CHAPTER ONE

INTRODUCTION

1.1 Motivation for the Study

Increasing numbers of litigants represent themselves in court. Many cases are pending in courts due to paucity of legally trained people. Every day new cases are filed. The rate of cases filling is increasing, but resources available to handle these cases are not increasing in the same proportion. This swelling tide of litigants constitutes a growing burden to the judiciary. To tackle this situation there are many ways. One of the ways is to use some tools, which will assist the legal process and thereby help community to get faster result of their cases in reduced time and cost. Advisory systems are a promising technology to reduce this burden by helping these litigants both to understand the legal remedies available to them and to satisfy the substantive and procedural requirements for those remedies.

The main objective of the study is to develop a legal hybrid framework for legal domain in Indian context. "Legal expert systems" are designed to make decisions and provide advice as would a human expert.

Office automation is an ongoing process; legal field is also one of the areas where automation is continuously done. In India, automation in legal domain is studied less so far. Most of the legal processes are done manually. Normally a lawyer prepares
case documentation based on past cases. She/he searches past cases manually from different law books/judgments/or other documents. Based on manual search result she/he prepares the case for hearing. To make the case stronger lawyer needs strong support of past cases so that the search is wider. This search also depends on the experience of the lawyer. If the lawyer is less experienced then she/he may take more time, which will delay the case result. If she/he misses an important case supporting the present problem case then the result may go against her/his client. If the client is really innocent then he may be charged/ punished due to lack of experience of the lawyer. To make results unbiased, cheaper and faster, there is need for a framework, which will automate legal process. This research is a step towards a try for developing such framework. This framework will also provide easy access of law to common man and will help to increase the awareness among public.

1.2 Aim of the Research

The main aim of this research is to design and develop a legal hybrid intelligent system framework for legal domain in the Indian context.

This research aims to show that a Hybrid Intelligent system can be developed in the domain of law and need not be based upon a complex model of legal reasoning in order to produce useful advice. It supports a practical approach to hybrid legal expert system design based on the way in which lawyers deal with the law on a day-to-day basis.

It argues that a system based upon a simple model of legal reasoning can still produce good advice, where that advice is evaluated by reference to the accuracy of its
predictions and to the quality of its arguments. Furthermore, such a system, with its simpler knowledge representation structure, makes commensurately simpler the process of knowledge acquisition. These arguments are made theoretically, and then by implementation. A Hybrid legal intelligent system which is based on a practical approach to the law has been developed. The design and development of that system framework, called NIRNAY, is presented in this thesis.

1.3 Objectives

The prime aim of the research is to propose the framework for Hybrid Intelligent System which will work in legal domain. The supporting objectives to the aim are as follows:

1. To prove that the hybrid intelligent system can be built by combining two different approaches of Expert System designing in legal domain.
2. To prove that the Rule Based System and Case Based Systems can be combined to build the Hybrid Intelligent System.
3. To demonstrate that the approach to propose framework for intelligent system is right and works properly.
4. To show that the Indian law can be an area of research where researchers can propose the different models for giving the good advice.
5. To show that statute i. e. Indian Contract Act can be represented using the data representation concept of Artificial Intelligence.
6. To show that the cases of Indian Contract Act can be represented using the data representation concept of Artificial Intelligence.
7. To show that The Indian Contract Act can be a domain where reasoning is used and predictive model of Expert System can be developed.

1.4 Impact

This research will impact as following -

1. Assisting in searching laws and/or previous cases faster. This will reduce the time and will improve the accuracy. The research will be based on expert system, rule based reasoning and case based reasoning.
2. Studying how reasoning can be used in legal domain.
3. Designing Legal expert system for use by user aiming to provide greater access and self-learning of the laws.
4. Reducing the cost and time of legal services.

Users for this framework will be the lawyers, the judges and/or any others who need advice/help for any legal matter in the domain of the specific Act.

1.5 Deliverables of Research

1. The proposed research work will result in a hybrid intelligent system framework for legal domain.
2. Methodology for hybrid approach of expert system in legal domain.

1.6 Research Methodology

The Proposed Research Methodology covers the following steps:

1. Deciding upon the area to be targeted from legal domain.
2. Collecting information of law and cases from selected area of legal domain.

3. Knowledge Engineering

4. Selecting an appropriate shell and customizing it.

5. Creating the rule structure and storing the knowledge related to law and cases into structured rule-format into rule base. (RBR Module)

6. Creating the case structure and storing the knowledge related to law and cases into structured case-format into database (case base) with retrieval rules. (CBR Module)

7. Constructing application layer to combine Rule-Based Reasoner and Case-Based Reasoner

8. Writing Testing the system for various cases and to see the results and performance

1.7 Literature Review

AI researchers and law students have worked in the area of legal domain. Hart [1994] believes in a rule based approach for developing legal expert system. He claims that rules can be extracted from all cases and that these are “as determinate as any statutory rule” [Hart 1994, page 135]. Wasserstrom claims deduction is the appropriate method of reasoning with the law and agrees with the eliciting of rules from cases. Wahlgren [1992] views the law from the positivist standpoint. That is, rules can be elicited from cases. He supports creating a rule-based legal expert system to operate on the British Nationality Act. Aarnio puts forward a view of legal reasoning in which induction is allowable, but it only provides prediction, not certainty. Calleros believes
forms of inductive reasoning (both creating rules and as comparison) are appropriate for reasoning with cases; deductive, rule-based, reasoning is appropriate for reasoning with statutes. The rule skeptics see reference to legal rules as a ex post facto justification of the decision in a case rather than the sources upon which to reach the decision. Allen proposes that analogy is the best method of reasoning with cases.

Llewellyn rejects any use of a previous case in the process of reaching a decision. However, previous cases may be used to justify the decision. Levi believes that the use of analogy is the method of arguing with cases in law — “the finding of similarity or difference is the key step in the legal process” Leith presents the view that more than rule-based reasoning is required to reason in “the legal world”. Leith states that rule-based reasoning is appropriate for statutes, but that it is not appropriate for the rest of the law (e.g., cases). Rissland agrees with the Gardner [1984] that to create a legal expert system, one should use “a rule-based approach for the 'easy' or black-and-white questions and a case-based approach for the 'hard' or gray-area [sic] questions.” The method of reasoning that Rissland visualize is for the rule-based reasoner to call upon the case-based one when required and vice-versa. Schauer does not agree with the proposition that cases can be argued using rule-based reasoning. The method of reasoning Schauer seems to advocate is that of analogy.

Typically the RBR parts of the hybrid system are used to capture knowledge not only about statutes, but also the common law. CABARET and GREBE use a RBR to capture both types of knowledge. PROLEXS perhaps is a little against the trend and uses a RBR for the capturing of knowledge about the statute, and a CBR for the case-base, however
for its other knowledge “other types of (mostly rule-based) reasoning” were used [van Opdorp et al. 1991, page 280]. The problem with these approaches is that, from a lawyer’s perspective, the only information that can be accurately captured and argued by a RBR is that found in statutes. No matter how clear a case may seem, it cannot be captured by a rule, because a rule would attempt to define how that case should apply to all possible future legal problems. Due to the complexity of human interaction, this is simply not possible.

Many researchers and law students have developed the expert systems in legal domain like AUDITOR, CABARET, DSCAS, FINDER, GREBE, IKBALS, JUDITH, LDS, LAS, LRS, PROLEXS, SAL, SARA, SHYSTER, FINDER, TAXADVISOR, TAXMAN, LEX. These systems are explained in brief in chapter 3.

Table 1.1 shows the short summary of the Legal Expert Systems developed.
Table 1.1 Summary of Legal Expert Systems

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>SYSTEM</th>
<th>DOMAIN</th>
<th>Developed At</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBR</td>
<td>AUDITOR</td>
<td>Audit</td>
<td>Champaign Urbana</td>
</tr>
<tr>
<td></td>
<td>CABARET</td>
<td>income tax law</td>
<td>(US)</td>
</tr>
<tr>
<td></td>
<td>DSCAS</td>
<td>A DSC claim</td>
<td>Colorado</td>
</tr>
<tr>
<td></td>
<td>JUDITH</td>
<td>civil law</td>
<td>Stanford</td>
</tr>
<tr>
<td></td>
<td>LDS</td>
<td>product liability cases</td>
<td></td>
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<tr>
<td></td>
<td>SAL</td>
<td>asbestos exposure</td>
<td>The Rand Corporation</td>
</tr>
<tr>
<td></td>
<td>TAXADVISOR</td>
<td>tax and estate planning</td>
<td>University of Illinois, Champaign-Urbana</td>
</tr>
<tr>
<td>CBR</td>
<td>FINDER</td>
<td>law of trover</td>
<td>Australia</td>
</tr>
<tr>
<td></td>
<td>SHYSTER</td>
<td>Copyright Act</td>
<td>Australian National University</td>
</tr>
<tr>
<td>SEMANTIC NET</td>
<td>LAS</td>
<td>intentional torts</td>
<td>MIT</td>
</tr>
<tr>
<td></td>
<td>LRS</td>
<td>negotiable instruments law</td>
<td>University of Michigan</td>
</tr>
<tr>
<td></td>
<td>LEX</td>
<td>criminal code - hit-and-run traffic violations</td>
<td>GERMANY</td>
</tr>
<tr>
<td>FRAME</td>
<td>SARA</td>
<td>discretionary norms</td>
<td>Norwegian Research Center for Computers and Law</td>
</tr>
<tr>
<td></td>
<td>TAXMAN</td>
<td>corporate tax law</td>
<td>Rutgers University.</td>
</tr>
<tr>
<td></td>
<td>GREBE</td>
<td>workers’ compensation law</td>
<td>Texas</td>
</tr>
<tr>
<td>CBR+RBR</td>
<td>IKBALS</td>
<td>credit law</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PROLEXS</td>
<td>landlord-tenant law</td>
<td>Dutch</td>
</tr>
</tbody>
</table>
1.8 NIRNAY Framework

NIRNAY is designed to help common men, lawyers and judges. It is an interactive system which interacts with the user and gives the solution to user of the system about the case. NIRNAY framework is designed to show that hybrid expert system can be developed to legal reasoning, in law domain. NIRNAY is a design and framework; it can be operated in different legal domains. It is designed to provide advice in areas of case law that have been specified by a legal expert using specially developed modules.

NIRNAY is a design and framework of knowledge based system. It uses two reasoning methods for giving the solution to the user. The methods for reasoning used are Rule Based Reasoning method and Case Based Reasoning method. The RBR reasoning produces the prediction using the rule base in the system. The RBR module runs the VIDWAN [VID] an open source inference engine. The output is displayed on the screen and stored in a file as well. The formation of rule base and reasoning is explained in detail in the following topics. The CBR reasoning produces the prediction using case based system. The previously decided cases of the Building Contract act are stored in case base. The case is represented in a frame. All the cases together form a case-base, which is stored on secondary storage device using a database. Objects are used to internally represent the frames of the case base. This file can be stored permanently and can be retrieved at the time of reasoning. The representation of case and retrieval procedure is explained in following topics.

NIRNAY uses the rule based reasoning (RBR) as one of its predictive module. RBR knowledge is basically represented in rules. The rule base uses VIDWAN¹ the inference engine (shell) to generate the legal argument. The knowledge is acquired from statute
law and represented as rules. NIRNAY framework produces its advice by examining and arguing. The RBR module is developed to check whether the contract is valid or not according to the Indian Contract Act. The law domain of RBR is Indian Contract Act, 1872 Ss 1-36. RBR module verifies the contract made between two parties. RBR module uses Resolution method, which produces proof by refutation. To prove a goal statement (i.e. contract is Valid) RBR attempts to show that the negation of the statement produces a contradiction with the known statement. Every section and subsection of Indian Contract Act, 1872 is considered when validating a particular contract.

NIRNAY is a framework for hybrid legal expert system. The application layer of NIRNAY combines the rule base reasoner and case base reasoner. RBR knowledge is basically represented in rulebase.CBR knowledge is basically represented in case-base. The knowledge of statute law is acquired and represented as rules. The knowledge of case law is acquired and represented as cases. These cases are stored in frames. This module asks the question to the user. These questions are mainly of YES-NO-Unknown type. If answer is unknown then user can specify U as answer. The parameters which are dependant are in the first part of substring and independent parameters are at second part of string.

The matching process matches exactly the dependant parameters and selects the cases from case base. These cases are now selected for further process of matching or finding the most appropriate case that is nearest – neighbor. In the second stage of matching the new case parameters are compared with the cases which are found in the first stage. The similarity measure is calculated for all the cases within the block. The case which has maximum similarity measure with the new case is selected for incorporating the decision.
The argument is considered and decision is adapted to solve the new case.

Case based reasoning uses the knowledge which is stored in case base for the reasoning purpose. This case base is mainly formed using case law. The previously decided cases and cited cases are used to form the case base. Sections Ss 73-75 of Indian Contract Act were firstly interpreted with the help of a human expert i.e. a lawyer who is practicing in the area of Contract Act. A case is actually a record or history of previous cases and stored in the case base. It is the knowledge, which comprises problem, solution and outcome. Reasoning by re-using past cases is a powerful and frequently applied way to solve problems for humans [Agnar Aamodt, Enric Plaza, 1994]. NIRNAY uses the solutions and outcomes of selected cases for forming the argument of current case. In CBR module, cases similar to the current problem are retrieved, and the best match is selected and adapted to suit the current problem. A problem solving system focuses on the construction of solutions suited to the new case by modifying previous case solutions.

NIRNAY framework produces its advice by examining, and arguing about, the similarities and differences between cases. By contrast, a rule-based expert system represents the law using rules. A hybrid system uses both rule-based and case-based techniques. NIRNAY has been designed so that it can work with a rule-based system and case-based system to form a legal hybrid expert system.

The application for which this framework has been developed relates to the determination of validity of a contract within the Indian Contract Act and the breach of building contracts. Some characteristics of Nrnay Framework which were perceived as making it a suitable project for development as an expert system are discussed below.
 DOMAIN

The NIRNAY Framework is highly domain specific in the issue of validation and breach of contract.

 OPERATION

There are ultimately only two possible outcomes from this application, where the contract can be valid and void. For this reason the application appeared to be amenable to the use of a backward chaining model, where facts can be established to prove or disprove a hypothesis of contract being Void.

 RULE-BASED

In common with other areas of law, rules may be derived from legislation and case law. In the area of Contract Act, there are statutory provisions defining the validity, and decided cases examining the issues.

 CASE-BASED

The way lawyers use the historical cases for citation, the case-base can be created to formulate the argumentation of the new case.

1.9 The Structure of this Thesis

The body of this thesis is divided into seven chapters:

 Chapter 2 presents the literature review of work done by the researcher in the area of law and expert systems. It lists the different expert systems in different areas. It discusses previous work of relevance to the development of legal analysis systems, especially legal
expert systems. The value of jurisprudence to legal expert system development is also discussed, and the adoption of a pragmatic approach is recommended. This approach holds that legal expert systems should operate at the same level of abstraction at which lawyers operate on a day-to-day basis. This chapter also provides an outline of some legal expert systems that have previously been developed. The expert systems can be classified into three main groups: the rulebased reasoning (―RBR‖), case-based reasoning (―CBR‖) and hybrid systems (using a mixture of RBR and CBR).

**Chapter 3** legal analysis focuses on the analysis of the system, sources of law and jurisprudence. It then proposes the model and methodology for the framework.

**Chapter 4** talks about the research methodology used for the research, aims and objectives of the study. The proper methodology delivers the output. This chapter explains the eight major steps of the construction of expert system. The prime aim of the research is to propose the framework for Hybrid Intelligent System which will work in the legal domain. The hybrid system can be built by combing two different approaches of Expert System. The Rule Based System and Case Based Systems can be combined to build the Hybrid Intelligent System. The different objectives were developing the NIRNAY system to demonstrate that the approach to propose framework is right and works properly in legal domain. It also aims to show that the legal area can be an area of research where researches can propose the different models for giving good advice.

**Chapter 5** presents the detailed development of Nrnay Framework. It also talks about the practical approach, which is proposed for developing legal expert systems. It incorporates a simple model of legal reasoning, and uses Rules and Frames for knowledge representation structure. The design of NIRNAY is detailed, and testing and
evaluation of the system are discussed. Rule Based Reasoning (RBR) module of NIRNAY is discussed in detail. The implementation of RBR module is explained in this chapter. Case Based Reasoning (CBR) module of NIRNAY is discussed in detail. The CBR module is described, and demonstrated using examples.

Chapter 6 presents the conclusion of the research. It talks about the aim and objectives which are set before starting the research to be achieved. Conclusions are drawn about NIRNAY and its approach to case law.

Chapter 7 lists down the Limitations of the research. It talks about the limitations in the pragmatic approach of the NIRNAY. The case law is an area which is uncertain and the nature of defending the cases is different and opposite. This chapter also gives the suggestions to the researchers, who want to work in the area of Expert System and the domain of law. Some enhancements to NIRNAY are suggested, and avenues of future research are identified. Finally, the nature of the contribution made by this thesis is discussed.

There are two appendices to this thesis. Appendix A contains screenshots A complete statute of Indian Contract Act 1872 is given in appendix B.
1.10 Flow Graph

Flow graph of the thesis is given in the following diagram figure no. 1.1

Figure No. 1.1: Flow graph of the thesis
1.11 Summary

This chapter gives a glimpse of motivation, aim and various objectives of the present research study, it also states the impact and the deliverables of the study. The research methodology is listed along with the brief information of NIRNAY framework. The flow of the chapterisation of the thesis is mentioned.

Due to lack of legal aid, lots of cases are pending in courts. The rate of cases filed is more than the cases solved every day. Study is carried out to assist the legal process and to get faster result of their cases in reduced time and cost. The present research work delivers

i. The framework of an intelligent system to achieve the above aim and objectives. The framework is named as NIRNAY framework.

ii. The methodology to develop hybrid expert systems in legal domain.