Corpus-Preparation with WebLicht for Machine-made Annotations of Examples in Philosophical Texts

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Outline

Examples in Humanities Research

- Recent research in literary studies and philosophy has underlined the role of examples for the formation of knowledge (Ruchatz, Willer, and Pethes 2007; Schaub 2010; Lück et al. 2013; Güsken et al. 2018–)
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- i.e. single examples are commented in detail following hermeneutical methods

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- i.e. single examples are commented in detail following hermeneutical methods
- Reason: For research on large amounts of examples, **there is no data set**.

Examples in Humanities Research

- DFG funded research project *Das Beispiel im Wissen der Ästhetik (1750–1850)*, FernUniversität in Hagen
- focus on philosophy of aesthetics
- frequent use of examples (the tulip, the horse, the Alps, . . .)
- frequent reflexions on the use of examples
- interesting aspects:
  - controversies on examples
  - effects of examples on fundamental conceptual distinctions (beauty of nature vs. beauty of art)
  - examples show that aesthetic judgments are governed by systems of knowledge, while authors say that in aesthetic judgments the (scientific) terms are suspended (example of the bat and the duckbill)
  - ...

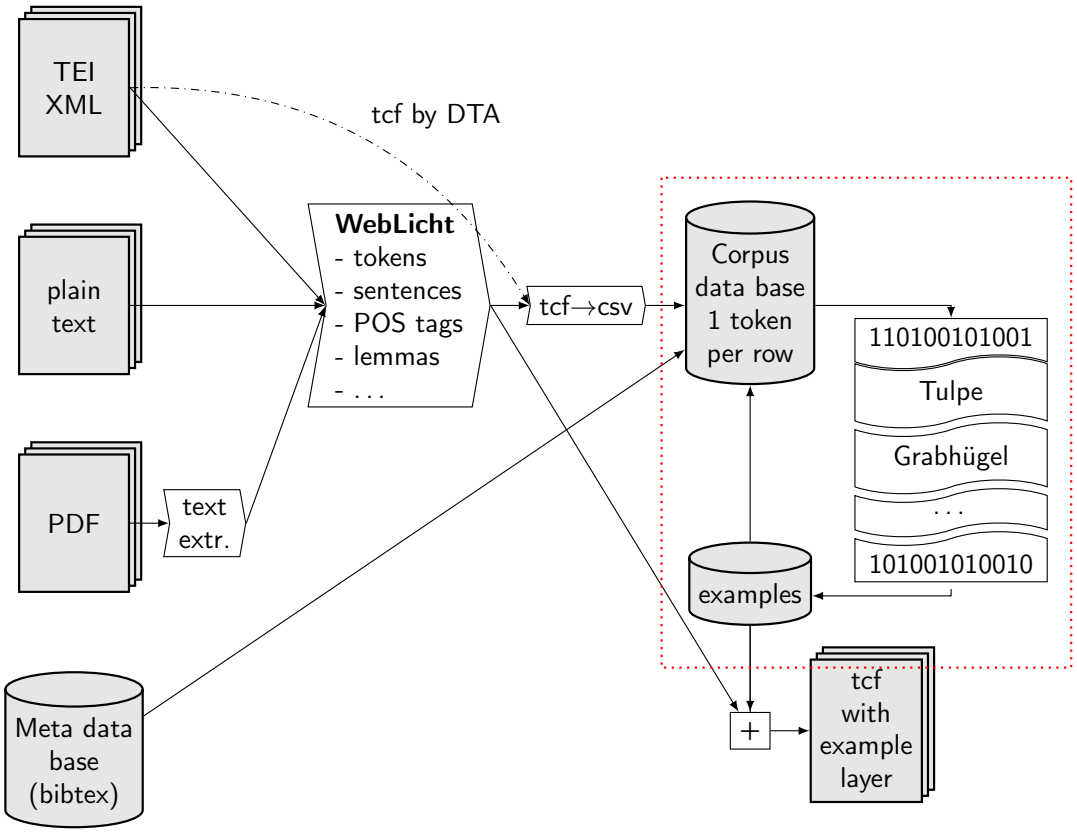
Additional value of a larger dataset of examples

- present an inventory of examples
- make historical cuts (ger. *historische Längsschnitte*) that reveal the course of the frequency of examples over the researched period
  - emergence
  - boom
  - disappearance
- correlate trends in the philosophy of aesthetics with other discourses
  - travel literature of the 18^{th}
  - colonial discourse of the 19^{th} centuries

From manual to machine-made annotations

- started with a database and a web form
  - results in collectanea without context
- proceeded with manual annotations in full texts
  - to time-consuming
  - to complex
- revised the model
- machine-made annotations based on a rule-based two-stage process

Architecture: WebLicht for Preprocessing



https://weblicht.sfs.uni-tuebingen.de

Using WebLicht for:

- sentence splitting
- tokenization
- lemmatization
- POS tagging
- (constituent parser)

R for text mining

- principles of tidy data
- one token per row

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- a single example may span a single word, a phrase, a sentence or even a paragraph

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Domain-specific observations:

- there is a single significant token
- we call it the **head of the example**
- it is a noun, a main verb or an adjective
- low to mid-range term frequency

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Can we exploit these observations?

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- **problem of decision**

Frist Stage

- Calculate the sum h of weighted feature values for each token in a sentence with a surface marker. Let t be the token, S the sentence and D the document, f_i the features and w_i the weights, then

$$h(t, S, D) = \sum_{i \in I} w_i f_i(t, S, D) \tag{1}$$

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- The token with maximum h in the sentence is the *head of the example*.
- Evaluated features:
  - PoS tag
  - token frequency and lemma frequency
  - distance from surface marker (in tokens and commas)
  - direction (before or behind the surface marker)

First Stage – PoS tag

$$f_{POS}(x) := \begin{cases} 1 & \text{if } x \in \{\texttt{NE}, \texttt{FM}\} \\ 0,8 & \text{if } x \in \{\texttt{NN}\} \\ 0,5 & \text{if } x \in \{\texttt{VVINF}, \texttt{VVIZU}, \texttt{VVPP}\} \\ 0,4 & \text{if } x \in \{\texttt{VVFIN}\} \\ 0,2 & \text{if } x \in \{\texttt{VMINF}\} \\ 0,1 & \text{if } x \in \{\texttt{VAINF}\} \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

First Stage – Token Frequency

An adaption of the augmented normalized term frequency (Salton and Buckley 1988) is used.

$$f_{tf}(t, D) := \begin{cases} 1 - c\dfrac{\#(t,D)-1}{\left(\max\limits_{\{t' | f_{POS}(t')>0\}} \#(t',D)\right)-1} & \text{if } f_{POS}(t) > 0 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

where $\#(t)$ is the number of times a token occurs in a document and c is a linearity factor with $0 < c < 1$.

First Stage – Distance from Surface Marker

Let $l(S)$ be the maximum number of tokens before or after the surface marker in sentence S. Let $z(t, S)$ be the number of tokens in sentence S between token t and the surface marker.

$$f_{dt}(t, S) := 1 - \frac{z(t, S)}{l(S)} \tag{4}$$

First Stage – Direction

$$f_{tf}(t, S) := \begin{cases} 1/4 & \text{if } t \text{ precedes the marker} \\ 3/4 & \text{otherwise} \end{cases} \tag{5}$$

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- 5 errors out of 52

First Stage – Perspectives

- keep manually corrected list of example heads
- use this list for assigning the weights by regression
- lesson learned: Manual annotations for training ML algorithms for this very well defined task would have been simple.

Second Stage

- Results from stage 1 underline that stage 2 is non-trivial:
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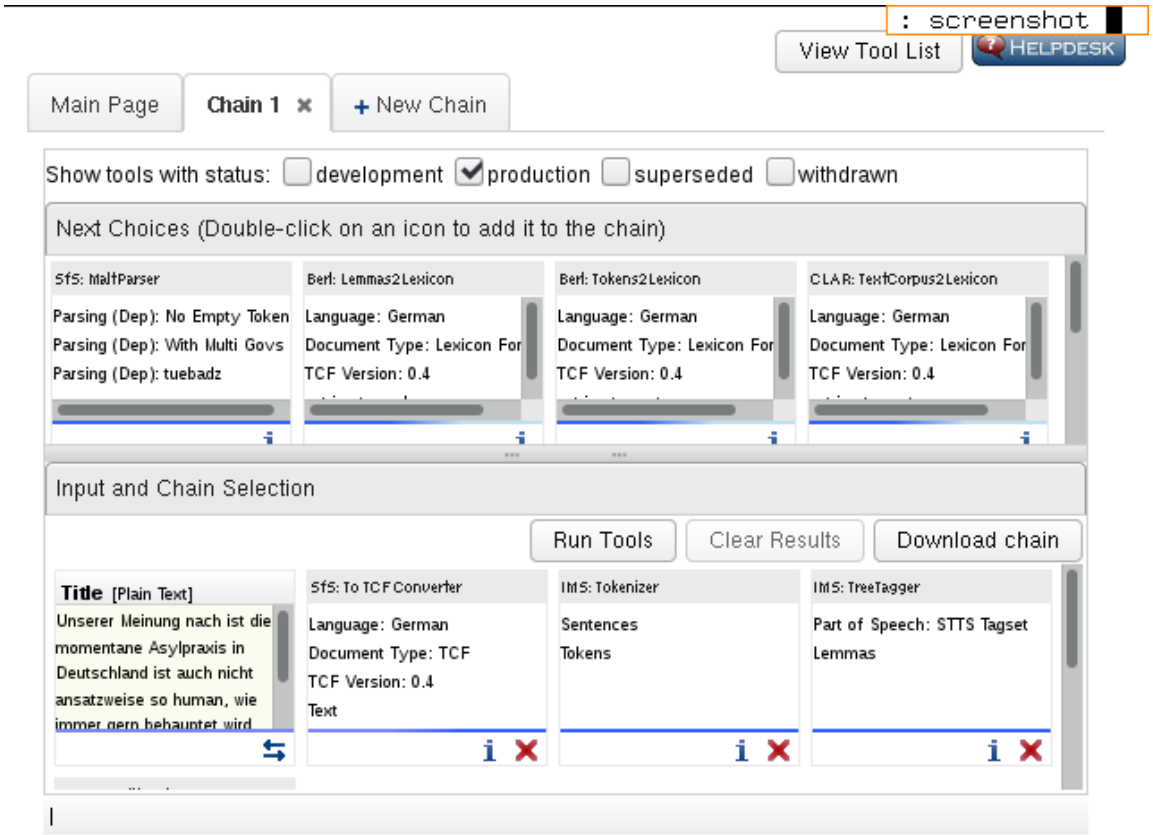
- Instead: manual annotations for training ML algorithms (e.g. decision tree learning)
  - Well defined and simple task for manual annotations:
  - Search all occurrences of a given token (or lemma) and annotate, whether it is an example or not!

Reproducible Results with WebLicht as a Service



⇓

```
curl -X POST -F chains=@$chain -F content=@$1 -F apikey=$WEBLICHTKEY $url
```

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changelog?	changelog present for most libraries

References

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