THE HISTORIES OF PAULUS OROSIUS

AN AUTOMATIC TEXT REUSE INVESTIGATION INTO THE FIRST CHRISTIAN HISTORY OF ROME

Greta Franzini and Marco Büchler

Digital Humanities Conference 2017, Montréal, Canada

eTRAP
Electronic Text Reuse Acquisition Project

GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

TABLE OF CONTENTS

1. Introduction
2. Research questions
3. Challenges
4. Methodology
5. Results
6. Conclusions and Next steps

INTRODUCTION

ABOUT US

Greta Franzini, Classicist
Marco Büchler, Computer scientist (NLP)

Members of the eTRAP Early Career Research Group, an interdisciplinary team funded by the German Ministry of Education and Research (BMBF) and focussing on Automatic Text Reuse Detection.

Text Reuse: written repetition or borrowing of text.

`http://www.etrap.eu`

OUR RESEARCH

Our research goal

Advance technology for automatic text reuse detection in historical texts through the study of intertextuality. Philological discoveries are an added bonus!

Q: How do we advance the technology?

A: We test it on as many different text reuse scenarios or *styles* as possible.

OROSIUS AS A CASE STUDY

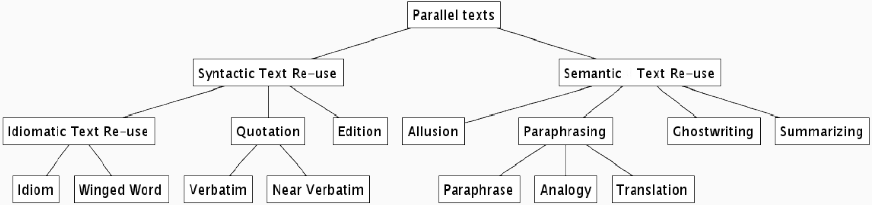


Figure 1: Different reuse styles.

Orosius is an ideal case study for Latin as he draws from 500 years worth of historical accounts providing many different reuse styles in one place.

OROSIUS AND HIS HISTORIES

Paulus Orosius [ca. AD 375-418]

- Roman historian and Christian from Spain;
- Wrote in Latin.

He wrote the *Historiae adversus Paganos* (*Histories against the Pagans**)

- First *Christian* history of Rome;
- Defense against pagan accusations that Rome's ruin had been caused by the advent of Christianity;
- Heavily reuses both pagan and Christian authors to support his argument (**1688** *known* instances of reuse: **18 authors** and **27 works**).

*Paganism = pantheism, polytheism, non-Christian.
*Christianity = monotheism. Declared *permitted religion* by Constantine the Great in 313 (Edict of Milan); declared official religion of the Empire by son Constantius II in 350.
*Founding of Rome: 753 B.C.
*Sack of Rome by Alaric, King of the Visigoths: 410 A.D.

RESEARCH QUESTIONS

RESEARCH QUESTIONS

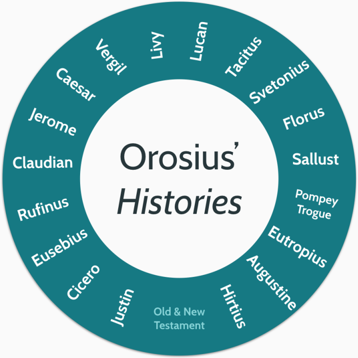
1. Can we automatically identify the 1688 instances of Orosian reuse reported by scholars (''gold standard'')?
2. How does Orosius' reuse diversity affect question 1?
3. What does this research tell us about the state-of-the-art of automatic text reuse detection in historical, and particularly Latin, texts?

CHALLENGES

CHALLENGE: BIG DATA VS. QUALITY

Big Data: data that cannot be manually processed due to its large size.

- The corpus is over 2M words in size;
- The corpus contains both poetry and prose, as well as Classical (1st BC-3rd AD), Late (3rd-6th AD) and Ecclesiastical/Medieval Latin (6th/8th AD-onward) - differences in style.



CHALLENGE: REUSE DIVERSITY

Orosius:

- reuses text from two words to entire sentences or even paragraphs;
- quotes word-for-word (*verbatim*), near-verbatim or (very) loosely;
- doesn’t always cite the original author;
- occasionally misattributes text as probably citing from memory;
- deliberately distorts text to fit his argument;
- reuses text that no longer survives.

In many cases, editors can’t tell whether there *is* reuse or not.

No single algorithm can extract all of this!

CHALLENGE: RESOURCES USED ARE INCOMPLETE

- LemLat 3 (Ruffolo, Passarotti): morphological analyzer & lemmatizer
  - lexical basis resulting from the collation of three Latin dictionaries (40,014 lexical entries; 43,432 lemmas):
    - Georges, K.E., and Georges, H. 1913-1918. Ausführliches Lateinisch-Deutsches Handwörterbuch. Hahn, Hannover.
    - Glare, P.G.W. 1982. Oxford Latin Dictionary. Oxford University Press, Oxford. Gradenwitz, O. 1904. Laterculi Vocum Latinarum. Hirzel, Leipzig.
    - ONOMASTICON: 26,415 lemmas from the Onomasticon of Forcellini, E. 1940. Lexicon Totius Latinitatis. Typis Seminarii, Padova.
- Latin WordNet (Minozzi): 9,124 lemmas; 8,973 synsets; 25,908 word senses
- BabelNet API (Navigli): 2,471,700 lemmas; 2,468,797 synsets (we use nouns & verbs only); 2,641,410 word senses

Quality in input = quality in output.

METHODOLOGY

METHODOLOGY: TRACER

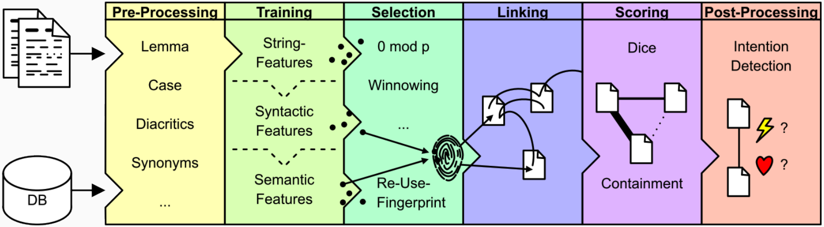


Figure 2: TRACER contains ca. 700 algorithms.

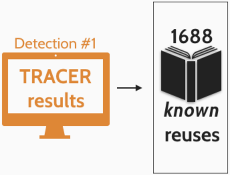
http://www.etrap.eu/research/tracer

METHODOLOGY: RESULTS EVALUATION

Detection #1

TRACER results

METHODOLOGY: RESULTS EVALUATION



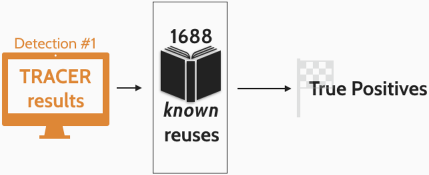
Detection #1

TRACER results

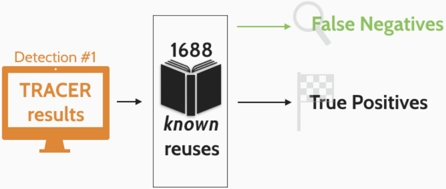
1688

known reuses

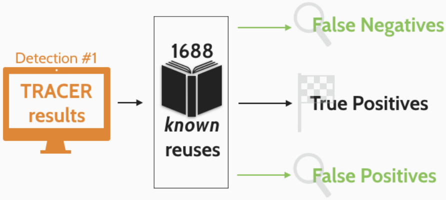
METHODOLOGY: RESULTS EVALUATION



METHODOLOGY: RESULTS EVALUATION



METHODOLOGY: RESULTS EVALUATION



Detection #1

TRACER results

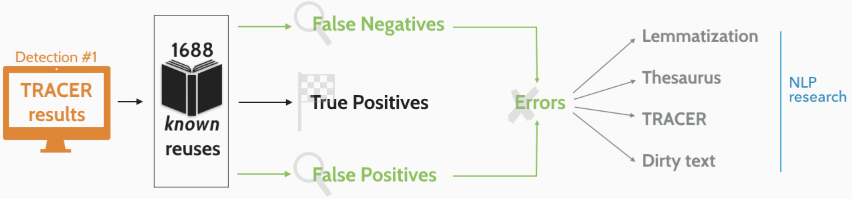
1688 *known* reuses

False Negatives

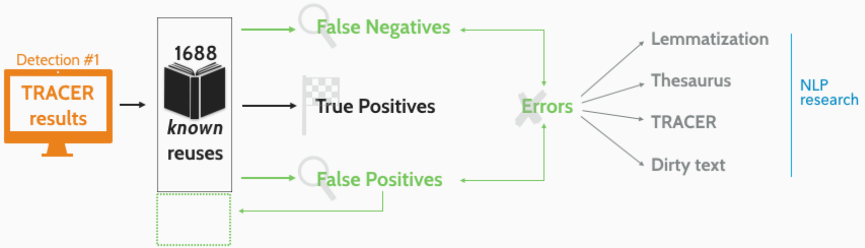
True Positives

False Positives

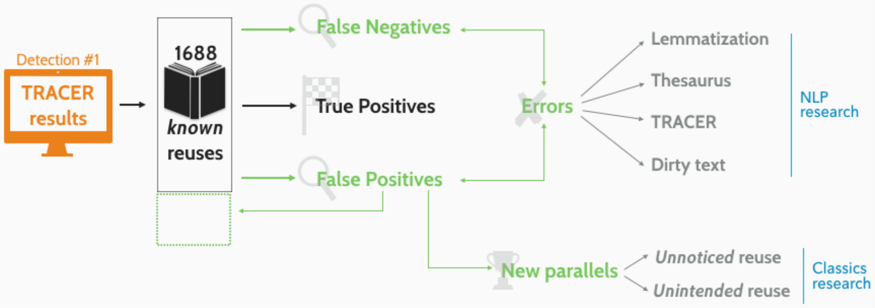
METHODOLOGY: RESULTS EVALUATION



METHODOLOGY: RESULTS EVALUATION



METHODOLOGY: RESULTS EVALUATION



RESULTS

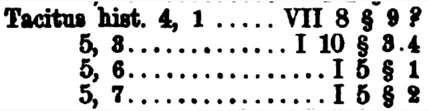
REALISTIC EXPECTATIONS

- Given previous scholarship spanning 1600 years, we don’t expect to find many new reuses.
- We usually expect an average of 5-10 new reuses. Colleague in Coptic Studies recently found 14 new reuses with TRACER.

RESULTS: OROSIUS' REUSE OF TACITUS' HISTORIES

Gold Standard - Experts tell us Orosius reuses Tacitus **15 times***:

- 10 we can't trace because they refer to lost books;
- 5 remaining* -1 uncertain reuse:



Tacitus hist. 4, 1	VII 8 § 9 ?
5, 8.............	I 10 § 3.4
5, 6................	I 5 § 1
5, 7................	I 5 § 2

Figure 3: CSEL reports 4 reuses of Tacitus, including 1 uncertain which we ignore.

We optimise for RECALL

In one detection task**, **TRACER identified 40 reuse candidates**:

- it identified the 4 reported reuses (=true positives)!
- it returned 36 other parallels (=false positives), of which 2 "new" discoveries.

**Corpus Scriptorum Ecclesiasticorum Latinorum* edition (1882) lists 4 reuses; the *Patrologia Latina* (1846) lists 5.

**Detection parameters: moving window of 15 words; 0.8 feat. density; syn. replacement; 0.5 (50%) sim. threshold.

RESULTS: OROSIUS’ REUSE OF TACITUS’ HISTORIES

Example of a Gold Standard match

Tacitus. *Sic conquisitum collectumque vulgus, postquam vastis locis relictum sit, ceteris per lacrimas torpentibus, Moysen unum exulum monuisse ne quam deorum hominumve opem expectarent utrisque deserti, sed sibimet duce caelesti crederent, primo cuius auxilio praesentis miserias pepulissent.* (5.3)

Orosius. *sic conquisitum collectumque uulgus postquam uastis locis relictum sit, ceteris per lacrimas torpentibus Moysen, unum exulum, monuisse, ne quam deorum hominumue opem exspectarent sed sibimet duci caelesti crederent, primo cuius auxilio praesentes miserias pepulissent.* (1.10)

RESULTS: OROSIUS' REUSE OF TACITUS' HISTORIES

New find: Syntactic text reuse; possibly intentional.

Tacitus. *Terra finesque qua ad Orientem vergunt Arabia terminantur, a meridie Aegyptus obiacet, ab occasu Phoenices et mare, septentrionem e latere Syriae longe prospectant.* (5.6)

Orosius. *Insula Cypros ab oriente mari Syrio, quem Issicum sinum uocant, ab occidente mari Pamphylico, a septentrione Aulone Cilicio, a meridie Syriae et Phoenices pelago cingitur.* (1.2)

RESULTS: OROSIUS’ REUSE OF TACITUS’ HISTORIES

New find: Semantic text reuse; possibly unintentional.

Tacitus. *Haud facile quis uni adsignaverit culpam quae omnium fuit.* (5.1)

Orosius. *quae tempora non uni tantum urbi adtributa sed orbi uniuerso constat esse communia.* (3.78)

RESULTS: OROSIUS' REUSE OF TACITUS' HISTORIES

Example of a false positive, to be added to the Gold Standard

TRACER output: `1200457 1101980 2 0.5`

RESULTS: OROSIUS' REUSE OF TACITUS' HISTORIES

Example of a false positive, to be added to the Gold Standard

TRACER output: `1200457 1101980 2 0.5`

Tacitus (`1200457`). *imus ad bellum*.
Reduced by TRACER to: `eo ad bellum`.
CORRECT

RESULTS: OROSIUS' REUSE OF TACITUS' HISTORIES

Example of a false positive, to be added to the Gold Standard

TRACER output: `1200457 1101980 2 0.5`

Tacitus (`1200457`). *imus ad bellum*.
Reduced by TRACER to: `eo ad bellum`
CORRECT

Orosius (`1101980`). *itaque bellum nocte commissum est*.
Reduced by TRACER to: `eo bellum nox committo sum`
INCORRECT

CONCLUSIONS AND NEXT STEPS

CONCLUSIONS

Despite all previous scholarship, our method makes it possible to detect new parallels for further study.

- Our methodology works but there is room for more automation.
- Our research limited by the linguistic resources at our disposal.

NEXT STEPS

Project

- Consolidate our methodology as we go through the entire corpus.

Research

Work towards an automatic taxonomy of reuse styles:

- Add *verba dicendi* (verbs introducing reported statements), idioms, proverbs, law maxims, figures of speech, etc. as embedded TRACER data resources to help filter results for evaluation;
- Incorporate WordFormation Latin (Litta, Passarotti) data (derivational dictionary) as additional text reuse detection dimension (word class).

CONTACT

Visit us

🌍 `http://www.etrap.eu`

✉ `contact@etrap.eu`

Stealing from one is plagiarism, stealing from many is research

(Wilson Mitzner, 1876-1933)

eTRAP

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

SPONSORED BY THE

Federal Ministry of Education and Research

ACKNOWLEDGMENTS

The authors wish to thank Marco Passarotti and Paolo Ruffolo (CIRCSE) for their continuous support with *LemLat3*.

LICENCE