Towards an Open Platform for Legal Information

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ABSTRACT
Recent advances in the area of legal information systems have led to a variety of applications that promise support in processing and accessing legal documents. Unfortunately, these applications have various limitations, e.g., regarding scope or extensibility. Furthermore, we do not observe a trend towards open access in digital libraries in the legal domain as we observe in other domains, e.g., economics of computer science. To improve open access in the legal domain, we present our approach for an open source platform to access and deploy new technologies. As proof of concept, we implemented six technologies in an open processing pipeline, processed more than 250,000 German laws and court decisions. Thus, we can provide users of our platform not only access to legal documents, but also the contained information.

CCS CONCEPTS
• Information systems → Open source software; Digital libraries and archives; Information retrieval; • Applied computing → Law; Document searching.

KEYWORDS
Legal information system, Open data, Open source, Legal data

1 INTRODUCTION
The importance of automatically processing legal documents is rising. Recent advances in research offer a portfolio of technologies to process legal documents, e.g., extracting, aggregating, and linking information from text. Hence, mostly commercial tools and platforms have emerged that promise support in processing and accessing legal documents. Unfortunately, there are various limitations when using these tools. For instance, they are country-specific, lack transparency and extensibility (closed source), or do not provide access to the raw data. These criteria are essential for legal data analysis [4], and the development of innovative technologies, e.g., visual query interfaces. Data analysis and visualization are of great benefit when interpreting the information, e.g., to investigate the mutual dependencies between statutes and the temporal evolution of law. In our opinion, democratizing the access to these tools and providing the data is fundamental when one is interested in facilitating access to justice and innovation in the legal domain. A key element to achieve these goals is open data, that can reduce integration costs, improve transparency, and harness the innovation of others [13].

In this paper, we present our approach for an open source platform to transparently process Legal Open Data by flexibly combining state-of-the-art technologies. Our approach enables the sustainable development of legal data processing tools by offering a single technology stack. The platform empowers others to quickly develop and deploy new technologies. As proof of concept, we implemented six technologies in an open processing pipeline, processed more than 250,000 laws and court decisions, and made them available on our Open Legal Data Platform. Our source code and our generated data is publicly available.

Below, we briefly discuss representative related projects and platforms. Subsequently, we present our approach as well as the implemented technologies.

2 RELATED WORK
CourtListener is a service for the United States, which is developed by the non-profit Free Law Project. CourtListener’s goal is “to provide free, public, and permanent access to primary legal materials on the Internet for educational, charitable, and scientific purposes to the benefit of the general public and the public interest” [9]. CourtListener seeks to collect and freely distribute historical and current United States court opinions on state and federal level. However, other international jurisdictions are not in the scope of the project. Similarly, the Caselaw Access Project by Harvard Law Library aims to make all published U.S. court decisions freely available. The Finnish government developed the web service Finlex, which provide laws and related legal documents as XML documents. In 2014, Frosterus et al. [5] improved Finlex in several ways, e.g., by transposing the XML documents to RDF documents following the Linked Open Data principles. They demonstrate the usefulness of Linked Open Data for content producers, application developers, and data analysts. OpenLaws is an open access platform for European legal information [7]. OpenLaws is built on top of open source software, but it does not provide access to the data. In summary, there are various projects scattered across the world that collect and publish legal documents. However, there is no single project that is open source, makes data openly accessible, and is not focused on a single country only.

3 THE OPEN LEGAL DATA PLATFORM
Our approach to develop a single legal technology platform is illustrated in Fig. 1. We provide the basic technology stack that legal engineers can build upon to develop new technologies. The developed technologies can be flexibly combined to provide country specific-platforms, e.g., for Germany. Developed technologies can

1https://www.vizlaw.de, accessed: May 28, 2020
2http://www.openlaws.eu, accessed: May 28, 2020
3http://www.courllistner.com, accessed: May 28, 2020
4http://www.openlegaldata.io/, accessed: May 28, 2020
5http://www.finlex.fi, accessed: May 28, 2020
6http://www.courllistner.com, accessed: May 28, 2020
7http://www.finlex.fi, accessed: May 28, 2020
8http://www.openlaws.eu, accessed: May 28, 2020

be included in the global technology stack to make them accessible to developers around the world. Moreover, legal tech developers benefit from the tools and the data provided by the platforms via our REST API. Finally, researchers benefit from easy access and the latest technologies integrated into a single platform ecosystem to conduct analyses.

Although there are country-specific differences in the legal systems, we firmly believe that the development of a legal technology platform can be tackled with a single technology stack. Akoma-Ntoso [11] is one prominent example for an XML schema that aims to standardize legal documents on an international level. By integrating standards, like Akoma-Ntoso, the platform comparability for different countries can be facilitated. For any Open Legal Data platform, we need to access primary and secondary data sources (Fig. 1 left), process the data to generate additional information (Fig. 1 center), and provide services to users (Fig. 1 right).

For Open Legal Data, we access primary source like government services, and secondary sources like Linked Open Data. The preprocessing system is designed to flexibly handle different types of documents, such as legislation or literature. The processing pipeline allows to enrich documents with additional information, e.g., automatically extracted references or manually created text annotations from domain experts. Finally, the data is made available to the public via information retrieval systems or REST APIs. As a foundation, we use the Django framework [7]. The user interfaces can be translated into different languages and adapted to specific information needs using Django’s template system. Django’s “app system” enables easy integration of new modules and the re-use of existing apps.

In the following, we describe in more detail technologies to access, process and provide legal documents. All technologies are integrated or are currently being integrated into our Open Legal Data technology stack.

3.1 Primary data sources & Linked Open Data

Finding and harvesting legal information is a challenging task due to several reasons. Accessing data directly from courts is time-consuming and expensive. Accessing data from sources on the Web induces quality issues. In the following, we present three alternative sources of legal information and our approach to include them.

Courts and Governmental data. We collaborate with courts to obtain decisions directly. Accessing data directly from courts has the highest level of trustworthiness. However, it is very time consuming since courts do not always make decisions publicly accessible. Furthermore, decisions obtained directly from courts are rarely in machine-readable formats and are not free of charge. Thus, information needs to be extracted from, e.g., from purchased PDF files.

Crawling trusted websites. Crawling trusted websites can significantly improve the amount of data. In Germany, there exists a small set of trusted websites. The German Federal Ministry of Justice and Consumer Protection (BMJV) operates websites with the latest version of federal legislation [8] and decisions from federal courts [9]. In Germany, state-level legislation and decisions are not available on a central web service. Each state needs to be handled separately. On European level, the service EUR-LEX [10] is the main data source. Additionally, we crawl legal blogs which have been shown to provide information for legal opinion mining [2]. Having different data sources requires the harmonization of the harvested data to avoid duplicates. To de-duplicate court decisions, we use the European Case Law Identifier [14].

Linked Open Data. According to the Open Data Monitor [11], 45% of all Open Data is currently provided in (semi-)structured and thus machine-readable format. Furthermore, the European Commission has identified the strong need to “opening up by default all scientific data” and to store and maintain it in the European Open Science Cloud [12]. The European Union Open Data Portal [13] serves as a single point of access to Open Data produced by EU institutions and bodies. In addition to major data portals, there exists a variety of small data providers. These data providers either provide data directly as RDF or embed Microformats in their websites. To automatically find and evaluate small data providers, we extend an existing pipeline to integrate Linked Open Data [1].

3.2 Open Processing Pipeline

Information in legal documents is hidden in the text and needs to be extracted to produce legal data. With this legal data, we can, e.g., implement question answering systems and structured text search. Furthermore, legal data can be linked to different (external) data sources to provide, e.g., background information or geo-locations.

We provide technologies to minimize the effort for tasks that can be applied in a semi-automatic setting. More specifically, we are

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[7]http://www.djangoproject.com, accessed: May 28, 2020
[8]http://gesetze-im-internet.de, accessed: May 28, 2020
[9]http://rechtsprechung-im-internet.de, accessed: May 28, 2020
[10]http://www.eur-lex.europa.eu, accessed: May 28, 2020
[11]http://www.opendatamonitor.eu/, accessed: May 28, 2020
[12]http://www.europa.eu/rapid/press-release_IP-16-1408_en, accessed: May 28, 2020
[13]https://www.europeandataportal.eu/en, accessed: May 28, 2020
It must therefore be held, in the light of the case-law referred to in paragraph 11 of the present position, that the General Court did not err in law in finding, in paragraphs 62 to 64 of the order under appeal, that it was possible for M. Group to withdraw its appeal of 21 August 2007 before the Board of Appeal and, in paragraph 66 of that order, that such a withdrawal meant, as a result, that the Board of Appeal was no longer required to rule on the incidental submissions presented by C.

Reference Extraction. Reference extraction to legislation and judicial decisions is of great interest [3]. A network analysis build on top of citation can reveal decisions with great influence [10]. We extract citations with a hybrid approach that combines rule-based methods with learning-based methods.

Named Entity Recognition & Entity Linking. Extracting named entities such as locations, courts, dates, and times is a well-known information extraction task. We implemented this task based on the SpaCy framework and trained a German NER model based on the dataset provided by Leitner et al. [8]. Extracted entities need to be disambiguated to provide further cross-connections between documents as well as to external data sources. For example, we link mentions of locations such as cities or states with open geoinformation systems like Linked Geo Data using the Nominatim service.

Keyword and Title Generation. Keywords accurately describing the content of documents are of great value for legal information systems. To generate keywords, we implement a module that combines rule-based methods with statistical methods. In Germany, court decision identifiers follow strict rules that allow determining the court and the general domain. Thus, we can extract the general domain of court decision by parsing the identifiers. Furthermore, we observe that the “Bundesverwaltungsgericht” cites the statute book “Verwaltungsgerichtsordnung” (VwGO) the most. Our preliminary analysis indicates that many citations to the VwGO are to cite reasons for rejections of revisions. Moreover, the “Bundesverwaltungsgericht” cites the statute book “Bürgerliche Gesetzbuch” (BGB) and the statute book “Zivilprozessordnung” (ZPO) the most. This indicates that most decisions the highest court in Germany are in the civil procedure. Citing the ZPO can also indicate a rejection of revision, e.g., ZPO Â§ 561. Additionally, we observe a high amount of citations from the “Bundesverfassungsgericht” to the statue book “Gesetz Ä¹ber das Bundesverfassungsgericht” (BVerfG), but also to the “Strafgesetzbuch” (StGB) and the “Strafprozessordnung” (StPO). The BVerfGG contains statues explicitly regulating the BVerfG. Citations to the StGB and the StPO indicate that the court decision is in the criminal procedure.

Overall, we made some interesting observations in the data by visualizing it, which motivates us to conduct an extensive analysis of our citation network. However, our analysis has several limitations with regard to the data. For one, the high amount of court decisions on federal level more likely reflects a more open publishing attitude of federal courts rather than an actual higher workload. Thus, it is important to address the publishing policy of courts and raise awareness of the benefits of open access in the justice domain.
4 CONCLUSION AND OUTLOOK

In this paper, we presented our approach to a single technology stack that allows accessing, processing, and providing legal information. We demonstrated that it is feasible to implement a variety of technologies in a single processing pipeline. We described in detail technologies that are implemented or currently being implemented in our open source project Open Legal Data. Furthermore, we published our first dataset of German court decisions. Based on this dataset, legal engineers developed the visual query interface VizLaw and were awarded the first place in the Berlin Legal Tech Hackathon 2019.

In conclusion, we see the Open Legal Data Platform as an important first step towards openness in the legal domain that will ultimately enable more collaboration among researchers and improve access to justice for the general public. In this context, we consider the MediaWiki software as role model, that powers all Wikipedias and helped to make encyclopedic knowledge available, and envision to achieve something comparable but for the legal domain. Making data technically open and accessible is only the beginning. In the future, we will also focus on Legal Design in order to make the data and information useful and usable not only for professional users, but also understandable and actionable for lay people.

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