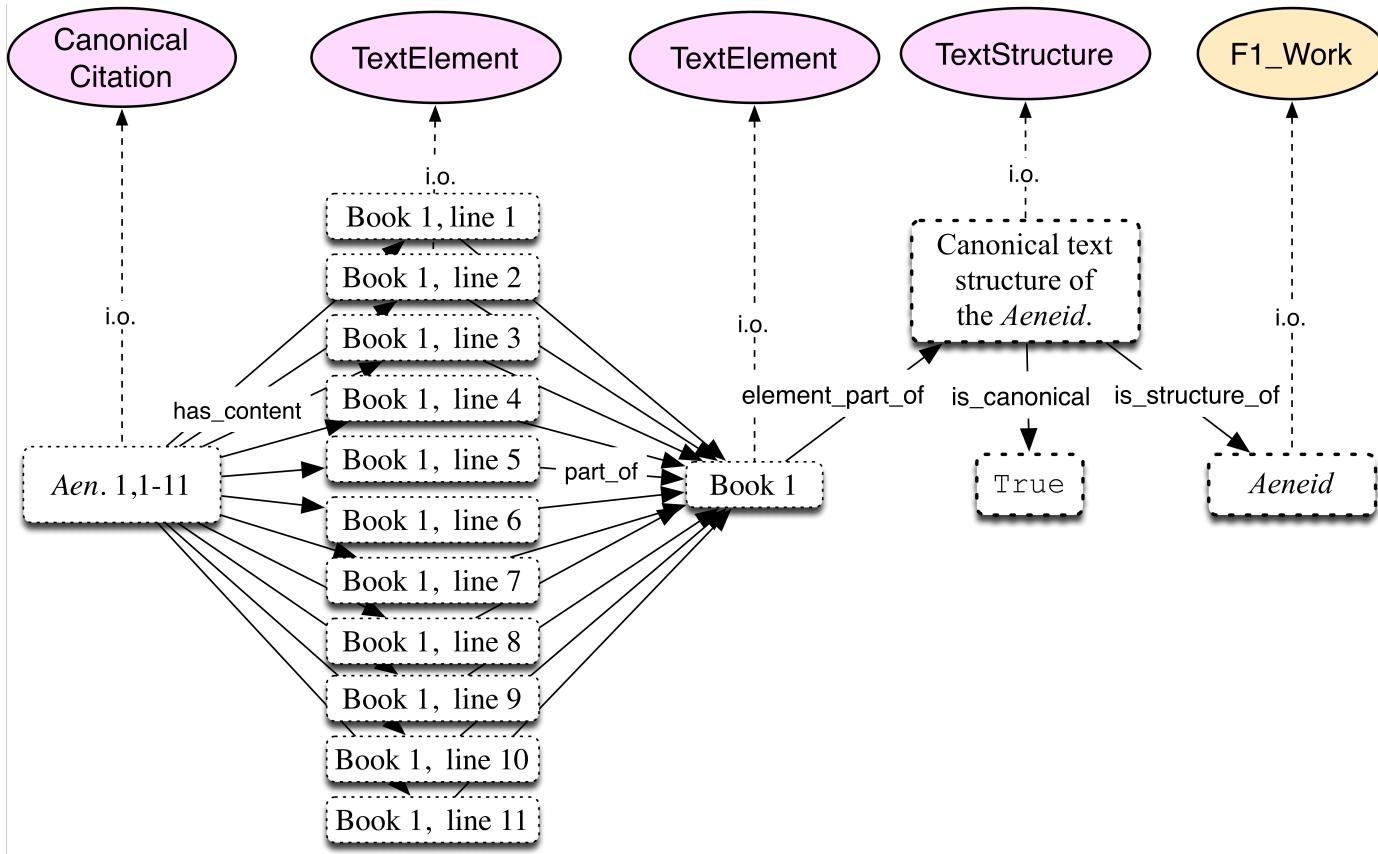
4 Citation Parser



<https://citedloci.org/>

<https://github.com/CitedLoci>

What is the content of a can. citation?



Contents of the KB

1. **names** (and abbreviations) of ancient authors;
2. **titles** (and abbreviations) of ancient works;
3. **unique identifiers** of authors, works and citable passages;
4. **links to Wikipedia** pages of ancient authors;
5. citable units of canonical texts (*)

Basic stats

	Total	Min	Max	Mean	Variance
Author names	4842	1	27	3.12791	9.81298
Author abbreviations	774	0	2	0.5	0.26309
Work titles	10354	1	31	1.99154	6.4174
Work abbreviations	2377	0	3	0.457203	0.574496

Resolvable text URIs

The screenshot shows the HuCIT Knowledge Base interface. The top navigation bar includes a user profile icon, the username "mromanello / hucit", a search bar with placeholder "Search ...", and "Login" and "Register" buttons. The left sidebar has a "HuCIT Knowledge Base" section with a house icon, a "Browser" section with a magnifying glass icon, and a "Table" section with a grid icon. Below these are "SPARQL" (with 2 results), "Graphs" (with 1 result), "Services" (with 0 results), "Assets" (with 0 results), and "Insights" (with 0 results). The main content area displays a page for "Homer, Iliad line 1.1" with the URL <http://purl.org/hucit/kb/works/2815/1.1>. The page title is "Homer, Iliad line 1.1" and it is identified as a "TextElement". The page content lists various triples:

- P1_is_identified_by [urn:cts:greekLit:tlg0012.tlg001:1.1](#)
- P2_has_type line
- is_part_of Homer, Iliad book 1
- Precedes Homer, Iliad line 1.2
- Resolves_to [cts/?request=GetPassage&urn=urn:cts:greekLit:tlg0012.tlg001:1.1](#)
- Type TextElement
- Label Homer, Iliad line 1.1

<http://purl.org/hucit/kb/works/2815/1.1>

Current limitations

- Accuracy of extraction still offers margins for improvement
- Only canonical references are captured
- Current implementation not up to date with state of the art

Romanello, M. (2020). “Large-Scale Extraction of Canonical References: Challenges and Prospects”

DOI: [10.5281/zenodo.3736455](https://doi.org/10.5281/zenodo.3736455)

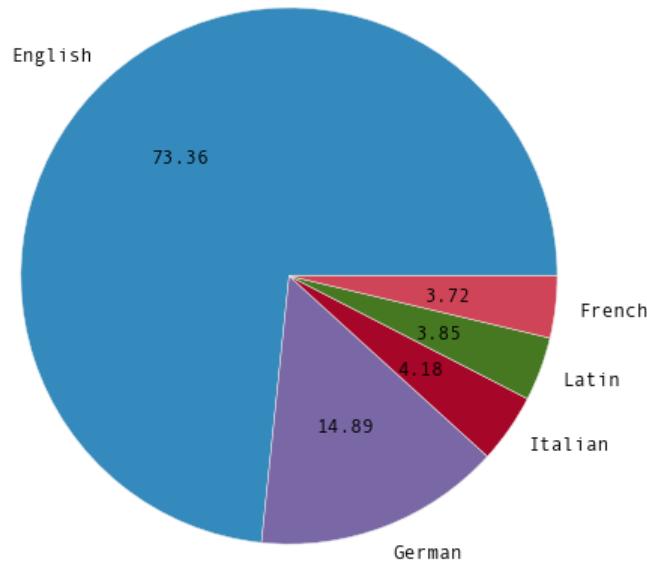
Information retrieval, scholarly publishing, reception studies

APPLICATIONS



Searching JSTOR the Classicists' way

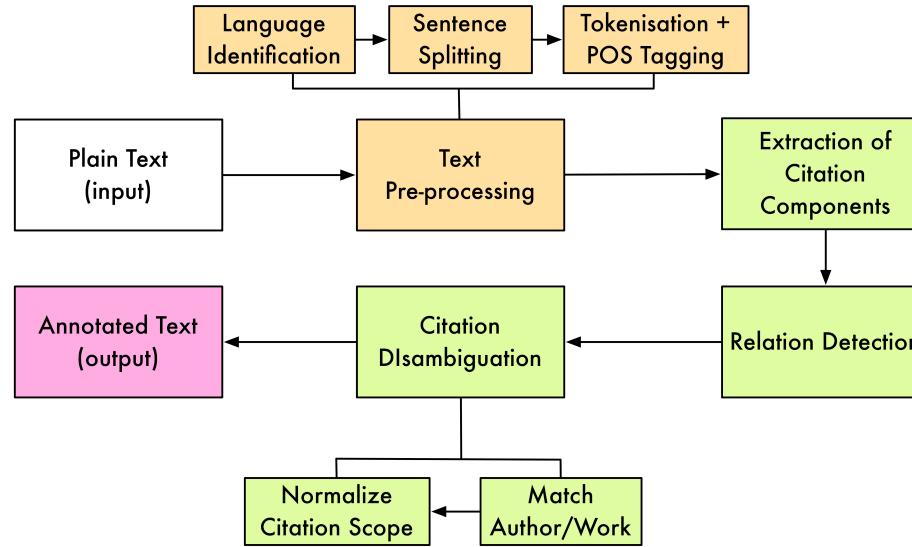
Goal: improve our ability to find relevant articles in JSTOR



	Number
Total articles	138,821
Successfully processed articles	119,723
Sentences	34,853,399
Tokens	865,075,857
Extracted canonical references	1,649,868
Extracted author mentions	1,448,163
Extracted work mentions	4,665

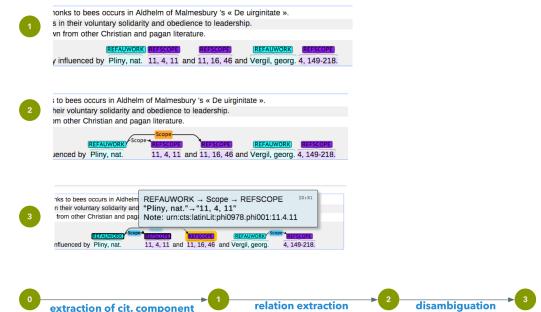
Table 2: Basic statistics about the JSTOR data.

Citation Mining from JSTOR

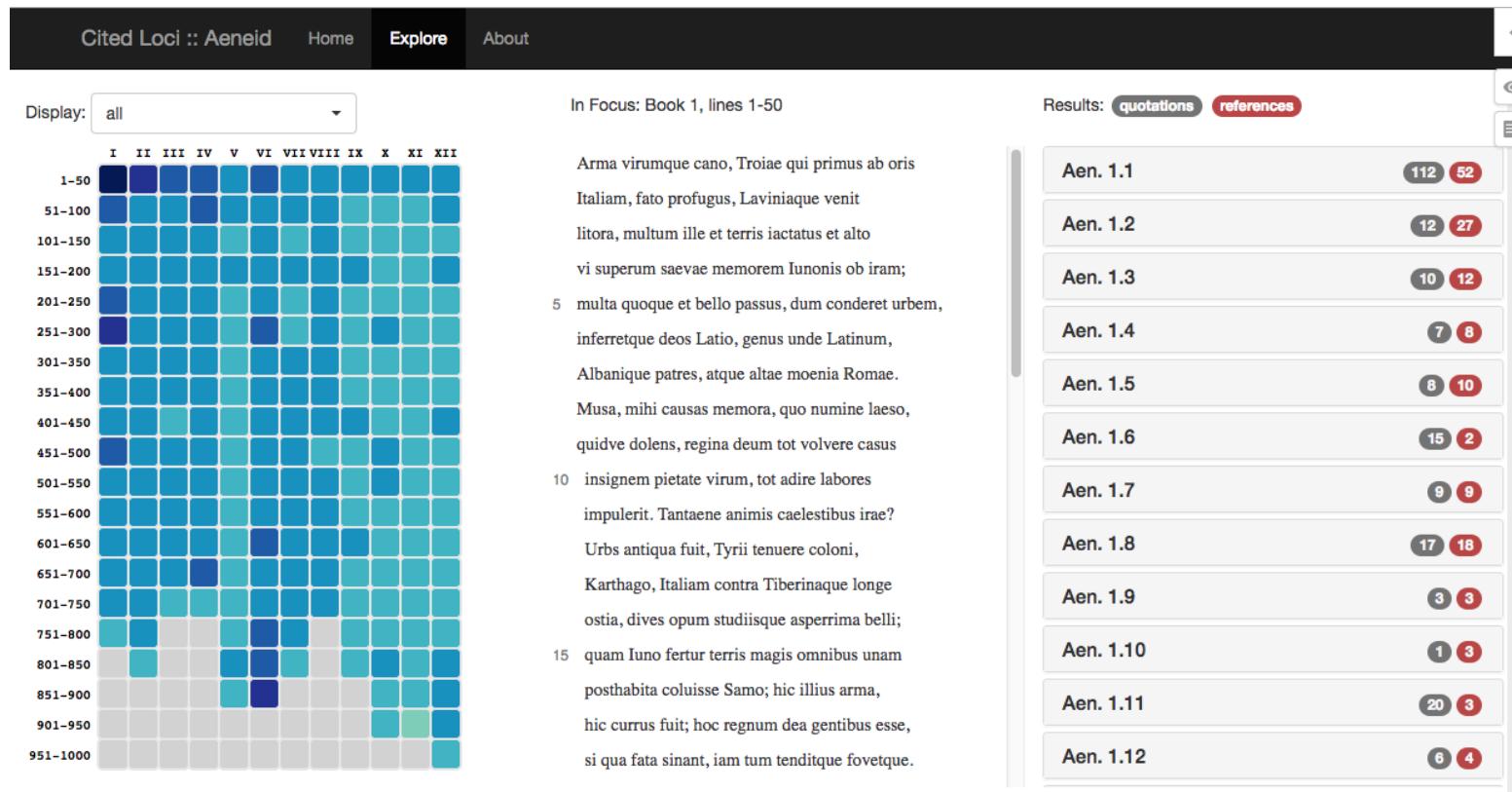


Task	Precision	Recall	F ₁ Score
Named entity extraction	79.24%	69.62%	73.88%
Relation detection	93.33%	91.87%	92.60%
Entity and relation disambiguation	61.04%	90.94%	73.05%

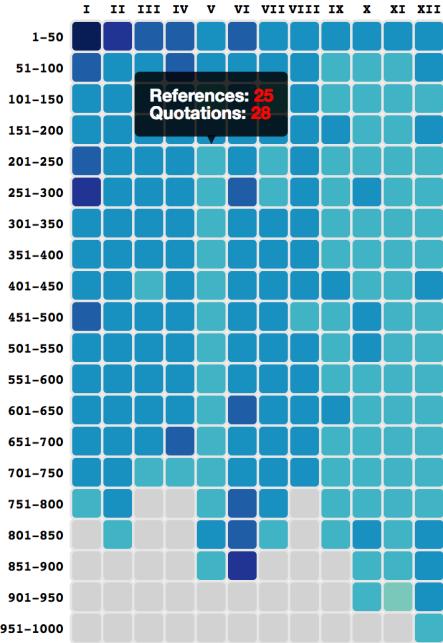
Table 1: The results of the evaluation for each step of the citation extraction process.



aeneid.citedloci.org



+5.7k articles · +11k quotations · +12k references



distant reading

In Focus: Book 6, lines 251-300

adventante dea. "Procul O procul este, profani,"
conclamat vates, "totoque absistite luco;
260 tuque invade viam, vaginaque eripe ferrum:
nunc animis opus, Aenea, nunc pectore firmo."
Tantum effata, furens antro se immisit aperto;
ille ducem haud timidis vadentem passibus aequat.
Di, quibus imperium est animarum, umbraeque silentes,



Results: quotations references

Aen. 6.258

10 7

Aen. 6.260

2 1

Aen. 6.263

1 1

Aen. 6.264

6 13

Proserpina's Tapestry in Claudian's "De raptu":
Tradition and Design
MICHAEL VON ALBRECHT
Illinois Classical Studies 1989
DOI: [10.2307/23064383](https://doi.org/10.2307/23064383)

Besides the role of the Sibyl, Claudian also takes the role of Virgil, invoking the gods of the underworld, as his great predecessor had done (1. 20 ; Aen. 6. 264).

— (reference: 571a493ab634c1c699eed3fa)

close reading
(primary lit.)

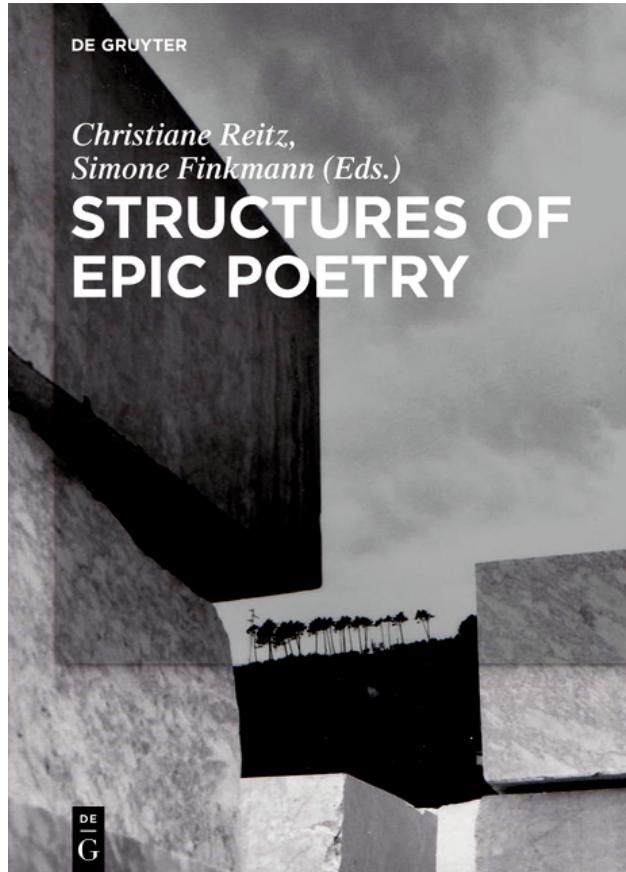
close reading
(secondary lit.)

Information retrieval, scholarly publishing, reception studies

APPLICATIONS



Structures of epic poetry



Cited Loci technologies employed to:

1. Support the creation of the [index locorum](#)
2. Produce a [digital companion](#) for the printed compendium

Publication in 4 volumes, 60 contributing authors, 70+ chapters, 2756 pages.

Romanello, M. (2019) "Experiments in digital publishing: creating a digital compendium". *Structures of Epic Poetry*, edited by C. Reitz and S. Finkmann, Berlin, Boston: De Gruyter, pp. 331-348. [DOI: 10.1515/9783110492590-074](https://doi.org/10.1515/9783110492590-074)

Structures of epic poetry

first ‘block’ of arrival scenes in the Telemachy (*Odyssey* 1–4): the arrival of Athena-Mentes at Ithaca (Hom. Od. 1.103–324):⁹ the goddess appears on the threshold of the palace (1.103–4) where she finds the suitors engaged in their respective activities (1.106–12). She is then seen by Telemachus (1.113, 1.118), who rises to accommodate the disguised goddess (1.119–20), takes her by the hand (1.121), and makes her enter (1.125); he welcomes her (1.122–4), takes her spear (1.121 and 1.127–9), and invites her to sit down (1.130–2); the dinner is prepared (1.136–43), consumed (1.149), and concluded (1.150); the visitor’s identity is finally revealed (1.169–93) and information is exchanged (1.194–305) before Athena escapes Telemachus’ attempt to retain her (1.309–19). This ‘classic’ hospitality scene highlights Telemachus’

Some statistics:

- 20,000 refs in 67 chapters
- ~300 refs per chapter in average
- skewed distribution: min. 3, max. 1,000 refs
- 50% of chapters contain up to 260 refs

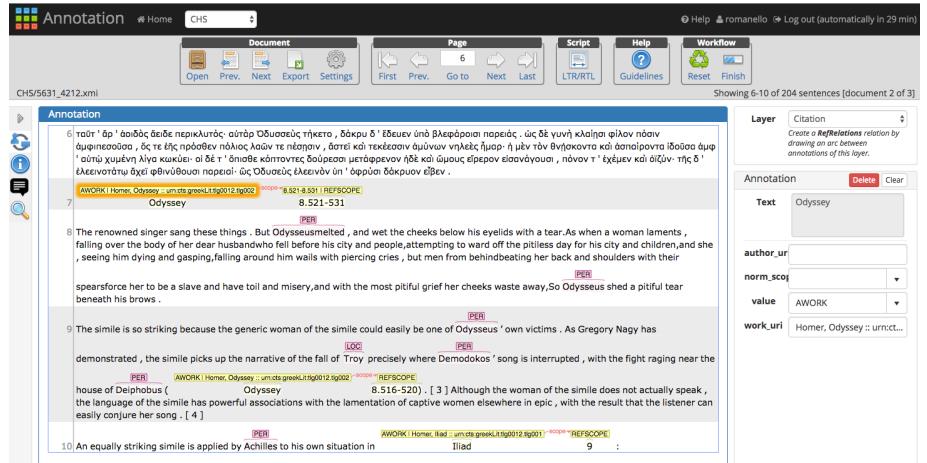
Semi-automatic indexing workflow

Four types of indices

- *Index locorum*: semi-automatic (87 pages)
- *Index fragmentorum*: manual (5 pages)
- *Index nominum*: manual (67 pages)
- *Index rerum*: manual (44 pages)

Index locorum:

- 4 chapters used as additional training data
- team of grad./post-grad. students manually verified the extracted references



INCEpTION annotation platform <https://inception-project.github.io/>

EpiBau Digital Companion

EpiBau Home Search About

Categories	Passages	Index terms	Keywords	
Search: <input type="text"/>	Search: <input type="text"/>	Search: <input type="text"/>	Search: <input type="text"/> scene	First Previous 1 2 Next Last
▼ <input type="checkbox"/> Communication • <input type="checkbox"/> Divine council scenes • <input type="checkbox"/> Messenger scenes • <input type="checkbox"/> Dream scenes • <input type="checkbox"/> Prophecies	> <input type="checkbox"/> Aulus Gellius > <input type="checkbox"/> Abbo of Saint-Germain > <input type="checkbox"/> Accio, > <input type="checkbox"/> Aegritudo Perdicæ > <input type="checkbox"/> Aelius Donatus > <input type="checkbox"/> Aeschylus > <input type="checkbox"/> Aesop > <input type="checkbox"/> Alan of Lille > <input type="checkbox"/> Albert of Stade > <input type="checkbox"/> Albertino Mussato > <input type="checkbox"/> Alcuin of York > <input type="checkbox"/> Aldhelm of Malmesbury > <input type="checkbox"/> De Virginitate (metrical version) > <input type="checkbox"/> Anthologia Latina > <input type="checkbox"/> Anthologia Palatina > <input type="checkbox"/> Ps.-Apollodorus of Athens > <input type="checkbox"/> Apollonius of Rhodes > <input type="checkbox"/> Appian > <input type="checkbox"/> Arator > <input type="checkbox"/> Aratus of Soloi > <input type="checkbox"/> Argonautica Orphica > <input type="checkbox"/> Aristophanes > <input type="checkbox"/> Aristotle > <input type="checkbox"/> Artemidoros > <input type="checkbox"/> Ausonius [Decimus] <small>Mosaico Aeneo</small>	Coming soon!	• <input type="checkbox"/> apparition scene • <input type="checkbox"/> arming scene • <input type="checkbox"/> arrival scene • <input checked="" type="checkbox"/> council scene • <input type="checkbox"/> departure scene • <input type="checkbox"/> hospitality scene • <input type="checkbox"/> messenger scene • <input type="checkbox"/> reception scene	Active filters x Export results (TSV) passage: Argonautica 1 passage: Vergil [Publius Vergilius Maro] keyword: council scene (Query returned 8 results)

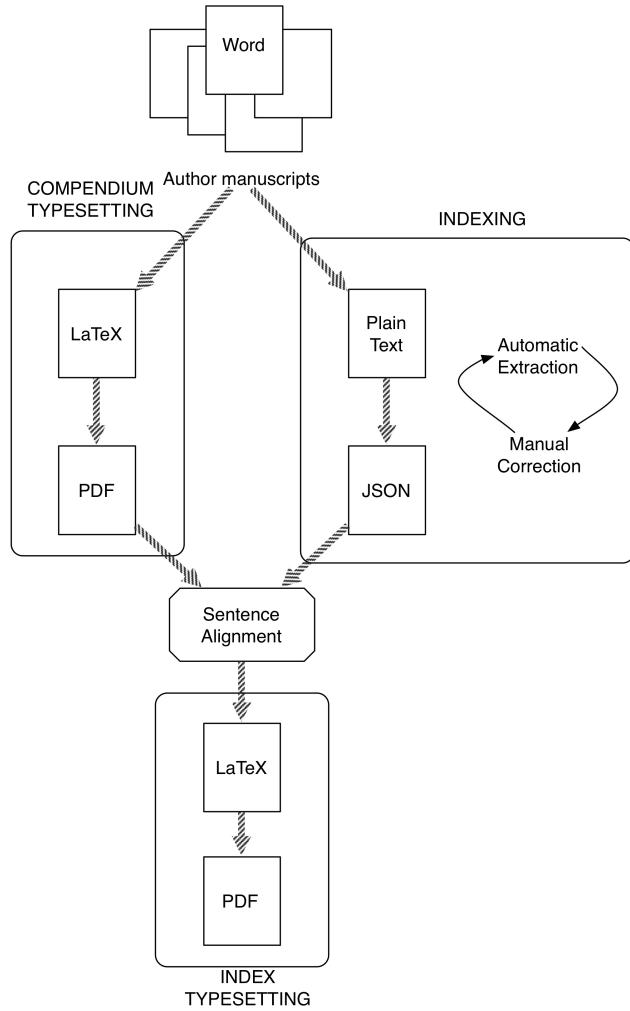
Christiane Reitz, *Divine council scenes in ancient epic*, Vol. 2.2, pp. 717-743
§197
The only divine council scene in the Aeneid (Verg. Aen. 10.1–117) has encountered heavy criticism, even the suggestion to atheise the passage has been made.[22] On the other hand, critics have pointed out that the council scene is an important respite from the fighting in the preceding book and the battle scenes which make up the main part of the tenth book (10.118–307 narrating the siege of the Trojan camp and return of Aeneas, and 10.308–908, the battle between the opposing forces of Aeneas and Turnus).
[Read online](#)

Christiane Reitz, *Divine council scenes in ancient epic*, Vol. 2.2, pp. 717-743
§198
The council scene is complemented by the discussion between Jupiter and Juno in 10.606–32, resulting in Turnus' temporary removal from the battlefield, and the dispute between Venus and Juno looks back to their plotting in 4.90–128.
[Read online](#)

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Hybrid editorial workflows



Constraints

- Manual correction needs final manuscripts
- *Index locorum* needs final pagination

Formats

- Word – writing/editing
- LaTeX – typesetting
- plain text – citation indexing
- PDF – final format for printing

Lessons learned

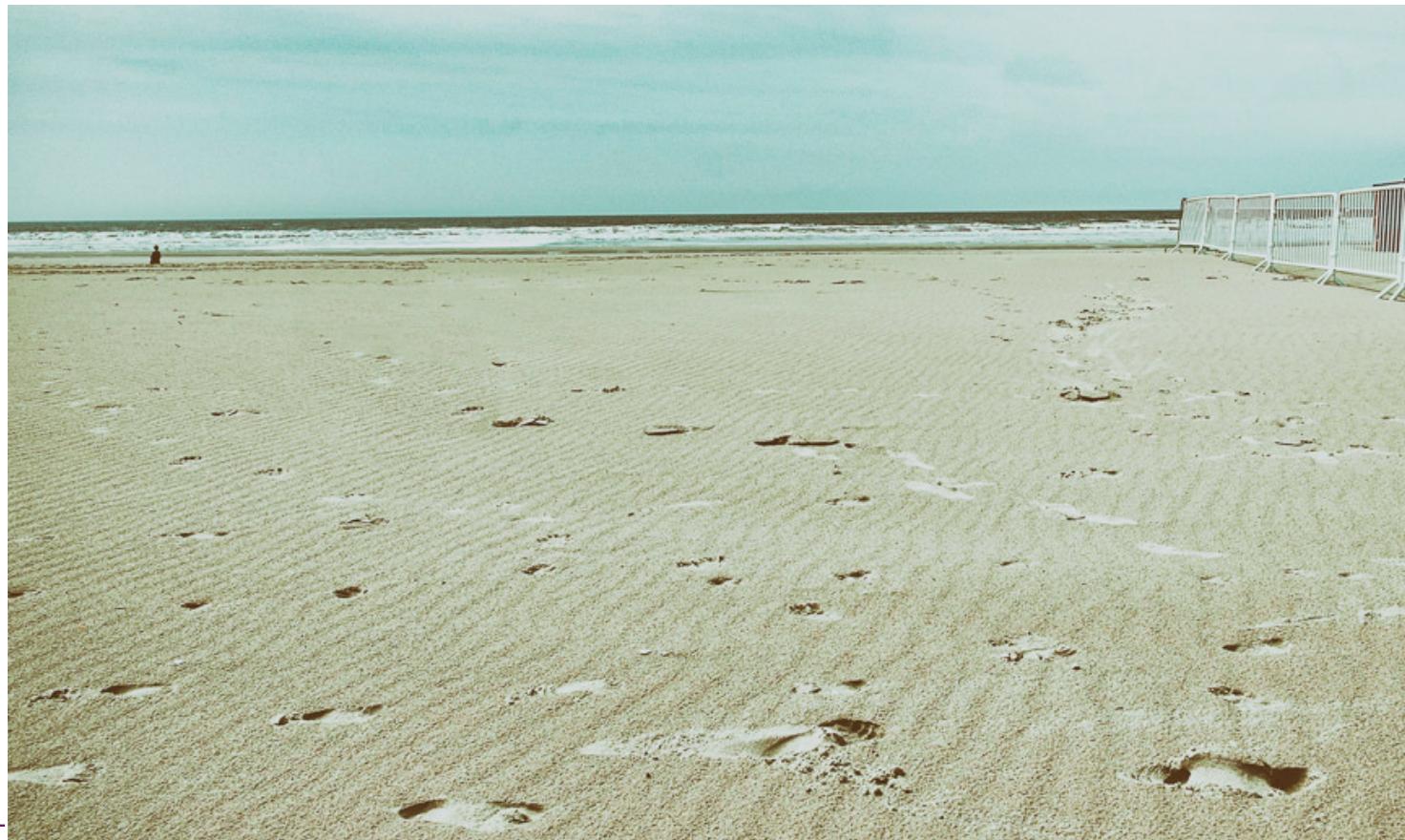
- Experiment worth given extent of publication and of citations
- Yet, disproportionate investment for a single publication
- But wider applicability of the process (if streamlined)

Information retrieval, scholarly publishing, reception studies

APPLICATIONS

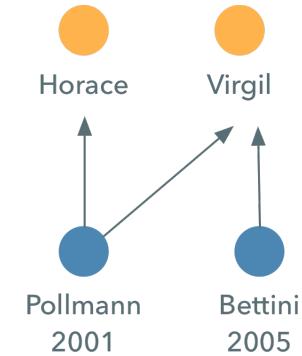
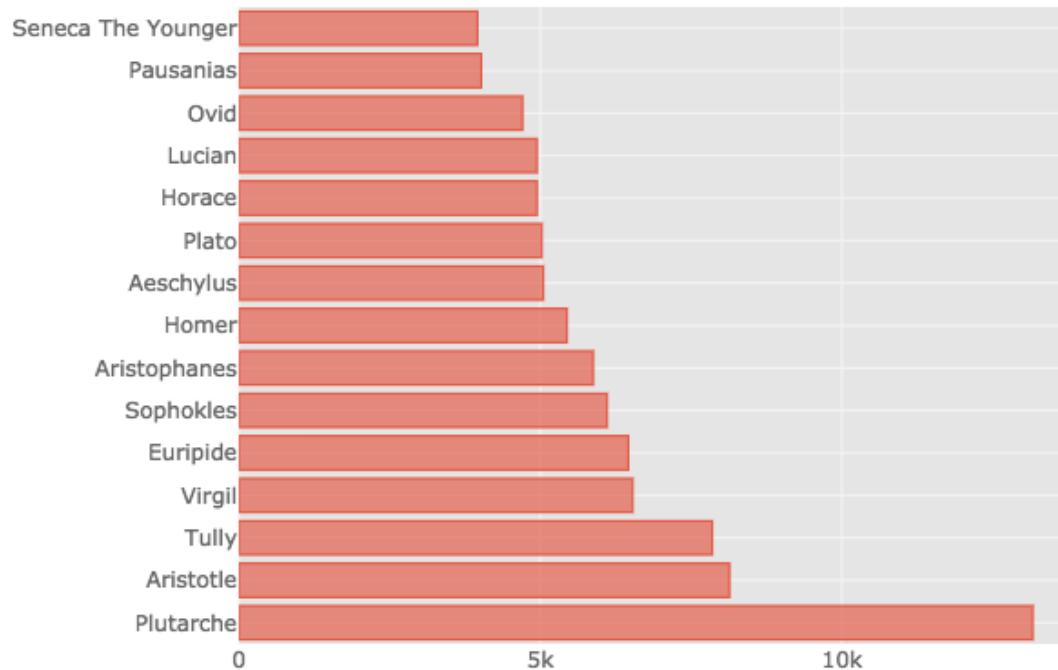


Citation as traces of scholarship



The canon emerging from citation data

15 most cited authors in JSTOR (1900-2009)



1% of Greek/Latin authors accounts for 30% of references in JSTOR

Canon and continuity

W. Scheidel (1997). "Continuity and Change in Classical Scholarship", *Ancient Society* 28.

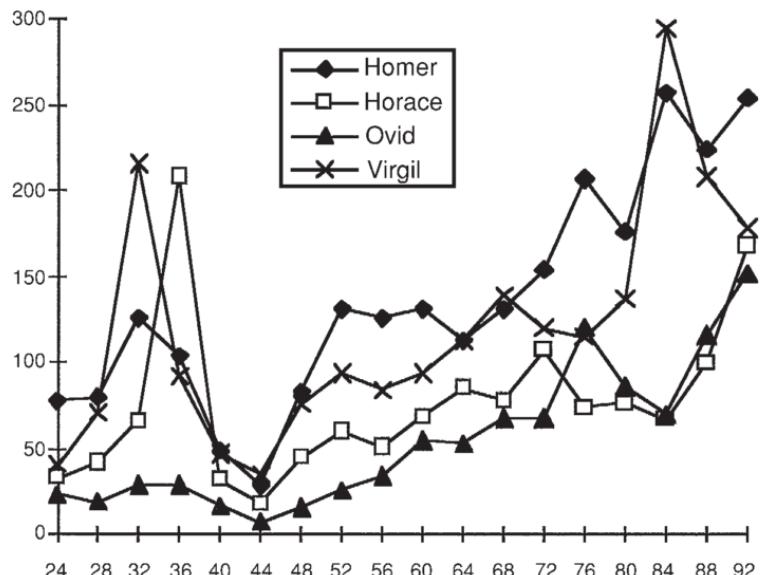


Fig. 7 Number of entries: poets

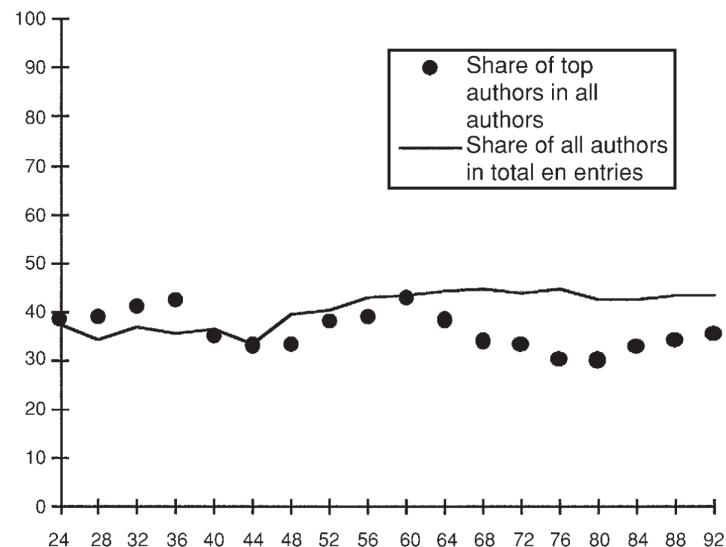
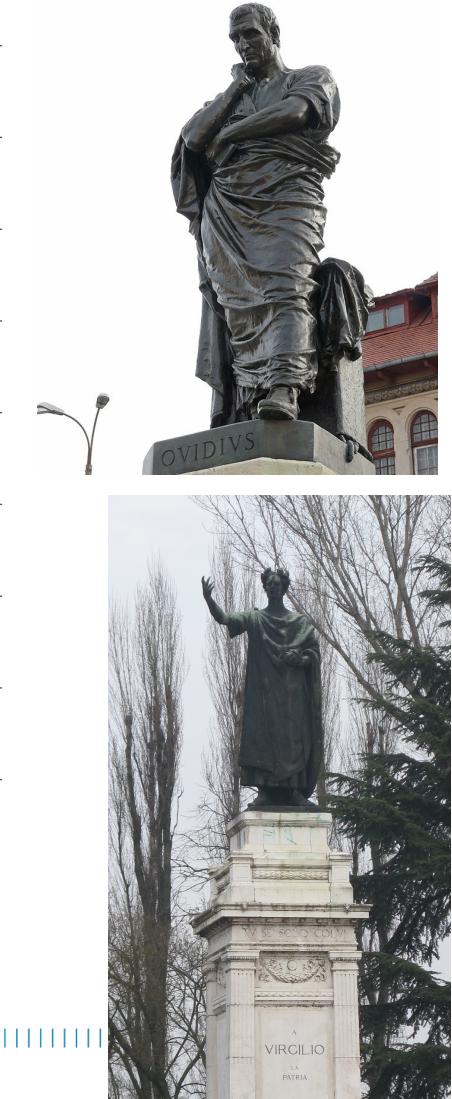
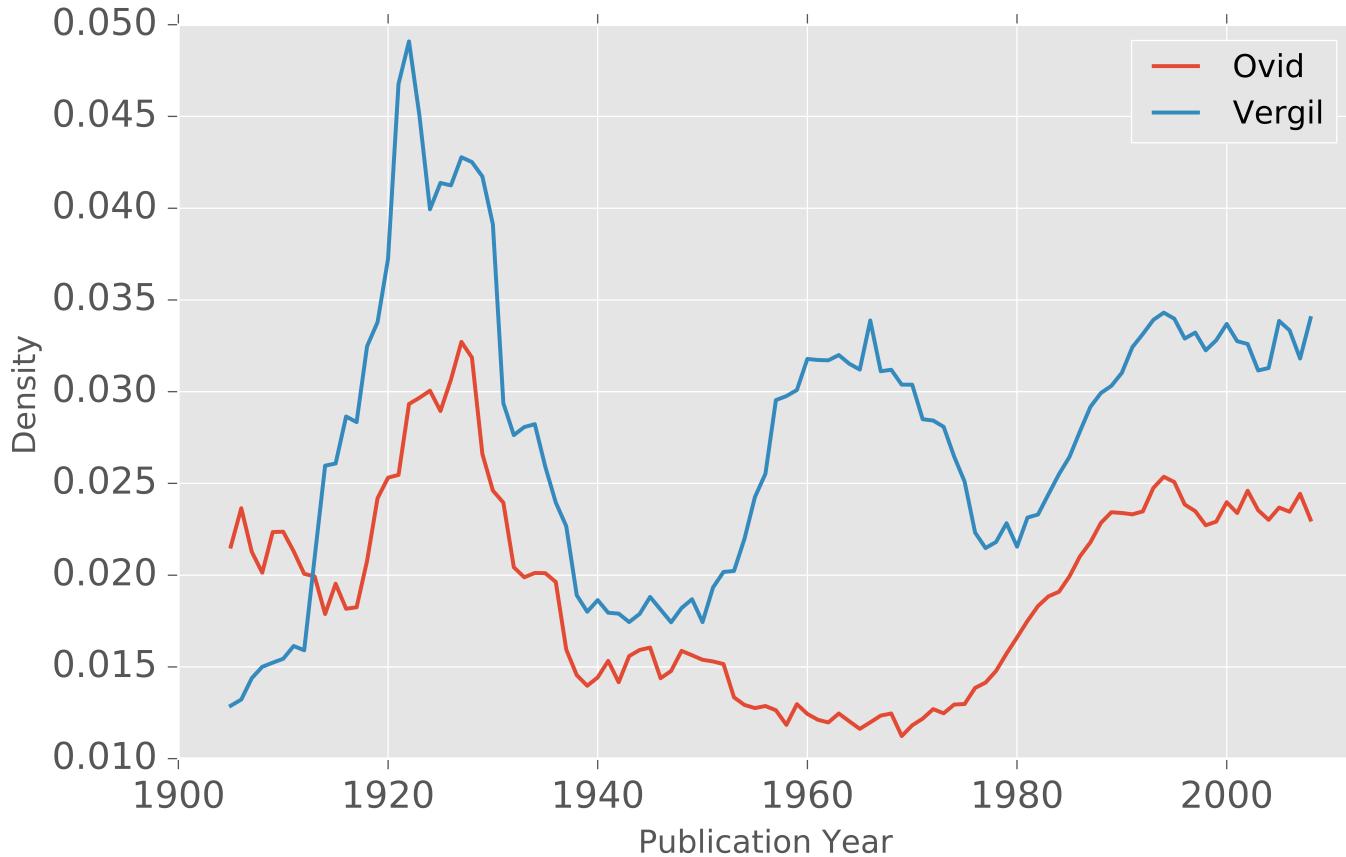


Fig. 9 Share of 14 top authors in total of all ancient authors (in per cent)

⁵ Aeschylus, Aristophanes, Aristotle, Augustine, Cicero, Euripides, Homer, Horace, Ovid, Plato, Plutarch, Sophocles, Old and New Testament, Virgil (based on the relative share of authors in 1992).

Waves of reception: Ovid and Vergil



cfr. Ziolkowski 2009, *Ovid in the Twentieth Century*.

Outlook

- Technological update
 - underlying machine learning models
 - Implementation of the pipeline, Python 2 to 3
- Application to OCRed classical commentaries
- Expand the range of captured references
- Publication of annotated data and annotation guidelines
- Continuing collaboration with scholarly publishers (e.g. Books2KGs project)

Hands-on part

A step-by-step walkthrough of the citation extraction pipeline

<https://github.com/CitedLoci/IndexLocorum101>