Anonymization of German Legal Texts

Bachelor Thesis - Kickoff

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Outline

Motivation

Problem Statement

Approach

Research Questions

Schedule

NLP for Legal Documents (today)

Manual Anonymization

NLP

Original legal texts

- Court decisions
- Contracts
- Accusatorial texts

➢ Not published

Anonymized legal texts

- No personal information

➢ Published

Knowledge

- Legal research
- Contract review
- Document automation
- Legal advice
- etc.

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Anonymization of Legal Texts

Example for court decisions:

Anonymization

6. Den Angeboten auf der Webseite ... liegt das Konzept der Produktdetailseite zugrunde. Dabei wird für jedes über die ...-Plattform angebotene Produkt jeweils nur eine Produkt-detailseite angezeigt; jedes Produkt enthält eine spezifische ...-Produktidentifikations-nummer (...) zugewiesen.

- **Expensive manual** anonymization process
  - ➢ Leads to rare publications of legal texts
  - ➢ Results in few data sets
- Development of an **automated anonymization process**
- Only anonymized data sets available
  - ➢ Anonymization training **without non-anonymized data sets**

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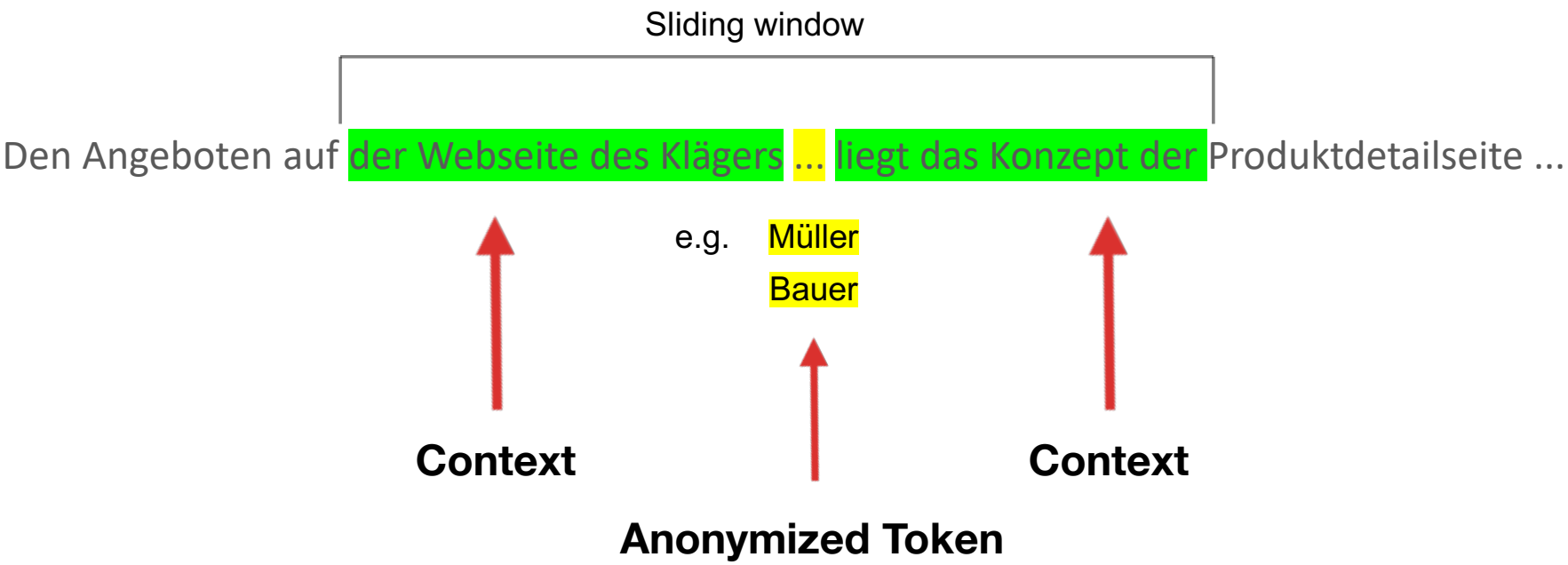
Context-based Analysis



- Statement: **Sensitivity** of token **depends only on context**, not the actual content itself
- Anonymized token in legal texts are annotated (e.g. by "...") and can be detected

➢ Anonymization model may be **trained using anonymized data**

Source: https://www.hrr-strafrecht.de/hrr/archiv/11-10/index.php?sz=6

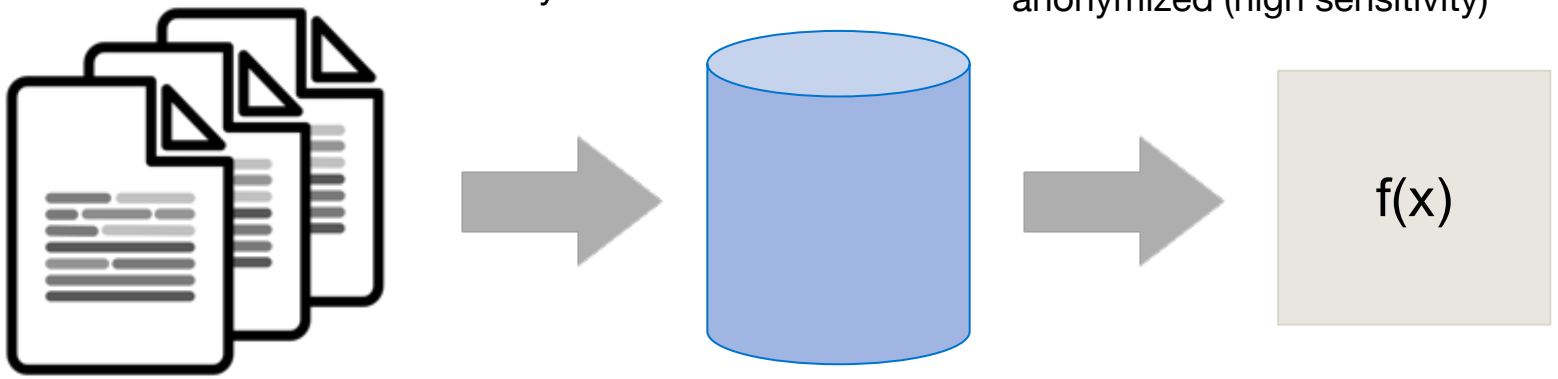
NLP: Sensitivity Prediction of Token

Preprocessing

- Text extraction
- Tokenization
- Anonymization Detection

Model Training

- Embedding of token context without the token itself
- Prediction if the token has been anonymized (high sensitivity)



Anonymized legal texts

- Raw data as PDF/RTF
- e.g. Court Decisions of ‘LG Munich’

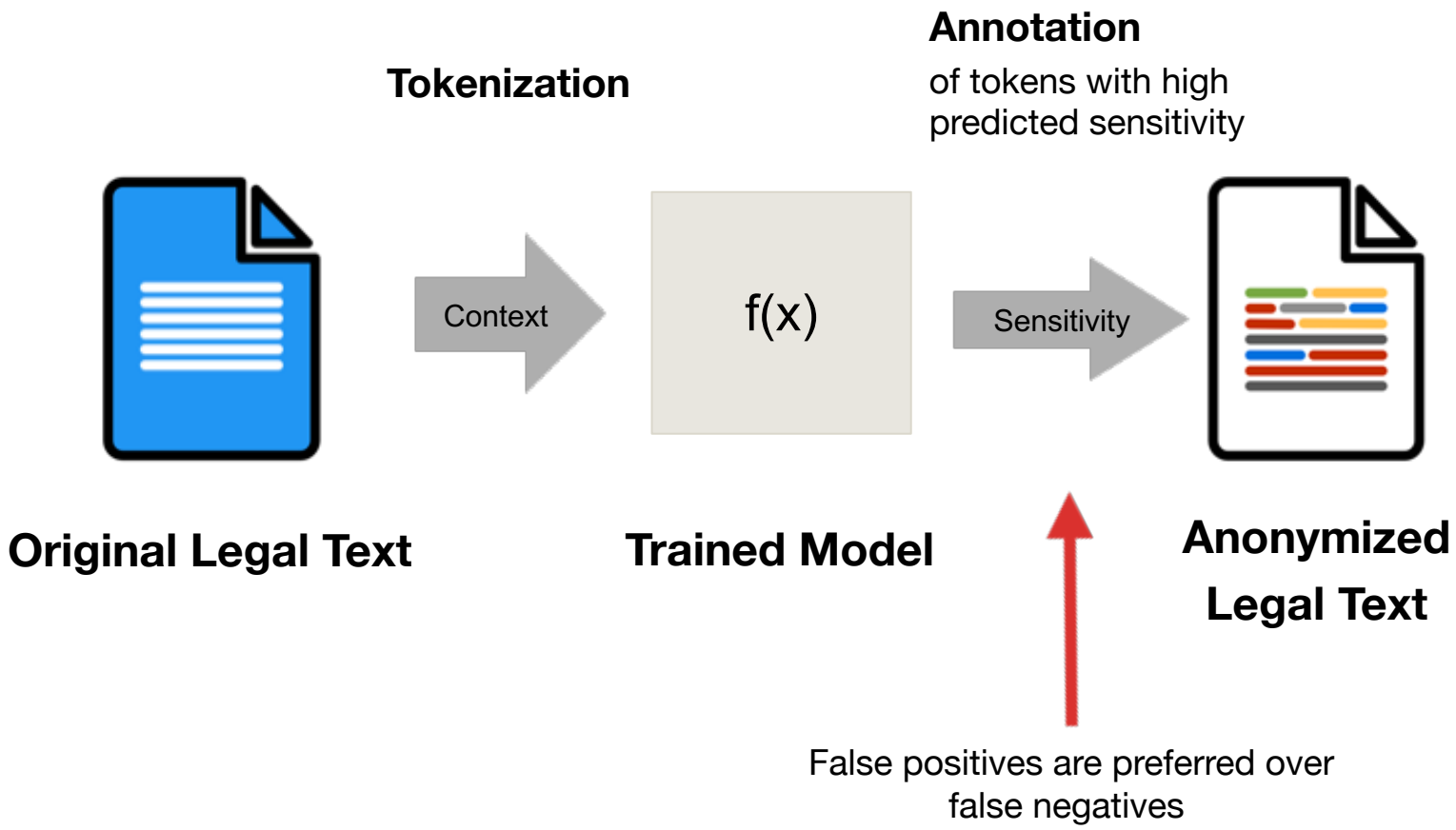
Tokenized Corpus

- Annotated anonymized tokens like ‘...’ or ‘B.’

Trained Model

- Inputs: Context
- Outputs: **Sensitivity**

Application of the Trained Model



Approach

1. **Literature research**
   - existing suitable NLP models
   - existing frameworks and implementations

2. **NLP model training** on anonymized court decisions
   - Fetching and preprocessing of court decision documents
   - Model training and hyperparameter fitting

3. **Evaluation of the model**
   - using court decision examples
   - using rewritten anonymized legal texts (e.g. using randomized NE replacement)

4. **Application**
   - Implementation of the anonymization process using trained NLP model

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Problem Statement

Approach

Research Questions

Schedule

Research Questions

Is the textual context of a token within legal texts enough to predict the sensitivity of this token?

- Classical anonymization solutions in other domains additionally use NER (named entity recognition)
  - Improves stability
  - But there is no non-anonymized data

- Additional data, which may be taken into account:
  - the **commonness** of words in legal texts
    - e.g. words like *mit* or *Kläger* probably have a low sensitivity
  - **document metadata** such as title, court, etc.

Research Questions

How can placeholders be detected in anonymized legal documents?

- Examples for **possible anonymization patterns** for the word ‘Schamberger’:
  - …
  - s…
  - S...
  - “S”
  - “S...”
  - s
  - S

Research Questions

Which machine learning approaches be used to automate anonymization using only anonymized data?

- Examples for contextual embeddings: **BERT**, ELMO, GPU, CMU
- Alternative classical embedding: Word2vec, GloVe

- Possible architectures: Convolution, RNN, Attention

- Possible sliding window sizes:
  - **Fixed number of words**
  - Full sentences
  - Full paragraphs

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