LEGAL EXPERT SYSTEM - LES-2


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1. INTRODUCTION

This paper presents the second version of the Legal Expert System (hereafter LES-2), which the Legal Expert System Association (LESA president Prof. H. Yoshino, Meiji Gakuin University, Tokyo) developed in cooperation with NEC Corporation in 1986.

In December 1985 LES-1 was developed. It was the 1st version of this system and it was developed as a reasoning system for substantial law (Japanese civil law). LES-2 was developed in June 1986, the structure of which is meant to augment LES-1 simple natural language transmission, Q&A system and a new reasoning system for civil procedural law. LES-2 employs PROLOG-KABA and WING on NEC PC9801 computer.

A legal expert system is a computer system containing specified legal knowledge, with which one can perform legal problem-solving. Progress in the expert system in the field of law has, comparatively speaking, made less headway than in other fields. A developing programming with PROLOG has, however, recently served to promote several systems. For instance, we can see new impact for research on description dealing with the time in law.

To build up a general legal expert system, one needs to have cooperation between informaticians and professionals (experts). In this very sense, it can be argued that this system has resulted from such cooperation.

In building up a legal expert system, it is necessary to analyze the structure of legal knowledge, and subsequently create a system suitable for that structure. The features of legal knowledge are: (i) it is expressed in natural language, and (ii) it is an OPEN-ENDED universe of discourse. This study examines LES-2 from those two perspectives.

2. THE FUNDAMENTAL STRUCTURE OF LAW AND LEGAL REASONING AND ITS FORMALIZATION

The process of judgement made by a jurist to solve legal problems, that is, the process of the legal judgement, is referred to as "legal reasoning." A legal expert system must be first and foremost a legal reasoning system.

The most typical form of legal reasoning is the reasoning of law application. That is, it means to reason the conclusion to be gotten by applying of law to a certain case. This legal reasoning is composed of the reasoning for justification of legal conclusions from the given premises and heuristic reasoning for the premises themselves. As the reasoning for justification of legal conclusion is looked upon as the fundamental source of legal reasoning, the system of the reasoning of legal justification should be created first.

The reasoning of legal justification is based on logical proof, but not legal syllogisms in a simple form which are composed only of legal rules and facts. While legal rules (the "articles") are
abstractly prescribed, each fact is concrete. It is necessary, therefore, for legal rules to be interpreted as the "concretization" of the meaning of the rules so that a bridge might be built between an abstract legal rule and concrete facts. These articles are not independent of each other, but are related logically to each other to form the legal system. There are legal principles which logically relate each legal article. The structure of the reasoning for the justification, as well as those principles formulated by PROLOG, can be expressed in the following modified legal syllogism:

Fig. 1.
Rule 1 (legal norm sentence):
1a. legal_principle: legal_effect_0(X):-
   legal_effect_1(X), legal_effect_2(X).
1. legal rule:
   legal_effect_1(X):-
   legal_requirement_1(X), legal_requirement_2(X).
1b. interpretation:
   legal_requirement_1(X):-
   legal_requirement_11(X), legal_requirement_12(X).
1c. judgement-supplementary interpretation:
   legal_requirement_11(X):-
   legal_requirement_111(X).

Rule 2 (subsumption judgement dictionary)
2. subsumption: legal_requirement_111(X):-
   fact_1(X).

Fact:
3. Fact:

Logical deduction:
4. Legal decision: legal_effect_0(a).

(The legal rule 2, legal requirement 2, legal requirement 12 needs an appropriate legal rule, interpretation, and facts, but they are abbreviated here.)

As shown in Fig. 1 above, the fundamental unit of legal knowledge, a legal norm sentence, has a logical structure based on the conditional sentence of legal requirement and legal effect. Moreover the legal system has a hierarchical logical connective structure reaching from the abstract to the concrete level. It should be noted that in the above PROLOG formulas the connection of each legal requirement on the right side, that is, of each literal in the body means not only the connection AND in logic, but also it prescribes the procedural order to decide the truth or falsity of each sentence, and thus the legal world resembles the PROLOG world in that both assume a closed world where each sentence must be false if it fails to be proved to be true. It could be said it corresponds to the reality of legal reasoning.

Supposing the rightness of the rules system, (the rightness of) the legal decision of a case can be proved as the logical deduction from this rules and the given facts. To construct a reasoning system of legal justification, the system has to be provided with a rule base of rule 1 and a dictionary base of rule 2. Then inputting the FACTS of the case the legal decision can be deduced by the back-tracking reasoning process of PROLOG.

In legal reasoning, there are valid meta rules which control priority in applying rules. For example, "A special law is prior to a general law," "An upper law is prior to a lower law," "A new law is prior to an old law" and so on. When it is possible to apply multiple legal rules to a case, it is necessary to control the reasoning by means of the meta rules. And it is necessary to build up an inference engine to control the priority. The precise way is to be stated in section 4 below.