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AUTHOR Muntjewerff, Antoinette J.
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ABSTRACT

An examination of Dutch research on legal case solving revealed that few law students get systematic instruction or testing in the technique of legal problem solving. The research being conducted at the Department of Computer Science and Law at the University of Amsterdam focuses on identifying the different functions in legal reasoning tasks in order to develop computational models which realize these functions. The major assumptions of the theory are: (1) in artificial legal reasoning, a separation should be made between reasoning about events in the world and reasoning about legal consequences; and (2) the "real" legal reasoning (when no reasoning about the world is conceived) should be viewed as a process of rule application and conflict resolution, rather than drawing logical inferences. The consequences of these assumptions for knowledge representation are, that in representing regulation knowledge, knowledge about the actions, agents, and objects should be separated from the representation of the regulation. In an intelligent tutoring system (ITS), the system and the student perform the task simultaneously; the way the system reasons has to be functional for educational purposes. The domain under study is administrative procedural law. The main educational goal of a student solving a case is to learn to handle the theoretical concepts in a specific field of law, to learn to find and apply the specific body of norms, to learn to plan the courses of action and to learn to construct a solution which is legally correct. A conceptual model of assessment, a typical task in the domain of law, is under development as part of the library of interpretation models; an interpretation model is an abstract conceptual model of a set of problem solving methods in terms of inference steps. The model can be used in the process of acquiring knowledge for building artificial legal problem solvers. (AEF)

Towards automated training of legal problem solving

Antoinette J. Muntjewerff
Department of ComputerScience and Law
Faculty of Law, University of Amsterdam
Kloveniersburgwal 72, 1012 CZ Amsterdam, The Netherlands
e-mail antoi@lri.jur.uva.nl

Abstract: The motivation to study legal problem solving originates from observations in Dutch legal education. Consultation of Dutch research on legal case solving confirmed the assumption that, in using cases in legal education, a method, or explicit strategy, is lacking. However the methods proposed in the research by Crombag, de Wijkerslooth, & Cohen (1977) and Abas & Broekers-Knol (1985) contain some important shortcomings. Research on artificial legal problem solving as proposed and performed by my department is the starting point for the study of automated training of legal problem solving. The domain under study is administrative procedural law. To be able to train students in legal problem solving a thorough analysis should be made of the task involved and the knowledge necessary for accomplishing the task. Because of the fact that training is involved a teachable model has to be constructed.

General description and motivation of the research

If you ask experienced practitioners how they learned to tackle legal problems and to find the appropriate set of norms, the chances are that they will say 'trial and error', 'hit and miss' or similar vague expressions. It is possible that they never actually 'learned' it at all, in the sense of being taught. Few law students get systematic instruction or testing in the technique of legal problem solving. This observation was the starting point of research done in the Netherlands by Crombag, de Wijkerslooth, & van Tuyll van Serooskerken (1972) and Crombag, de Wijkerslooth, & Cohen (1977). They were confronted with the situation that there was no explicit strategy or method for teaching students legal problem solving. The problem solving process of legal practitioners (in this case judges in the field of civil law) was studied. Thinking aloud protocols were gathered and a rational reconstruction of the problem solving process was performed. The idea behind this approach was that the constructed strategy could be used for instructing students on how to solve legal problems. The constructed strategy consists of a series of steps to be taken by the student in the course of solving a legal problem. The strategy was adapted by Abas & Broekers-Knol (1985) and reconstructed into a smaller series of steps. These methods were constructed for use in legal education, not for implementation in a Computer Assisted Instructional (CAI) program or an Intelligent Tutoring System (ITS). This research and my own experiences in legal education lead to the confirmation that legal education is in need of a way to instruct students explicitly in how to solve a case and to provide an opportunity for students to get skilled in solving legal cases. Because there is no time in the official curriculum for training students in this skill, an automated tool could be of use to train students in legal problem solving. However, the problem with the developed problem solving strategies is that they only consist of a series of steps to take

by the problem solver (in this case the student). For a method or strategy to be teachable in an artificial problem solver certain requirements are necessary. First of all the method needs to have a kind of rationale, a justification of what kind of problems can be solved using this method. Next to that it must be clear what kind of products come out of an intermediate step in the process. Every step in the problem solving process, every action, has to have an outcome. These outcomes must be specified in order to provide coaching. Furthermore there has to be a relation between the strategy and the knowledge needed to perform the problem solving task. Law students learn about legal concepts in statutes and doctrine, but they do not know how to apply this knowledge to proceed from a specific legal case to an analysis of the problem and an assessment of the situation according to a specific body of norms. Students do not know how to apply their knowledge to a specific case, i.e. how to make the step from support knowledge to operational knowledge. They have to learn to select and qualify facts from a specific situation in legal terms/concepts and link those terms/concepts to rules. There is however a lack of strategy which can give support in the problem solving process. There is no method which tells the students how to proceed, even worse, it is not clear to the student what is expected of her. Students need to gain insight in the task involved, in the knowledge needed to perform the task and in the method or course of actions to take to accomplish the task. Empirical studies with law students solving an administrative law problem show that students do not have a task structure other than a kind of trial and error approach (Muntjewerff, 1993). Research on artificial legal problem solving as performed at my department is the starting point of my research. This research provides a new way to approach legal problem solving and to think about the tasks involved and the knowledge and methods needed for teaching legal problem solving.

Artificial legal problem solving

The research carried out by the department of Computer Science and Law focuses on representation of legal knowledge and on modelling legal problem solving tasks. The research aims at constructing a theory on legal reasoning. The theory is not a psychological theory. The process of legal reasoning of the legal practitioner is not the focus of the research. The focus is on constructing a theory of legal problem solving/legal reasoning, like the approach in (modern) legal theory. The theory under construction is about *artificial* legal reasoning. The research is on identifying the different (abstract) functions in legal reasoning tasks and to develop computational models which realise these functions. In research on artificial legal problem solving the models of knowledge representation can be tested by implementing these in a system. Research focuses on the abstract functions involved in many legal reasoning tasks and on architectures which support these functions. The major assumptions of the theory under construction are :

- In artificial legal reasoning a separation should be made between reasoning about events in the world and reasoning about legal consequences of states in the world.
- The "real" legal reasoning (when no reasoning about the world is concerned) should be viewed as a process of rule application and conflict resolution, rather than drawing logical inferences.

The consequences of these assumptions for knowledge representation are, that in representing regulation knowledge, knowledge about the actions, agents and objects (in the world ruled by the regulation) should be separated from the representation of the regulation. The architecture derived from this view gives the specifications of functions and structure of a legal practitioners workbench to be. The architecture can be enhanced to support various types of tasks of legal practitioners. For example giving advice in cases requires an extension in communication functions which can transform a story into a legally relevant situation description and in planning facilities to optimise legal courses of action (Breuker, 1990; Breuker & den Haan, 1991). The proposed architecture can be enhanced to support the task of training students in a variety of legal tasks (drafting legislation, planning courses of action, argumentation, advice).

Training by means of an Intelligent Tutoring System (ITS)

An ITS is a knowledge based system in which the major function is to coach novices in acquiring expertise in some domain of problem solving. An ITS accomplishes this function by 'looking over the shoulder' of the student who solves a problem presented by the system. The ITS monitors the students problem solving behaviour and compares this with the systems own knowledge about the domain. This means that both the student and the ITS perform the same (sub)task at the same time. When there is a discrepancy between the performance of the system and the performance of the student this is diagnosed in terms of misconceptions or a lack of knowledge at the side of the student. The ITS expertise is the standard. The outcome of the diagnoses triggers a related remedy to correct the misconception or lack of knowledge. To be able to perform the problem solving task an ITS has to embody an expertise component just like a knowledge based system (KBS). However the requirements for expertise to be taught demand more from the model. The way the knowledge is structured should be different and the reasoning process has to be more transparent.

Given the proposed theory on artificial legal reasoning and the consequences the assumptions have on knowledge representation and computational logic, and given the proposed architecture what extensions, refinements or adaptations need to be made when the function of a system is training law students legal problem solving? When the system performs legal reasoning on a task the way proposed in Breuker (1990) and Breuker & den Haan (1991) what kind of adjustments have to be made in order to be able to train legal problem solving to students? In an ITS the system and the student perform on the task at hand at the same time. The way the system reasons, goes about the task and solves the problem, has to be functional for educational purposes. Research on developing a training system for diagnosis in physiotherapy shows that the domain knowledge of an ITS needs to be more explicit and deep (Winkels, 1992). Next to that a model of expertise, constructed in the knowledge acquisition phase of a project, is a descriptive model. The teachability of the strategy however implies a prescriptive strategy, an explicit strategy for solving legal cases that can be learned and executed by students.

The domain of administrative procedural law

The domain under study is the domain of administrative procedural law. The legal sources involved are the General Administrative Law (in dutch de Algemene Wet Bestuursrecht, AWB), case law and other legal texts. In administrative law a set of instruments is provided for local and governmental authorities to accomplish certain objectives. Next to that administrative law provides guarantees for citizens. Public nature and participation are guarantees proceeding a decision of an authority, legal protection is a guarantee afterwards. At the request of one or more citizens, a more or less independent authority checks if the administration follows or followed the rules. In a conflict between a local or governmental authority and a citizen there has to be a judgement by an independent court. However before a conflict reaches the court the administration itself may be asked to give an opinion on the attacked decision of the administration. Generally speaking there are two courses of action for a party concerned :

- to start administrative appeal. This means that a decision taken by an administration will be tested by an other administration (most of the time higher in the hierarchy) on request of a party concerned.
- to make objections. The administrational body which has taken the decision will reconsider the case on request of the party concerned.

In both cases there is no independent court involved, but even so this is also called legal protection. The body or bodies of authority which have to test or reconsider the decisions taken are obligatorily stated in the law. The system is quite complicated. The legislator has stated different factors which determine which procedure has to be followed.

These factors concern the nature of the disputed actions of the authority, the field in which the

disputed action was taken, the quality of the party concerned, the type of administration that has taken the decision. In the new General Administrative Law (AWB) the procedure of making objections (and ask the administration to reconsider the decision) is a pre-procedure for admission to the court. The recent reorganisation of the courts in the Netherlands has provided new administrative colleges in the law courts. Solving problems in the domain of administrative procedural law involves planning and assessment. Because the exchange of documents between the parties involved plays an important role in the administrative procedure, students need to learn to assess the form and content of the documents involved, need to learn to act and react in the procedure, need to learn to construct the necessary documents and need to learn to plan the course of action. In doing so they need to learn to take the standpoint of the official body as well as the standpoint of the citizen(s).

A case description

A legal case, as used in Dutch legal education, is a written description (a kind of restricted story) of a (potential) problem situation in which some facts and events are mentioned. A link with a certain field of law is already made. A case description is about a half page to a page long and ends with a question which restricts the problem situation and the possible solutions to the problem (the question sets the direction and puts the student on a certain track). The main educational goal of solving a case is (for a student) to learn to handle the theoretical concepts in a specific field of law, to learn to find and apply the specific body of norms, to learn to plan the courses of action and to learn to construct a solution which is legally correct. Administrative law experts and students from the faculty of Law at the University of Amsterdam were engaged in solving the problem below. The thinking aloud protocols gathered in this experiment will be used for (re)constructing the model for teaching legal problem solving. The student protocols will be used for detecting misconceptions and lacks of knowledge.

> Mayor and aldermen of Maastricht decided by degree of 30 July 1981, to grant permission to the Bowl corporation in Maastricht, under clause 56 of the Housing Act, to use the house at Looiersgracht number 12 as an office. This is under the condition that the corporation makes suitable for residence (for one and two person households) the office at Looiersgracht number 8 which is in ownership of the Bowl corporation. The Provincial Corporation for Mental Health in Limburg which has an office at Looiersgracht number 8 is very much opposed to the decision of the Mayor and aldermen.
>
> What actions can they take and at which moment?

Domain representation and task model

A teachable model for legal problem solving has to be constructed and decisions on how to teach this model to law students have to be made. A rational reconstruction of the domain knowledge and problem solving strategies are necessary because there is no suitable approach neither in instructional material or in practice. Experts solving problems have an approach which is not suitable for teaching (according to a first analysis made of thinking aloud protocols of experts in the field of administrative law, solving an administrative law problem). An analysis of the types and structures of the domain knowledge is needed. Besides that, an interpretation model from the KADS library of interpretation models is a starting point for modelling the task and the inferences. Regulations consist of abstract norms and definitions. There are also regulations which define authority. Procedural law contains definitions, procedures and courses of action and divides tasks and plans over time. To construct a model of the world actions, objects and agents are distinguished and hierarchies of types are constructed. These typologies are used in reasoning (denHaan & Breuker, 1991) To model the world of administrative procedural law type hierarchies and consist-of relations are constructed

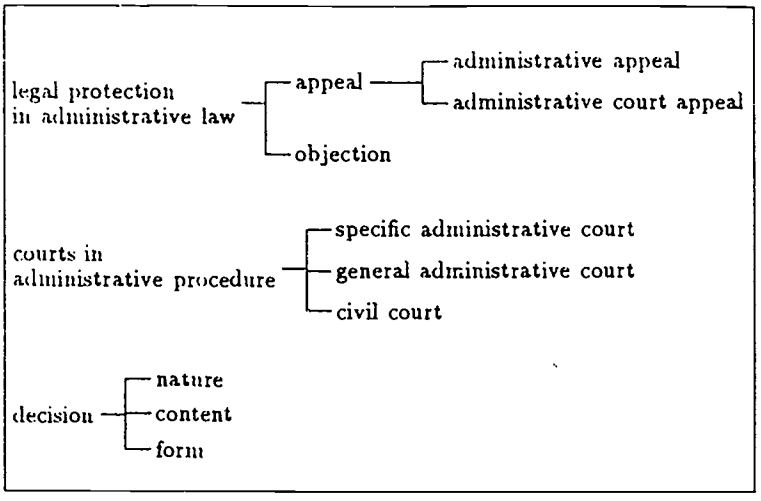

Figure 1: Examples of tree structures in the domain of Administrative procedural law

A most typical task in the domain of law is assessment. A case (situation, events) has to be assessed according to a body of norms. Less frequently occurring tasks are drafting of regulations (a design task) or finding courses of action (a planning task). But even then assessment is implied. For example in administrative law different kinds of documents play a role. First of all a request is made to an authority for a permit. Then a decision is made by the authority. There is a possibility of objecting against the decision. For the party directly involved as well as for a third party concerned. They have to write a complaint and send it to the official body. There is a lot of interaction going on on paper, documents are exchanged, a file grows. This exchange of documents plays an important role in the administrative process. You have to be in time for the right document and write the right kind of objections to be able to proceed. In the process of action and reaction a case is build so to speak. Depending on the state of the documents and the position in the process a certain kind of problem may arise (so a specific case is build) which requires a solution in the form of a decision. In this procedure planning as well as assessment is involved. A conceptual model of assessment is under development in the CommonKADS project as part of the library of interpretation models (Aamodt et al, 1992). An interpretation model is an abstract conceptual model of a set of problem solving methods in terms of inference steps. This model can be used in the process of acquiring knowledge for building artificial legal problem solvers. Assessment tasks are characterized by the fact that a description of a case (situation, events) has to be compared (has to be applied) to norms in order to reach a decision. The task of assessment consists of two subtasks. Case abstraction and norm application. In case abstraction a case description is translated into abstract terms, the relevant items are selected and abstracted. A case description is a structure of events or situations. The abstraction is in most cases identification or classification of instances as concepts. The inference that has to take place is abstraction/transformation. An event or situation in the world has to be abstracted (to be able to compare it to a norm, norms are stated in abstract terms) and/or transformed (to a legally relevant concept, event or situation).

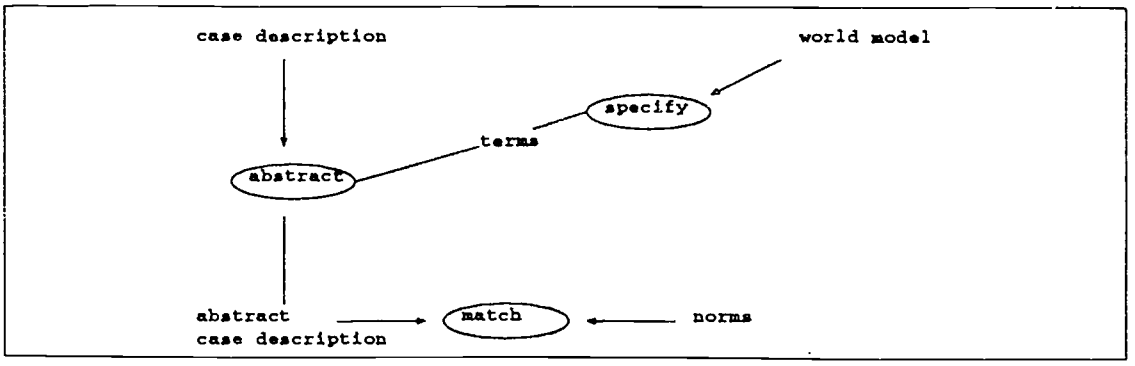

Figure 2: *Legal assessment*

Summary

A repre ntation of the domain knowledge, especially representing the world in which the regulations play a role, has to be performed. The function of the prospective system is education, this means that the knowledge should be structured in a way suitable for teaching and learning. The tasks involved should be modelled. The assessment model could be a starting point to model the task of solving administrative law problems. Thinking aloud protocols of experts in the field of administrative law and of students of the law faculty will be used in this modelling process.

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