

SOME REQUIREMENTS FOR A
COMPUTER-BASED LEGAL CONSULTANT

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Although the literature on computer-based consultation systems has often suggested the possibility of building an expert system in the field of law (see, e.g., [2]) it is only recently that several AI researchers have begun to explore this possibility seriously. Recent projects include: the development of a computational theory of legal reasoning, using corporate tax law as an experimental problem domain [6] [7] [8]; the development of a language for expressing legal rules within a data-base management environment [4]; the design of an information retrieval system based on a computer model of legal knowledge [3]; and the design of an artificial intelligence system to analyze simple tort cases [10].

This paper attempts to identify the principal obstacles to the development of a legal consultation system, given the current state of artificial intelligence research, and argues that there are only certain areas of the law which are amenable to such treatment at the present time. The paper then suggests several criteria for selecting the most promising areas of application, and indicates the kinds of results that might be expected, using our current work on the TAXMAN project [9] as an example.

I. Potential Applications.

One can imagine numerous applications of artificial intelligence techniques, in several diverse areas of law, but most of these would fall into one of the following categories:

(1.) Legal Retrieval Systems. There are a number of systems in operation today which maintain data bases of statutes and decided cases, in full text, and which are capable of searching these texts for combinations of key words, using standard information retrieval techniques. (For a comparative survey of the principal domestic systems, LEXIS and WESTLAW, see [12].) These retrieval systems have turned out to be useful for certain kinds of legal research tasks, but only when used in conjunction with the traditional manual digests and indices, all of which are organized according to a rigid conceptual

classification of the law (usually: the West "key number system"). With the use of artificial intelligence techniques, however, the retrieval systems could be augmented to provide a form of automated conceptual searching as well, and without the rigidities of the manual indices. For a discussion of these possibilities, see [6] and [3].

(2.) Legal Analysis and Planning Systems. A step more sophisticated than a retrieval system, a legal analysis and planning system would actually analyze a set of facts, or propose a sequence of transactions, in accordance with the applicable body of legal rules. This is the kind of system that most often comes to mind when one speculates about computer-based legal consultation, for it is the system most similar to the successful systems in chemical and medical domains: a lawyer, engaged in a dialogue with a computer, would describe the facts of his case, and the computer would suggest an analysis or a possible course of action. In fact, there are systems of this sort under development today, using techniques much less powerful than those available to the artificial intelligence community, and they seem close to commercial application: see, e.g., [13]. The advantages of artificial intelligence techniques for these applications have been discussed by [6].

(3.) Integrated Legal Information Systems. Instead of looking only at the tasks of the private attorney, we could focus our attention more broadly on the legal system as a whole. One of the tasks of the legal system is to manage information and to make decisions about the rights and obligations of various individual actors, and there seems to be no reason, in principle, why some of this information and some of these decisions could not be represented entirely within a computer system. For a current example, using conventional programming technology, consider the computerized title registration systems which are now being used to manage real estate transactions (see, e.g., [5]). With the availability of artificial intelligence techniques, a large number of additional applications come to mind: financial transactions, securities registration, corporate taxation, etc. At present it appears that these possibilities are being taken more seriously by European lawyers than by American lawyers (see, e.g., [1] and [11]).

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If we consider the potential role of artificial intelligence techniques in all of these applications, a basic paradigm emerges. A computer-based legal consultation system must represent the "facts" of a case at a comfortable level of abstraction, and it must represent the "law" in the chosen area of application. The "law" would consist of a system of "concepts" and "rules" with the following characteristics: (a.) they would be relatively abstract, that is, they would subsume large classes of lower-level factual descriptions; and (b.) they would have normative implications, that is, they would specify which actions were permitted and which actions were obligatory in a given situation. Legal analysis, in its simplest form, would then be a process of applying the "law" to the "facts". Put this way, the paradigm seems to be an ideal candidate for an artificial intelligence approach: the "facts" would be represented in a lower-level semantic network, perhaps; the "law" would be represented in a higher-level semantic description; and the process of legal analysis would be represented by a pattern-matching routine.

The difficult problems with this paradigm, however, are the representation problems. In the existing knowledge-based systems, in other domains, the representation of the "facts" and the "law" has been relatively straightforward. In DENDRAL, for example, the ground-level description of all possible chemical structures could be represented in a simple graphical notation, and the rules for splitting these structures in a mass spectrograph could be represented as simple operations on the links of the graphs. In MYCIN, the basic facts of a case could be represented as a set of features listing the presence or absence of certain symptoms and the results of certain laboratory tests, and the diagnostic rules could then be represented as a probabilistic judgment that a given symptom or test result implied a certain disease.

By contrast, the facts of a legal case typically involve all the complexities of daily life: human actions, beliefs, intentions, motivations, etc., in a world of ordinary objects like houses and automobiles, and complex institutions like businesses and courts. Even if the facts of a particular case could be represented in a computer system, the rules themselves would often be problematical. Some rules, usually those embodied in statutes, have a precise logical structure, and this makes them amenable to the existing artificial intelligence techniques. But it is a commonplace among lawyers that the most important legal rules do not have this form at all: instead they are said to have an "open texture"; their boundaries are not fixed, but are "constructed" and "modified" as they are applied to particular factual situations. A sophisticated legal consultation system would not be able to ignore these complexities, but would have to address them directly.

II. Possible Approaches.

Since the representation problems for a legal consultation system are so difficult, it is tempting to start with the "simplest" possible legal issues, such as the subject matter of the first-year law school courses. We might therefore be tempted to investigate assault and battery cases from the first-year torts course [10], or offer and acceptance cases from the first-year contracts course. But these cases are "simple" for law students primarily because they draw upon ordinary human experience, and this is precisely what makes them so difficult for an artificial intelligence system. To understand tort cases, we must understand all the ways in which human beings can be injured, intentionally and unintentionally, mentally and physically, with and without justification. To understand contract cases, we must understand the expectations of real people in concrete business situations, and the ambiguities of human language in expressing particular contractual intentions. If we abstract away these details, we will miss entirely the central features of legal reasoning, and our consultation systems will tend to produce only the more trivial results.

Paradoxically, the cases that are most tractable for an artificial intelligence system are those cases, usually involving commercial and corporate matters, which a lawyer finds most complex. There is a simple reason why this is so. A mature legal system in an industrialized democracy is composed of many levels of legal abstractions: the law initially defines "rights" in terms of concrete objects and ordinary human actions, but these rights are then treated as "objects" themselves, and made subject to further human "actions"; by repeating this process of reification many times, a complex body of commercial law can be developed. Because of their technical complexity, the legal rules at the top levels of this conceptual hierarchy are difficult for most lawyers to comprehend, but this would be no obstacle for an artificial intelligence system. The commercial abstractions, in fact, are artificial and formal systems themselves, drained of much of the content of the ordinary world; and because of the commercial pressures for precision and uniformity, they are, by legal standards, well structured. A reasonable strategy for developing a computer-based legal consultation system, then, would be to start here.

This is the strategy we have followed in the TAXMAN project [6] [7]. The TAXMAN system operates in the field of corporate tax law, which is very near the apex of the hierarchy of commercial abstractions. The basic "facts" of a corporate tax case can be captured in a relatively straightforward representation: corporations issue securities, transfer property, distribute dividends, etc. Below this level there is an expanded representation of the meaning of a security interest in terms of its component rights and obligations: the owners of the shares of a common stock, for example, have certain rights to

the "earnings", the "assets", and the "control" of the corporation. Above this level there is the "law": the statutory rules which classify transactions as taxable or nontaxable, ordinary income or capital gains, dividend distributions or stock redemptions, etc. Although these rules are certainly complex, the underlying representations are manageable, and we have concluded from our earlier work that the construction of an expert consultation system in this area of the law is a feasible proposition [6].

In our current work [7] we are taking this model one step further, in an attempt to account for the "open texture" of legal concepts and the process by which a legal concept is "constructed" and "modified" during the course of an argument over a contested case. In many areas of the law this would be an impossible task: the complexity of the representation would be overwhelming, and the structural and dynamic properties of the concepts would be obscured. But in the world of corporate abstractions the task appears to be feasible. Looking at a series of corporate tax cases before the United States Supreme Court in the 1920's and 1930's, we have been able to construct a model of the concept of "taxable income" as it appeared to the lawyers and judges at the time (see [9]). Although the concept is sometimes represented as a "logical" pattern which can be "matched" to a lower-level semantic network (we call this a logical template structure), the more important representation for the process of legal analysis consists of a prototype structure and a sequence of deformations of the prototype. We are currently involved in an implementation of these ideas, and we will describe them in detail in a future paper (for an initial description of the implementation, see [8]). We believe that the "prototype-plus-deformation" structure is an essential component of a system of legal rules, and that it ought to play an important role in a sophisticated legal consultation system.

III. Prospects.

This paper has emphasized the difficulties in constructing a computer-based legal consultation system, but it has also suggested some feasible approaches. The main difficulty is the representation problem: the factual situations in a legal problem domain involve complex human actions, and the most important legal rules tend to contain the most amorphous and malleable legal concepts. By selecting legal problems from the commercial and corporate areas, however, we can construct a representation of the legally relevant facts without having to model the entire human world, and we can begin to develop the necessary structures for the representation of the higher-level legal rules. We have had some success with this strategy in the TAXMAN project, and we believe it can be applied elsewhere as well.

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