Fragmentary Texts and Digital Collections of Fragmentary Authors

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What is a fragment?

(Oxford English Dictionary, s.v. fragment)

- a part broken off or otherwise detached from a whole
- a part remaining or still preserved when the whole is lost or destroyed
- an extant portion of a writing or composition which as a whole is lost
- a portion of a work left uncompleted by its author
Different kinds of fragments

- material fragments
- textual fragments
material fragments

material fragments = physical remains of ancient evidence

reconstruction of the monument

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textual fragments (1)

textual fragments
= material fragments bearing textual evidence

→ surviving broken off pieces of ancient writings
Ἑλλάνικος δ᾽ ἐν Κτίσεσι καὶ ἐκ ρίζων, φησι κατασκευάζεται τὸ βρύτον γράφων ὦδε· ἔπινουσι δὲ βρύτον ἐκ τινῶν ρίζων, καθάπερ Οἰράκες ἐκ τῶν κριθῶν. Ἐκαταῖος δ᾽ ἐν δευτέρῳ Περιηγήσεως εἰπὼν περὶ Αἰγυπτίων ὡς ἄρτοφάγοι εἰσίν ἐπιφέρει· τὰς κριθάς ἐς τὸ πῶμα καταλέουσιν. Ἐν δὲ τῇ τῆς Εὐρώπης περιόδῳ Παιόνας φησι πίνειν βρύτον ἀπὸ τῶν κριθῶν καὶ παραβίην ἀπὸ κέγχρου καὶ κόνυζαν. Ἀλείφονται δὲ, φησίν, ἔλαίω ἀπὸ γάλακτος. καὶ ταῦτα μὲν ταύτη.

Hellanicus in The Foundings says that beer is made also of rye; he writes as follows: ‘They drink beer made of rye, as the Thracians drink it made of barley’. Hecataeus, in the second book of his Description, after saying of the Egyptians that they were bread-eaters, continues: ‘They grind up the barley to make the drink’. And in The Description of Europe he says that the Paeonians drink a beer made from barley, also parabias, made from millet, and even fleabane. ‘They also anoint themselves’, he says, ‘with an oil made from milk’. So much for that. (trans. Gulick)
print collections of fragmentary texts

- textual excerpts drawn from many different sources
- excerpts arranged according to various criteria
- length of the excerpts different from one edition to another
- when printed the excerpt gives a false illusion of materiality
- duplication of the same text in multiple editions
representing textual fragments

- construct truly hypertextual editions, including not only excerpts but links to the scholarly sources from which those excerpts are drawn
- create meta-information through an accurate and elaborate semantic markup
- produce meta-editions consisting not only of isolated quotations, but also of pointers to the original contexts from which the fragments have been extracted
- provide scholars with an interconnected corpus of primary and secondary sources of fragments that also includes critical apparatuses, commentaries, translations, and modern bibliography on ancient texts
• textual fragment as **hypertext**
  ◦ a text derived from another text and interconnected to many other different typologies of texts

• textual fragment as **multitext**
  ◦ the result of a work of stratification of manuscripts and scholarly conjectures
demo.fragmentarytexts.org

About

demo.fragmentarytexts.org is a site complementary to Fragmentary Texts, which is a blog on "collecting and representing fragments of lost authors and works".

The aim of this site is to experiment tools and devise methods for representing fragments of lost works, i.e. ancient texts that have survived only through quotations preserved by other authors.

Print collections of fragmentary texts are collections of textual excerpts drawn from many different sources and arranged according to various criteria, such as chronological order or thematic disposition. The length of these excerpts can be significantly different from one edition to another and depends on the editor's choice. The aim of a digital collection of fragmentary texts is to go beyond the limits of print collections and express fragmentary sources in a more dynamic and interconnected way.

We begin by presenting some examples from the Lives of Plutarch and the Deipnosophists of Athenaeus, whose texts are full of quotations of ancient authors. The aim is to visualize fragments inside their context of transmission, which is the first requirement to understand the origin of a quotation and its meaning.

We have adopted Ajax technology to represent fragments, and this experimental web site has been created using an Open Source CMS enriched with plugins created ad-hoc in order to add visual functionalities.

http://demo.fragmentarytexts.org

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Bibliography


What is text mining?

„Process of deriving high-quality information from text“  
(Feldman & Sanger 2006)
What is text mining?

„Text Mining is 'big reading'.“
(Craig Bellamy on Twitter, Jul. 5th 2010)
Classes of text mining tools

- Unsupervised
- Supervised
- Bootstrapping
- Pattern
- Manual
Tasks of extracting and collecting fragmentary authors

- **Task 1**: Associations between person and work names
- **Task 2**: Extraction of fragments of an author
- **Task 3**: Finding new quotations and parallel texts
- **Task 4**: Expansion of the fragments' set
### Task 1: Workflow person name extraction

- **Step 1**: Extraction of candidates by pattern such as
  - VN VN
  - VN ETH
  - VN LOC

- **Step 2**: Resolving morphological dependencies using Morpheus

- **Step 3**: Statistical evidence criterion

- **Step 4**: Generating a similarity graph of those candidates and building valid concept classes

- **Step 5**: Applying validated patterns on text in order to extract less frequent occurrences

- **Step 6**: Iterating step 2 - 5

**Pattern**

**Unsupervised**

**Supervised**

**Botstrapping**
Task 1: Some results of the PN extractor

- **Step 1**: Extraction of candidates by pattern such as
  - 'Ελλάνικος Λέσβιος (VN ETH)
- **Step 2**: Resolving morphological dependencies
  - Removing candidates like 'Ελλάνικος Ἀκουσιλάῳ VN VN
- **Step 3**: Statistical evidence criterion like min freq is 4.
- **Step 4**: Generating a similarity graph of those candidates and building valid concept classes e.g.
  - 'Ελλάνικος Λέβιος (VN ETH)
  - 'Ελλάνικος ὁ Λέβιος (VN ZN ETH)
- **Step 5**: Applying validated patterns on text in order to extract less frequent occurrences
  - 'Ελλάνικός τε ὁ Λέσβιος
  - 'Ελλάνικος δὲ ὁ Λέσβιός
  - Λέσβιος Ἐλλάνικος
  - ...
  - Overall after 1 iteration 16 different versions of Hellanicus of Lesbos
Task 3: Finding new quotations and parallel texts: pseudo algorithm

1. \( V = \text{segment\_corpus}(C) \) with \( v_1, v_2, \ldots, v_n \in V, \bigcup v_i = C \) and \( v_i \neq v_j \)

2. for each \( v \in V \)
3. \( F_i = \text{train\_features}(v_i); \)

4. for each \( v \in V \)
5. for each \( f_k \in F \)
6. \( e = (v_i, v_j) \in E = \text{select all } v_j \text{ containing feature } f_k \)
7. for each \( e \in E \)
8. \( s_i = \text{scoring}(e = (v_i, v_j) \in E; F_i; F_j); \)
9. if \( s_i < \text{threshold} \) \( \{ E = E \setminus \{e_i\} \} \)
Task 3: Finding new quotations and parallel texts: Types of Completeness

Extraction of fragmentary authors

- **String approaches:**
  - GST
  - Letter n-grams
- **Syntactic approaches (literal quotations):**
  - N-gram expansion
  - Word n-grams
  - Distance based co-occurrences
- **Semantic approaches (parallel texts):**
  - Semantic clustering
  - Semantic graph based approach(es)
  - Relations of contrastive semantics
  - Radius retrieval
- **More complex approaches:**
  - DCT
  - Winnowing
## Task 2: Extraction of fragments: Role of named entities

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<th>Graph properties</th>
<th>Complete graph</th>
<th>w_id=100 &amp;&amp; freq(word)&gt;1</th>
<th>w_id=300 &amp;&amp; freq(word)&gt;1</th>
<th>w_id=500 &amp;&amp; freq(word)&gt;1</th>
<th>Named Entities</th>
<th>Normalised Named Entities</th>
<th>Normalised Text and Named Entities</th>
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<td>353,618</td>
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<td>0.74</td>
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<td>0.55</td>
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<tr>
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<td>55.90</td>
<td>48.68</td>
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<table>
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<tr>
<th>Argumentation trail properties</th>
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<td>&gt; 10^9</td>
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</table>
Task 2: Extraction of fragments: Possible ways?

- **Option 1**: Statistical based
  - Supervised

- **Option 2**: Pattern based
  - Pattern

- **Option 3**: Completely different?
  - Unsupervised
Hellanicus in *The Foundings* says that beer is made also of rye; he writes as follows: ‘They drink beer made of rye, as the Thracians drink it made of barley’. Hecataeus, in the second book of his *Description*, after saying of the Egyptians that they were bread-eaters, continues: ‘They grind up the barley to make the drink’. And in *The Description of Europe* he says that the Paeonians drink a beer made from barley, also parabias, made from millet, and even fleabane. ‘They also anoint themselves’, he says, ‘with an oil made from milk’. So much for that. (trans. Gulick)
Why was it reused?

‘They drink beer made of rye, as the Thracians drink it made of barley’.

the Paeonians drink a beer made from barley, also parabias, made from millet, and even fleabane.

‘They also anoint themselves’, he says, ‘with an oil made from milk’.

Some „significance“ related properties:

• **tf.idf**: Except „Thracian“ and „Paeonians“ all other words have a term weight of 0 (function words) or are weak content words.

• **Difference analysis**: no discriminating words

• **Log–likelihood ratio**: no discriminating words

**Dale Chall Readability Index**: [6.59;9.36] AVG: 7.85 (level of 9\textsuperscript{th} – 10\textsuperscript{th} grade of a secondary school)

Is there any measurable content in this fragments?
**Definition/Motivation**

- **Definition Co–occurrences:**
  - Common occurrence of at least two objects/events within a dedicated window
    » Possible windows in Classical Studies: line, sentence, paragraph, document, author, century

- **Motivation:**
  - Psycholinguistic experiments: Given a word: What is the first word test persons answer?

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>Response Prob.</th>
<th># of Prob.'s</th>
<th>Co–occurrence</th>
<th>Significance</th>
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<tbody>
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<td>16</td>
<td>Farina</td>
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<tr>
<td></td>
<td>yellow</td>
<td>14</td>
<td>Eggs</td>
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<td></td>
<td>Bread and butter</td>
<td>8</td>
<td>Pound</td>
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<tr>
<td></td>
<td>Box / can</td>
<td>6</td>
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<td>13</td>
</tr>
<tr>
<td></td>
<td>eat</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Overview of the approach (Humanists friendly)

- Observation:
  - Every word has a contextual profile (based on co-occurrences) in which it is typically used

Source: http://corpora.informatik.uni-leipzig.de

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An example of Data Mining: Relation between beer and diapers I

There is a story that a large supermarket chain, usually Wal-Mart, did an analysis of customers' buying habits and found a statistically significant correlation between purchases of beer and purchases of nappies (diapers in the US). It was theorized that the reason for this was that fathers were stopping off at Wal-Mart to buy nappies for their babies, and since they could no longer go down to the pub as often, would buy beer as well. As a result of this finding, the supermarket chain is alleged to have the nappies next to the beer, resulting in increased sales of both.

Contrastive relation: (beer, diapers)

Source: http://web.onetel.net.uk/~hibou/Beer%20and%20Nappies.html
An example of Data Mining: Relation between beer and diapers II

There is a story that a large supermarket chain, usually Wal-Mart, did an analysis of customers' buying habits and found a statistically significant correlation between purchases of beer and purchases of nappies (diapers in the US). It was theorized that the reason for this was that fathers were stopping off at Wal-Mart to buy nappies for their babies, and since they could no longer go down to the pub as often, would buy beer as well. As a result of this finding, the supermarket chain is alleged to have the nappies next to the beer, resulting in increased sales of both.

Latent relation: (beer, diapers)

**Context:** fathers, stopping off, Wal-Mart, could no longer go down to the pub as often

**Result of this relation:** nappies next to the beer

*Source: http://web.onetel.net.uk/~hibou/Beer%20and%20Nappies.html*
What should be the result?

father

could no longer go down to the pub as often

stop off

Unexpected & contrastive relation

Relevant context

beer

diaper

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Some examples (if the original text is still existent)

• Relation of (Ὀδόμαντοι, πέος)
  – engl.: (Odomastai (a folk in Thrace), penis)
  – Context: Found in an Ancient comedy (Aristophanes, 5th c. BC)

• Relation of (κοπρολόγος, ψάλτρια) – engl.: (shit collector, dancing girl)
  – Context: ἀστυνόμοι – engl.: (protecting the city, public festivals)
  – Found in Aristotle (4th c. BC)
Results

• Lots of *contrastive semantic relations* can be found (manual evaluation is still in progress)

• But depending on text sort:
  – Other clusters can be found additionally
    • As shown in examples *comedy*
    • *Sarcasm*
    • *Cynicism*
    • *Artificial ambiguity* like „*Michael Schumacher the red king*“ (translated from a German corpus)
  • *Scope to gnomology & philosophical texts*
Contrastive semantic relations from a bird's eye view

• What did I do with the example of beer and diaper?
  – If I would write it down: A semantically textual reference.
• Is there a relation between contrastive relations and textual reuse?
  – Clearly, yes.
  – First evaluation results: More than 90% of the latent relations (Settings: minimum frequency: 2, Except the contrastive relation itself not more than 2 additional associations)

Focus:

Here: Why is knowledge reused?
Nobody would reuse something like: „Milk is white and good for you“.
Why: It's well-known.
Why was it reused?

‘They drink beer made of rye, as the Thracians drink it made of barley’.

the Paeonians drink a beer made from barley, also parabias, made from millet, and even fleabane.

‘They also anoint themselves’, he says, ‘with an oil made from milk’.

Dissimilarities in the contextual usage (TLG):
• (milk,oil): 72%
• (fleabane, millet): 92%, (parabias, millet): 97%, (fleabane, parabias): 94%, (barley, fleabane): 94%, ...
• (rye, barley): 80%
How can Marco benefit from work with Monica?

- **NEW QUESTION:** Shannon's Noisy Channel Theorem (witness):

- **NEW QUESTION:** Not HOW but why is something quoted?
  - Contrastive semantics

- **EVALUATION:** How to evaluate text reuse & knowledge transfer?
  - Collection of fragmentary authors as highly reviewed *Gold Standard*

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To be, or not to be, that is the question

*Hamlet, Shakespeare*