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Establishing the Necessary Link Between Electronic Sources and Legal Education Erich Schweighofer, University of Vienna

Abstract:

Only a short look into European law books or commentaries shows the fact that the existence of electronic sources has not much changed writing or teaching on EU law. References to electronic materials are very rare. This is disappointing because better access leads to better knowledge and a less burdening load of memorising details of important statutes or cases.

The link between electronic sources and legal education should be Integrated Computer Assisted Legal Research (ICALR). Proper search strategies should be taught in the area of the substantive law itself. Legal knowledge can be easily extended to recent materials or very special details with this method.

This meta knowledge can be formalised as ontology of legal information retrieval consisting of present rudimentary conceptualisations (citations, concept hierarchies, etc.) and queries.

Authors of legal treatises should change their habit of footnoting. Very often, the best reference may be a search strategy in a database or an Internet/World-Wide-Web site.

Knowledge of ontologies of legal information retrieval enables students to deal with any legal question if relevant material is available. The students should be taught how to find relevant materials and how to use this output efficiently for problem solving. The results of our course on EU law are very encouraging and should lead to a major change in the law school: less learning but more emphasis on problem solving and search strategies. The example of LEXIS shows the way in which it can be combined with teaching software.

1 Introduction

Electronic access to legal sources should have changed the teaching of law, especially in European law with severe difficulties in finding the law. Boolean keyword searching or hypertext links between documents should provide the basis for retrieving relevant information besides having in mind relevant materials or reading in libraries in order to find interesting documents. Practice has not has much changed yet. Computer assisted legal research is seen as a new form of library search but not as a supplementary part of law teaching.

Only a short look into European law books or commentaries shows the fact that the existence of electronic sources has also not changed very much the style of writing [Fischer/Köck96, Hilf/Grabitz95, Groeben92]. References to electronic materials are very rare. An important exception can be found in [Stix-Hackl/Schweighofer93]. This is disappointing because better access leads to better knowledge and a less burdening load of memorising important statutes or cases.

2 The Potential of "Electronic" European Law

The concept of "electronic" European law comprises electronic materials as well as the methods dealing with better access to law with information technology. The core of the materials are provided by the EU databases CELEX, SCAD, ECLAS, INFO92, RAPID, APC, EPOQUE and ABEL (for an overview see [Commission95, Schweighofer96c]) as well as the now very fast emerging EU Internet (for an overview see the fine collection of M. Nentwich: <http://fgr.wu-wien.ac.at/nentwich/euroint.htm>). However, the methodological possibilities go beyond the traditional teaching of information retrieval that familiarises students with this important legal tool [Leith91, Paliwala91].

The assumption that the law can be learnt in all details has to be challenged. Good knowledge of the "hard core" of the law is sufficient that consists of principles, concepts, main legal questions, sources and legal procedures of the area of law. Lawyers should be able to master any legal problem in due time with the help of improved documentation and efficient retrieval of relevant materials. New documents have to be taken into account when they come into existence. Very specialised documents have to be found if they are relevant.

This higher demand of mastering the law must lead to a change of legal teaching. The emphasis should be shifted from learning the law to case-solving techniques. Based on the knowledge of the "hard core" of law students should solve legal problems with the help of retrieval of existing solutions. Some legal questions still need creativity but most problems can be solved using this method. Students are enabled with efficient search methods to solve many more problems in reasonable time by limiting the burdening learning load.

3 Limits of Information Retrieval

Recall and precision of present legal information retrieval systems [Salton/McGill93] are not satisfactory for lawyers. Information retrieval concentrates on similarity between query and document collection. Not many studies are available concerning the quality of information retrieval research in law but the results of the STAIRS study remain relevant. Fulltext Boolean search achieves less than 30% of recall [Blair/Maron85]. Due to possible liability claims, lawyers have to achieve much higher recall in their research. Therefore, traditional instruments like commentaries, classification systems or citation indices are still in use because they provide much higher recall if they are used properly by an expert.

Much research is done concerning the improvement of recall and precision. The SIGIR conferences give an overview about such applications. The inference network has been implemented in legal information retrieval systems with remarkable success [Turtle95]. Internet search techniques are less sufficient because they emphasise on word counts and document ranking.

Nearly all legal information retrieval systems have integrated some techniques of legal indexing. The best example may be the EU legal information systems CELEX. The success was disappointing because of difficult user interface and high training costs [Schweighofer95b]. With rising familiarity such tools like citation indices become more and more important. If such techniques could be integrated within law teaching course this huge potential will be much enhanced.

4 I-CALR

The main use of information technology in both legal practice and in legal education is information retrieval systems and nowadays the Internet and World-Wide-Web. Computer Assisted Legal Research (CALR) can be seen as the prior method in dealing with this new form of publishing of legal materials. CALR is based on methods developed by the information science. The aim is on introducing users in information technology with the specialities of retrieval languages, user interfaces and data structures in legal databases (for an overview see [Frakes/Baeza-Yates92, Salton/McGill83]).

The aim of CALR is limited to information technology even if CALR is given by specialists in computers and law [Janto/Harrison-Cox92]. The task of learning the law is left for respective courses in which CALR may be used.

A missing link between CALR and law courses is emerging because of the growing importance of electronic materials. Information retrieval systems and the Internet meet the demands of the very dynamic character of law by regular updating of the contents. The present interpretation of a statute may not be found only in a commentary but with greater accuracy in the electronic materials.

Integrated Computer Assisted Legal Research (I-CALR) should provide the missing link between electronic sources and law education. The emphasis of teaching should be shifted from information retrieval to a new form of meta knowledge for mastering huge documentations: ontologies of legal information retrieval.

4.1 Ontologies of Legal Information Retrieval

An ontology is an explicit conceptualisation of a domain and describes the entities and relations in a given domain [Visser/Bench-Capon96, Valente/Breuker95]. Legal ontology focuses on norms, acts and concept descriptions. In our view, this typology has to be supplemented by the relations between these objects (citations). Another additional part is the relationship between legal problems and these ontologies.

The existing methods of conceptualisation of legal knowledge have been developed for many years in jurisprudence. Citations are the most prominent legal invention. The methods of documentation languages (thesauri and classification codes), dates, hypertext links or legal language have been improved by relevant sciences.

The present state of the art of conceptualisation does not fully meet the requirements of ontologies. The ontologies in legal information retrieval systems are somewhat rudimentary if compared with the much more developed knowledge representation methods. As the focus of research is on the representation of queries this task can be left for further research.

Introducing this concept to legal search techniques, the ontology describes the relation between legal problems and the conceptualisation of the domain. It provides a meta-level view of the structure and the vocabulary of the domain that facilitates sufficient retrieval of relevant materials. The object of this ontology is the query that describes the relation between the entity legal problem and the other objects norms and concept descriptions. In I-CALR, queries are meta information that describes efficient access to huge information retrieval systems or data warehouses. Three types of query descriptions can be distinguished:

- The most used expression of the query is in natural language. The huge advantage of easy use is diminished by lacking formalisation for information retrieval as well as for ontologies. This type of query could be easily integrated into textbooks or commentaries as references or footnotes.
- The query as defined in information retrieval [Wartik93] is only the formal implementation of the relation in information retrieval languages. This formalisation of the query can be Boolean search, probabilistic search or hypertext browsing. In the first 20 years of legal information retrieval, syntax of queries was important and a reason for non-acceptance of such systems. Nowadays, this factor becomes more and more irrelevant. This should not lead to neglect the ontologies of the conceptualisation of the documentation as it is quite often the case in World-Wide-Web applications.
- The query is described by a knowledge representation comprising the following elements: (1) a natural language expression of the legal problem, (2) a problem identifier, (3) a problem type, (4) ... (n) queries consisting of (a) description of solution (b) formal expression within the information retrieval system (formal search formulation). Such formal search formulations exist for each important interface of the database and can be easily adapted to new systems. Element (1) is closely related to query type 1, element (3) to query type 2. For the time being, this rudimentary formalisation fulfils our purposes but a more powerful formalisation is needed for the future.

The following figure describes the relation:

Figure 1: Elements of I-CALR

The knowledge of this ontology of legal information retrieval yields high results. With sufficient legal knowledge, queries produce new developments and necessary details of legal knowledge. They supplement efficiently existing handbooks or commentaries in order to combine treatise with documentation and dynamic character of law.

The integration of information retrieval ontologies into law teaching solves the problem of the otherwise high training costs. The advantage of this approach is much improved recall and precision of the search. Proper documentation in legal information retrieval systems combined with the ontology of queries raises such systems from legal documentation to commentaries.

4.2 Teaching of Ontologies in EU Information Retrieval

The concept of ontologies of EU information retrieval is still in its infancy. Therefore, we concentrate our description on existing conceptualisations of legal knowledge and queries expressed in natural language. The conceptualisation comprises document types, field structures, indices, bibliographic descriptions, thesauri, classification codes, citations, formalisations of time and terminological information about natural language fields.

A description of the conceptualisation is available in the handbooks of the various EU databases. Research on the quality of such conceptualisations is rare. For details of the following description, we refer to our extensive study [Schweighofer95b].

The link between this conceptualisation and the teaching can be very often realised without much effort. Due to improved user interfaces, technical details and formalisations can be left aside.

Four different types of conceptualisation can be distinguished:

- Tools of information science: bibliographic data, thesauri, classifications
- Citations
- Hypertext links
- Time
- Legal terminology

4.2.1 Bibliographic Data, Classifications and Thesauri

Legal materials often contain a significant amount of bibliographic data or indexation with a documentation language. The manual assignment of classification codes or descriptors of the thesaurus is common in legal information systems [Turtle95]. Although some authors have questioned the improvement in recall and precision tests have indicated the relative merits of this approach [Bing95].

Documentation languages are very efficient search tools for broad areas of law. In combination with bibliographic and temporal search the query results are quite satisfying with sufficient recall and precision.

As legal terminology is very complex the much smaller documentation language represents an easier access to the documents. Sufficient documentation is available for the thesaurus or the classification but not for the legal terminology. The index of a full-text system is only a poor substitute for such information.

The integration of bibliographic data and documentation languages into legal education is easy. The chapters of textbooks should contain relevant descriptors or classification codes. Electronic courseware should include also hypertext links. On-line information during querying the database is also very helpful. Practise with documentation languages greatly improves proper use because of developing a mental map of the document collection.

4.2.2 Citations

Legal documents are nearly always related to other legal instruments. Statutory provisions, principal cases or other documents cite other cases or instruments. Knowing this particularity, lawyers have developed very sophisticated forms of citation handling. Whenever a legal document is referred in another a reference is normally found. Citations are extremely valuable in legal research because reference to relevant statutes, amendments, preparatory work or cases is a necessity for the lawyer. The publication of citation manuals was already well developed at the advent of legal information systems [Tapper76, Schweighofer95b]. This citation may be denoted as coded reference (e.g. USA, UK, Austria) or as a special document number (EC legal information system CELEX with its CELEX documentation number). Different citations may be distinguished. The CELEX database uses 10 different citations. In his excellent study [Berger71] describes 60 variations based only on statutory material. US law citators like Shepard's Citations, Auto-Cite or LEXCITE have similar distinctions [Emanuel95]. The question of the usefulness of variations of citations cannot be answered here in detail. Based on our own experience, a distinction between important and other citations is always very helpful (e.g. the citation fields CONCERNS and LEG.BASE in CELEX). A major drawback of citations in EU law is lacking information concerning leading cases or subsequent treatment of cases.

It may only be noted here that legal information retrieval systems use existing citations with much greater efficiency. With the code of reference, citations retrieve 100% of the relevant documents with 100% precision. Former restrictions like time-consuming consulting of many volumes, limited number of entries, lacking Boolean search, and limited time coverage disappeared with the advent of information retrieval systems. Citations were a major boost for the success of legal information retrieval systems. Another important advantage contrary to classification codes is the possible automatic generation of the citations and the high integration of citations in traditional law teaching.

The integration of citators into legal teaching is tricky in EU law. The reason is the CELEX document number that has to be used as code of reference. Official abbreviations or short titles do not exist in EU law that could form the basis for citators as in the case of Austrian or German law. The numbering of legal acts is a substitute but two different formalisations exist. Official documents and legal literature cite the Database Protection Directive as Directive 96/9/EC whereas the CELEX number is 396L0009. The link is evident but needs some training. Intelligent interfaces may solve this problem of notation (e.g. the Lovdata CELEX application). Besides this problem, the concept of *ultra vires*, the importance of case law and the frequent amendments familiarise students with the high importance of citations.

Textbooks or commentaries should contain also information about the CELEX number. References to citators as proper search queries help in updating the textbook on-line. Course materials should include hypertext references to these possibilities.

4.2.3 Hypertext Links

Nowadays, hypertext references are the proper implementation of citations with many advantages [Greenleaf95, Schweighofer95b, Nielsen93]. A fine example in a World Wide Web environment is the server of the Australasian Legal Information Institute [Greenleaf96].

Hypertext links can also be used to implement thesauri or classification codes. An example is the KONTERM workstation that will be described below [Schweighofer96b].

The self-explaining character of hypertext links has many advantages in teaching and should replace existing citations, classifications or thesauri if possible.

4.2.4 Time

Fields filled with dates represent an approximation of the changing character of law. The most important date field contains the document's expire date that enables the retrieval of documents in force only at a given date.

The only difficulty in teaching temporal searches is the sometimes very difficult syntax.

4.2.5 Terminology

The most important problem remains the terminology of the documents. Current information retrieval systems require the knowledge of a terminology with about 80.000 words. Legal education and training help in becoming acquainted with legal concepts and principles. The problem remains that many levels of terminology exist due to the fact that different authors use varying terminology in different times. In European law, the EU bureaucracy coins special terms used only within the institutions. This Eurospeak problem is intensified by the translation from the working languages to the official languages without sufficient regard to the legal language in the respective member state.

The same terminology problem exists in a paper environment but it is more severe using electronic materials. In order to read and understand printed materials, passive knowledge is very often sufficient. The entry into an electronic collection is always a query that requires active and precise knowledge of the used terminology.

Only long and extensive practice with European law yields proficiency with this terminology but a good description of the legal terminology presents a possible approach for this problem. Handbooks or commentaries should explicitly describe the terminology used in legal languages. A very good illustration of the problem can be given with the example of titles of EC acts. In literature, easy-going abbreviations are used without any reference to the often quite unknown official title.

Lists of good keywords should be added as references in textbooks or commentaries that are based on terminology research. Automatic search strategies are advisable for courseware or on-line help features.

The results of terminology research can be incorporated into more intelligent information retrieval systems. The natural language search of LEXIS or WESTLAW contains already features of terminology support although no details have been reported in [Emanuel95] or [Turtle95]. A much nicer application would be the integration of such terminology into a norm based thesaurus as proposed by [Bing87].

Some help may be offered by language research. We have done some experiments with the project *KONTERM workstation* that will be described below.

4.3 KONTERM Workstation: A Tool for the Semi-automatic Creation of Terminology

The aim of the project *KONTERM workstation* is to provide a hybrid application of methods of legal knowledge representation assisting lawyers in their task of managing present high quantities of legal information contained in natural language documents. Besides legal information retrieval and hypertext, a main aim of the *KONTERM workstation* is the automatic analysis of text corpora and the semi-automatic generation of the document description. The documents are segmented into document parts, articles, paragraphs and sentences and transformed into HTML documents. Legal concepts are represented in a knowledge base of descriptors, probabilistic context-sensitive rules and meta rules. Context-sensitive rules are linguistic templates allowing to detect complex concepts in legal documents. The wording of rules is facilitated allowing also probabilistic expressions. Meta rules represent a concept that must be defined as a combination of rules occurring in the same document or section of a document. This method allows the automatic detection of knowledge in legal documents. Vector space model, cluster analysis and the self-organising map of Kohonen are efficient tools in building the knowledge base. The description of documents is done by matching documents with the knowledge base. This automatic generation of summaries and meta information of the documents is presented in hypertext structure. Hypertext links are generated automatically from concepts to documents, from documents to concepts, from text corpus to documents, from document descriptions to documents, etc. The document space can be described using cluster analysis or neural network. Details may be found in [Schweighofer96a, Schweighofer96b].

Results of the *KONTERM workstation* are available at the *KONTERM* server (<http://www.ifs.univie.ac.at/intlaw/konterm/konterm.htm>)

The detection of word senses is a central issue of *KONTERM*. Three tools may be used for the analysis of the

terminology of the text corpora.

Statistical data (word counts, inverse document frequency, etc.) provide details about the distribution of the words within the document collection. An important application is the semi-automatic generation of stop words.

An assumption of KONTERM is that the meaning of a term can be found in the context. Therefore, the document segments containing the relevant term are formalised with a vector according to the vector space model of information retrieval [Salton/McGill83]: $D_i = (TERM_{i1}, TERM_{i2}, \dots, TERM_{in})$. Cluster analysis gives an overview about the various meanings. This analysis of the concept space can also be done by the Kohonen map [Schweighofer95a]. The existing vectors for the formalisation of natural language text segments are used as input for the neural network. The results achieved with the self-organising maps were slightly better.

4.3.1 Terminology Research

The terminology tool of KONTERM has been widely used in about 15 different applications. Details concerning the examinations of the various notions of neutrality can be found in [Schweighofer95a].

In this paper, we give some examples of the test collection *Public International Law Treaties*, a text corpus containing 100 documents representing the most important treaties in public international law. The knowledge base consists of about 1600 descriptors and rules.

4.3.1.1 Connotational Use of Terminology

With the tools of linguistic analysis, nearly every idea, concept or principle can be examined concerning its connotational use. The result of this matching process is presented in a hypertext environment.

As examples of terminology research we present various meanings of the concept space for the descriptor *propaganda*.

The lexical analysis provides exact descriptions for the meanings of the descriptors. The descriptions provide an overview that can be checked simply by jumping to the relevant document parts.

Figure 2: Meanings of the Descriptor Propaganda

The advantage of this approach is the fast and efficient presentation of various meanings of descriptors in a hypertext environment. Therefore, the KONTERM workstation provides a good tool for linguistic research but also for training.

With this small application, students can easily become acquainted with the use of various concepts in public international law. This experience will help them in the formulation of full-text queries.

4.3.1.2 Term Lists

For this aim, we have used the statistical tool of the *KONTERM workstation*. The assumption of this approach is that particular fields contain more precise terminology. If the stopwords are eliminated the remaining word list is a quite accurate description of the terminology.

The CELEX database fits well in that approach having text fields like title, summary or index with a very precise language. A particularity of the title of legal acts is the high number of stopwords.

As test area we have chosen the class information technology and telecommunications of the *Register of Community Legislation in Force* (classification code 13.20.60). We have downloaded the titles of all legal acts in force as well as of recent preparatory acts. The word list of this input was reduced by an extensive stop word list that was created with the help of the statistical tools (especially word counts and inverse document frequency).

An extract of the remaining list is presented in Figure 3. It contains the 30 most used words. For reasons of convenience, we have translated this list into English although the tests were performed in German.

Figure 3: List of the 30 most important words, classification code 13.20.60

The list gives an overview about the used terminology. Another approach with similar results is a lexical analyser generator [Fox93].

5 Experience with Courses

At the University of Vienna, our course on EU law should acquaint students with this new form of mastering the law. The focus of this course is on the ontology of legal information retrieval that enables students to deal with any legal question if relevant material is available. The students are taught how to find relevant materials and use this output for problem solving in reasonable time. The results are very encouraging and propose a further shift from traditional teaching with a high learning load to more emphasis on problem solving techniques [Schweighofer95c]. Beginning with the summer semester 1997, the students may choose case-solving techniques as optional part of the examination in European law.

At other Austrian universities, we have given very successfully similar courses. This shows the potential of this new method in a still quite "new" member state.

6 Conclusions

Ontologies of legal information retrieval can improve mastering of European law. The shift from learning the law to mastering the law with problem solving techniques using information technology brings higher proficiency in European Law with limited learning load.

The concept of ontologies of legal information retrieval is still in its infancy. The description of conceptualisation is still based on the insufficient standards of information retrieval. Terminology remains a tricky issue as too much dark exists concerning the words used in a legal database. More research is needed in order to lift the veil on that important meta knowledge. Possible approaches have been shown by the project *KONTERM workstation* with connotational word use and term lists. Tests have shown the usefulness of this approach.

In practice, the most important advantage of ontologies of legal information retrieval is the potential for improvement of recall and precision.

The introduction of ontologies of legal information retrieval in legal textbooks will help the student as well as the practitioner. The best reference may be very often a query in a database or the Internet. This reference should contain relevant queries based on legal terminology and the conceptualisation of legal knowledge (citations, concept hierarchies or hypertext links). Legal courseware should also follow this approach as shown in the example of [LEXIS96].

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