

A Case Study on Legal Case Annotation

Adam WYNER¹, Wim PETERS², Daniel KATZ³,

¹*Department of Computing Science, University of Aberdeen, Scotland*

²*Department of Computer Science, University of Sheffield, England*

³*Law School, Michigan State University, United States of America*

Abstract. The paper reports the outcomes of a study with law school students to annotate a corpus of legal cases for a variety of annotation types, e.g. citation indices, legal facts, rationale, judgement, cause of action, and others. An online tool is used by a group of annotators that results in an annotated corpus. Differences amongst the annotations are curated, producing a *gold standard* corpus of annotated texts. The annotations can be extracted with semantic searches of complex queries. There would be many such uses for the development and analysis of such a corpus for both legal education and legal research.

Keywords. case base reasoning, text analytics

1. Introduction

The paper presents a case study on rich semantic annotation of legal cases, leading to the creation of a small, but significant *gold standard* corpus. There would be many uses for such a corpus and its development: students learning to analyse legal cases could use the approach to annotate cases, then easily compare and contrast their results; law school teachers could use it to evaluate student performance on the analysis of legal cases; and legal researchers could use it to examine cases in the case base. A scaled up gold standard can be used as a training corpus for machine learning. And extraction and analysis of particular portions of the corpus would help to understand just what characterises different portions of the case decision. Yet, to date, there are no open-source, richly annotated corpora of legal texts that serve the interests and needs of the legal education and research communities.

Large, public domain corpora of legal texts are increasing available and searchable. Advanced Scholar Search in Google Scholar makes patents, legal opinions, and journals searchable according to keywords and a variety of metadata such as author, publication, subject area, court hierarchy, states, and decision date. The United Kingdom's National Archives¹ offers linked legislation online, where each act contains links to related acts. Related efforts in the legal domain have created annotation tools for smaller corpora evaluated against relatively constrained gold standards for arguments [12,11,15], elements of legal cases [7,14], rules and norms [4,17], and case factors [1,2,16]. Yet, semantic annotation and the creation of gold standards is not, in and of itself, straightforward and unproblematic. Generally, a small number of annotators are deployed on a fragment of

¹<http://www.legislation.gov.uk/>

the corpus due to the cost and complexity of the task, and the results are not always available for further analysis or development [1,2]. Moreover, annotation guidance and adjudication are significant issues [9,5]. While some of the annotation types are relatively straightforward, e.g. citations or participants, other high value targets for information extraction are less tractable using current NLP techniques, e.g. the legal facts cited in the case, the various reasoning outcomes, and others. These are linguistically complex and various expressions.

To make progress towards the goal, we have developed an approach to legal case analysis that is not only feasible and uses currently available open source web-based tools, but addresses issues such as open verification of results that are needed in the legal domain. The approach engages law school students and staff in an activity that they currently carry out, but in a new and useful manner by making the results of their individual annotation efforts public, comparable, curatable, and machine readable. The result is a law school generated public, open source *gold standard*. Scaling up the approach would yield a high value corpus which can be used by law school faculty in research on the history, development, and reevaluation of case law as well as by practicing legal professionals who seek an in depth view on cases they wish to cite. The approach is a counterweight to current reliance on information service providers that sell legal case briefs as summaries of cases, yet which are opaque in terms of the relationship between the summary and the source textual materials; such briefs may miss relevant information in the body of the case, are privately held by a firm or accessible at cost from a legal information provider, do not support semantic search, and do not allow comparative analyses of the same documents. The approach is also a counterweight to related, recent, web-based commercial enterprises to crowd-source legal annotation: Learnleo² engages law school students in manual case annotation, while Judicata³ uses a mixed manual and automated approach. However, neither make the resultant annotated corpus freely and openly available to the research and educational communities for further development and analysis. By the same token, there is no open, transparent adjudication process, making the quality of the corpora opaque.

Our approach to addressing the current limitations is to use an online legal case annotation tool, to distribute the task to law school students, to curate the distributed results into a gold standard, and to share the results of the activities. The outcome artifact, an open source, available gold standard corpus, can be used for research, professional, and educational purposes.⁴ Broadly speaking, such a corpus of analysed cases makes case law a public resource that democratises legal knowledge.

The structure of the paper is as follows. In Section 2, we discuss the materials, the annotations, and the method. Analysis of the corpus and curation of a gold standard is discussed in Section 3. Conclusions and future work are presented Section 4.

2. Materials and Method

In this section, we describe the corpus, the annotations, and the annotation exercise.

²<https://learnleo.com/>

³<https://www.judicata.com/>

⁴See <http://wyner.info/LanguageLogicLawSoftware/?p=1955> for auxiliary materials.

2.1. *The Corpus*

We have a working corpus of about 140 cases which combine all the cases used in CATO [1] and some additions such as cases referred to in intellectual property courses. Of these, 20 were annotated, as described below, by 3 student annotators. And of these 20, 10 were curated into a gold standard. The report here focusses on these 10. All 10 cases are cases on appeal and bear on intellectual property. The sample of cases is not systematic, varying over jurisdictions and dates. There are 231,555 tokens; the cases vary in size from 11KB to 74KB, with 33KB being average. Though a small corpus, it is semantically analysed in depth and exercises the annotation method.

2.2. *The Annotations*

The annotations in this study are those used in practice in the analysis of cases in law schools [8]. In this way, we count on existing knowledge to carry out the annotation task or to present the tool as a method to train students in the knowledge. For use in the annotation exercise, we divided the annotations into types and features, each of which was described; for search, the features were “promoted” to first class annotations. In all, we had 32 annotations, and consequently, can search the corpus for the annotations in complex query patterns [14]. In general, we provided more general annotation notions, for given the nature of the tools, it is easy to reanalyse annotations and textual portions in subsequent exercises rather than try to find more general notions from more particular annotations; it is straightforward to add or refine the set of annotations. Among the annotations, we had:

Facts - legal and procedural facts:

- Cause of Action - the specific legal theory upon which the plaintiff brings the suit.
- Legal Facts - the legally relevant facts of the case that are used in arguing the issues.

Indexes - various indicative information:

- Case Citation - the citation of the particular case being annotated.
- Court Address - the address of the court.
- Hearing Date - the date of the hearing.
- Judge Name - the names of the judge, annotated one at a time.
- Jurisdiction - the legal jurisdiction of the case.

Issues - the issues before the court:

- Procedural Issues - what the appellee claims that the lower court did procedurally wrong.
- Substantive Issues - the point of law that is in dispute.

Legal Roles - the role of the parties in the case:

- Appellee, Appellee’s Lawyer, Appellant, Appellant’s Lawyer, Defendant, Defendant’s Lawyer, Plaintiff, Plaintiff’s Lawyer.

Procedural History - the disposition of the case with respect to the lower court(s):

- Appeal Information - who appealed and why they appealed.

Reasoning Outcomes - various parts of the legal decision:

- Holding - the rule of law or legal principle that was applied in making the judgement; the new legal ground that the court is covering in this case.
- Judgement - Given the holding and the corresponding rationale for the holding, the judgement is the court's final decision about the rights of the parties, the court's response to a party's request for relief, and bearing on prior decisions.
- Rationale - the court's analysis of the issues and the reasons for the holding.

2.3. The Annotation Exercise

To crowdsource conceptual annotations of legal cases, we use the General Architecture of Text Engineering (GATE) Teamware tool [3], which is a web-based application that provides an annotator with a text to annotate and a list of annotations to use. As such, the task is a web-based version of what law school students and legal analysts of cases already do. The annotators are given full instructions about the task, examples, the annotations, instructional videos, a survey, and an extensive list of FAQs concerning a range of issues. The annotation types and features popped up as relevant during the annotation of the cases, so no memorisation was required. The annotation of the 20 cases was broken up into: the annotation of 9 cases in two parts, each part using half the annotations in order to lighten the cognitive load at first; then the annotation of 11 cases, using all the annotations. After the annotation of the first part of the 9 cases, the annotators were shown the results of their work and a discussion was had about annotation issues. Throughout the annotation exercise, the students were supported with any questions or problems they had with the tasks.

- Corpus A. 10 cases (one omitted). Total time 5:50:58; average time 35:05; variation from 0:16:50 to 1:55:17.
- Corpus B. 10 cases (one omitted). Total time 5:23:52; average time 32:23; variation from 0:07:24 to 1:38:23.
- Corpus C. 11 cases. Total time 17:02:24; average time 1:32:56; variation from 0:13:52 to 6:45:53.

3. Analysis and Curation

Following the annotation task, we analysed the results (Inter Annotator Agreement) and then had a curation task in which a curator decides, perhaps in consultation or on her own, which annotation is right in cases where the annotators differ. Where the annotators concur, no curation is required; where there is some disagreement, curation is required. It is, then, useful to analyse the level of agreement between annotators, and hence determine which annotation instances require curation. To do so, we apply an agreement measure to our annotators with respect to each annotation type, which we discuss next. Following it, we discuss the curation and gold standardisation.

3.1. Inter Annotator Agreement

Inter Annotator Agreement (IAA) can be used as a measure to assess a task by yielding a score that takes into account the overlaps and mismatches between the involved anno-

tators. If annotators agree to a large extent, the IAA score is high and this indicates that the annotation task was clear and easy. On the other hand, if there is little agreement we can conclude that the task was not clearly defined, difficult and/or complex.

What we effectively measure to compute IAA are the relations between annotations from different annotators. The main relations that are taken in to account between any pair of annotators are the following:

- Two annotations are coextensive if they cover the same span of text in a document, i.e. their start and end points are identical.
- They are overlapping if they share a common span of text.
- One of the two annotations is missing

Table 1 gives an overview of the partial versus full agreement between pairs of annotators with respect to instances of the different annotation types. From this table we can see that, to a certain extent, there is a relation between annotator agreement in terms of full and partial annotations on the one hand, and conceptual complexity of annotation types on the other.

The annotation types LegalRoles and Indexes (e.g. CaseCitation, AppellantsLawyer, DecisionDate and Plaintiff) are simpler in their conceptual make-up in that they refer to concrete instances of singular legal concepts. This is reflected in the relatively much higher number of full agreements. However, differences in full/partial correlation seem to indicate that e.g. Defendant is less clear for annotators than JudgeName. For a curator, this is a point of attention, signalling where the instructions do not seem to yield the desired result.

On the other hand, concepts such as Rationale, Judgement, Legalfacts, CauseOfAction and Holding are complex entities involving complex textual realizations, and are as such difficult to annotate in an unanimous fashion. This is why the number of partial overlaps is relatively much higher.

We now turn our attention to the computation of inter annotator agreement. IAA can be computed in many ways, the most well-known being Kappa [6]. However, Kappa needs positive as well as negative examples annotated in text, in other words, computing the kappa coefficient is a classification task, which is difficult to conceptualize in our annotation exercise. Our annotation task does not produce an exhaustive list of positive and negative annotation instances, because we solicit the expertise of our expert annotators to identify positive annotation instances from scratch. In other words, the kappa coefficient requires both a gold standard that annotators agree or disagree with, and a specific annotation setting which enables the derivation of negative examples.

Moreover, we cannot expect that for all annotation types all annotators will annotate the exact text span every time they agree on an annotation. In other words, we expect annotations often to be overlapping, which Kappa does not allow. For instance, for relatively simple annotations such as Appellant, we can expect reasonable overlap between annotators. But even in this case only very detailed and exhaustive instruction can prevent annotators from selecting the span "Amerigas INC" rather than "Amerigas INC.", or one annotator from selecting the span "UGI CORPORATION, AmeriGas, Inc. and James A. Sutton", while the other annotator selects the three individuals mentioned within that span. For more complex instances such as "Cause of Action" or "Rationale" it is even unrealistic to expect many coextensive annotations.

Because of the high frequency of partial overlaps and the lack of both a pre-existing gold standard and negative examples, we decided to measure inter annotator agreement

Table 1. Partial versus full agreement between pairs of annotators

Annotation Type	partial	full
Rationale	525	11
LegalFacts	342	21
Judgement	65	12
CauseOfAction	20	0
Holding	8	0
Plaintiff	6	25
CaseCitation	10	59
Appellant	16	26
AppellantsLawyer	2	48
DecisionDate	3	14
HearingDate	0	19
JudgeName	2	89
DefendantsLawyer	0	22
AppelleesLawyer	0	53
Defendant	16	32
Appellee	11	26
Jurisdiction	5	20

by aggregating pair-wise precision, recall and f-measure between annotators over all documents in the corpus. These metrics have a very long-standing tradition in the field of IR [13,10]. Precision measures the number of correctly identified items as a percentage of the number of items identified. In other words, it measures how many of the items that the system identified were actually correct, regardless of whether it also failed to retrieve any correct items. The higher the precision, the better the system is at ensuring that what is identified is correct. Recall measures the number of correctly identified items as a percentage of the total number of correct items. In other words, it measures how many of the items that should have been identified actually were identified, regardless of how many spurious identifications were made. The higher the recall rate, the better the system is at not missing correct items. The F-measure [13] is often used in conjunction with Precision and Recall, as a weighted average of the two.

In this pair-wise aggregation of precision, recall and F-measure between annotators, we can vary the weight we assign to partial overlaps. A strict measure assigns less weight to partial overlaps because it favours full agreement. A lenient interpretation of the results considers all partially correct responses as correct, and yield in most cases better results.

Overall, the level of agreement between annotators regarding Index and LegalRole type annotations (JudgeName; HearingDate; Jurisdiction; DecisionDate; CaseCitation) is reasonable (F1 strict 74%, lenient 86%; see table 2 below). Differences between annotators are mainly due to small span differences covering blank spaces and punctuation, or more meaningful elements such as titles. Because of the minor nature of these differences, curation can be performed by a non-expert.

However, Facts and ReasoningOutcomes show a considerably lower level of agreement, which is due to the complex structural nature of the text spans expressing the concepts, and the identifiability of the annotations on the basis of legal theory, instruction, and annotator insight.

Table 2. Observed agreement between annotators

Annotation Type	P Strict	R Strict	F1 Strict	P Lenient	R Lenient	F1 Lenient
Indexes	0.84	0.82	0.83	0.93	0.90	0.91
CaseCitation	0.86	0.79	0.82	1.0	0.92	0.96
Jurisdiction	0.84	0.79	0.81	1.0	0.94	0.97
HearingDate	0.70	0.90	0.79	0.70	0.90	0.79
DecisionDate	0.74	0.45	0.56	0.89	0.55	0.68
LegalRoles	0.79	0.67	0.72	0.92	0.79	0.85
JudgeName	0.82	0.87	0.85	0.84	0.89	0.87
Plaintiff	0.76	0.64	0.69	0.94	0.79	0.86
Defendant	0.68	0.58	0.63	0.96	0.82	0.88
DefendantsLawyer	0.81	0.43	0.56	0.81	0.43	0.56
Appellant	0.59	0.52	0.55	0.86	0.76	0.81
AppellantsLawyer	0.90	0.81	0.86	0.94	0.85	0.89
Appellee	0.65	0.59	0.62	0.88	0.80	0.83
AppelleesLawyer	0.78	0.88	0.83	0.78	0.88	0.83
Facts	0.53	0.67	0.59	0.37	0.47	0.41
CauseOfAction	0	0	0	0.33	0.4	0.36
LegalFacts	0.1	0.06	0.06	0.36	0.45	0.4
ReasoningOutcomes	0.05	0.04	0.04	0.34	0.3	0.32
Holding	0	0	0	0.12	0.89	1
Judgement	.01	0.1	0.1	0.47	0.50	0.49
Rationale	0.22	0.18	0.2	0.22	0.18	0.2

3.2. Gold Standard

The annotation task was carried out and analysed in the absence of a gold standard, as it was intended to help support the creation of the gold standard in the first instance. In this approach, the gold standard is an incrementally realised *goal* rather than a *given* such as provided for in machine learning approaches.

In the curation process we are faced with a number of possible choices. The first option entails that we consider the annotations from all annotators to be contributing towards an incremental definition of the gold standard. From this perspective, we need to consider all annotators as equal contributors. This entails an aggregation strategy over all annotators. The most simple strategy is a majority vote, which works well for the conceptually simple annotations covering Indexes and LegalRoles. A second option, more suitable for the more complex annotations, allows for discussion and arbitration amongst the annotators themselves, under the guidance of a legal expert with thorough knowledge of the intricate issues associated with the interpretation of and interrelation between annotations. One step further is to impose top-down integrity constraints [5] on the collective annotation we want to arrive at, and assign the role of arbitration and curation to the expert. The arbiter will determine the annotation quality, especially in instances where there is diverse judgement between the annotators.

In the previous section we examined the agreement between the annotators, and found it wanting, particularly for the complex annotations of LegalFacts, CauseOfAction, Holding, Rationale, and Judgement. One plausible reason for this is the fact that the

annotators are students who are yet learning how to analytically read a case. Therefore, the curator strategy seems suitable for our setting. In addition, curation under guidance and discussion of diversions with respect to a curator’s gold standard is very apt for an educational setting. Further, in the process of annotation aggregation, i.e. arriving at a communal annotation, imposing top-down integrity constraints involves the prioritization of one annotator. This annotator produces a de facto gold standard.

In the end, we decided for a mixed approach, in which we apply on the one side bottom-up aggregation and curation (without top-down constraints) on the basis of annotator agreement for simple annotation types such as Indexes and LegalRoles. The curation of complex annotations involves constrained aggregation. For this purpose, our curator produced gold standard annotations for five complex annotation types, listed in table 3. The curator annotated the largest text span that contains the relevant material, leaving for later analysis elements within the span. This table also shows pairwise agreement for combinations of curator and original annotators.

Table 3. Observed agreement between annotators

Annotation Type	P Strict	R Strict	F1 Strict	P Lenient	R Lenient	F1 Lenient
Holding	0.03	0.33	0.06	0.18	0.61	0.25
Judgement	0.33	0.08	0.13	0.67	0.1	0.35
CauseOfAction	0	0	0	0.33	0.4	0.36
LegalFacts	0.1	0.06	0.06	0.36	0.45	0.4
Rationale	0.22	0.18	0.2	0.22	0.18	0.2

3.3. Didactic Intervention and Curatorial Analysis

Prior to the creation of the gold standard by the curator, we had anticipated that our annotators would participate in a collective curation of the complex annotation types, which would afford a range of didactic interventions, thus helping students gain deeper insight to and understanding of the contents of the cases. This exercise was carried out with respect to CauseOfAction, e.g. those passages bearing on why the case was brought to court and with respect to such intellectual property topics as *patent infringement* and *disclosure of trade secret*. However, in the course of the exercise, it became clear that the students had difficulty identifying and agreeing to the common relevant passage. Indeed, the task is not straightforward for decisions express the causes of action in various ways (e.g. as a list of claims by the plaintiff) which must be distinguished from holdings or rationales. While this was a highly useful and engaging approach to teaching students about how to analyse case law over time, it proved not to be fruitful as a method of creating a gold standard itself which could be used as the basis of teaching. In other words, it became clear that it would be most beneficial to establish a gold standard corpus, have students annotate the corpus afresh, then compare the students’ results against the gold standard. Moreover, the exercise would have to be carried out with particular problematic annotations, e.g. holdings, causes of action, and so on, as part of coursework over time, giving detailed instruction with varied materials. This would help students refine their understanding of the cases. Given these insights to the pedagogic context, we turned to the creation of the gold standard by the curator, which creates the basis for future development of pedagogic materials.

It should be added that even for the curator, differentiation of passages into the complex annotation types is not always altogether straightforward given the complexity of the writing style and the conceptual material. While it is useful to differentiate legal facts from the rationale, there is an intermixing, as the legal facts can be considered to be part of the rationale, meaning that the reason for the judgement is based on the legal facts; see, for example, 634 F2d 895 *Hurst v. Hughes Tool Company* sections 25-35 or 728 F2d 818 *American Can Company v. Mansukhani* section 3. In our view, the legal facts are those properties and occurrences prior to the case being brought to court. They are not occurrences that arise over the course of the case in court, which is often procedural history. On the other hand, rationales are couched in abstract language or reasoning beyond the legal facts of the case; they also appear to be followed by a reference to a case. Similar issues arise with the identification of holdings. The methodology of annotation, curation, and extraction allows just such close examination for the explicit linguistic signatures most closely associated with the distinct annotation types. While there may be interpretive differences between curators, these are not arbitrary, nor unrestricted; given sufficient data, the parameters of interpretative variation may too be drawn forth. In our view, recording the complexities of the curatorial process makes essential aspects of legal knowledge accessible and available for further analysis.

4. Discussion

The study highlighted that it is essential to provide extensive training and rich training materials even to law school students. While students study cases in their course of study, the cases tend to be selected for any number of pedagogic reasons. Among these, the cases are clearly structured and well-written. Yet, for “cases in the wild”, we find that there are a range of drafting styles for the same annotation. For instance, causes of action may be presented as issues in the case, or causes of action may be presented narratively rather than according to a given legal “label”. Similarly, holdings can be subtly expressed, since it may not be clear whether the judge is simply clarifying a point that already holds or is refining or extending the law. In principle, cases on appeal are matters of how the law is applied where it otherwise is claimed to be unclear; so what appear to be “intermediate judgements” in the course of the overall decision are taken to be holdings in the case, and thus, refinements where the law was unclear.

In future work, we intend to develop didactic materials around the analysis of legal cases, using the gold standards as guides and the annotation-student curation process as a learning opportunity that is integrated to the group study sections that law students often use. Further annotation types will be added, for instance, the range of precedential relationships or the subtypes of legal case factors that are found in the CATO analysis [1,16]. In this way, students will both learn from and construct a large corpus of curated case law. While this study was small scale, the essential aspects of the methodology are scalable; we would look to opportunities to engage law schools with the materials, thus further distributing the tasks. In terms of research, with a sufficiently large, richly annotated corpus, we can query it using GATE, identifying legal patterns that are only accessible at scale. As well, we can process the corpus with respect to a range of NLP components that are not feasible to manually annotate such as parts of speech, syntactic and semantic structure, and auxiliary named entity recognition, amongst many others. In

addition, we expect to be able to isolate those linguistic signatures of particular parts of the decision and, with a sufficiently large corpus, to apply machine learning techniques. It will also be valuable to compare our approach to case analysis and legal pedagogy to [18] in the Civil law context.

Acknowledgments

The authors thank the annotators - Chase Hertel, Courtney Soughers, and Dain Barnett - and Michigan State University School of Law for financial support.

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