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ROSA
A MODEL-BASED COMPUTER SYSTEM FOR TEACHING LEGAL-CASE SOLVING

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Abstract

This research aims at providing a solution for problems experienced by law students when solving legal cases. We propose a computer coach for training legal-case solving, the ROSA system. The basis for ROSA is an explicit, teachable and learnable model of legal-case solving, executable by machines and by humans.

In this paper the construction of the model for teaching and learning legal-case solving is described and the tracer, a tool to support the information management during the case-solving process, is introduced.

1 Legal-case solving

Legal cases are frequently used in legal education for teaching law students how to apply law to a specific situation. For this purpose legal cases (either hypothetical or based on real cases) are used as examples and as problem situations to be solved by a student when learning legal problem solving. Cases are also used in preliminary examinations as problems that need to be solved by the student. A legal case contains a description of a situation and a legal question. In the situation description, the specific facts and events are supplied. The case needs to be solved on the basis of the (sometimes hidden) legal question(s). The situation description may vary from a short case to cases of one page or more. The question(s) in between or at the end restrict both the problem situation and the possible range of solutions. The question may indicate a direction to the relation and may put the student on a reasoning track.

The case is constructed from a legal dogmatic point of view; cases are formulated with the dogmatic means of solving in mind. The cases used in major subjects as civil law, criminal law, constitutional law and administrative law are closed regarding the content, that is, the problem is presented in a specific area of law and the solution has to be found within that area. Moreover, the student has to look for a solution that is acceptable within the legal system (to look, for instance, at the consequences for society is not the issue).

There is a correct solution; sometimes there are two or more solutions possible. An example case is given in Figure 1.

2 Problems with legal-case solving

Law students experience difficulties when solving cases. To find the causes of these difficulties literature on legal-case solving was studied, a law teacher, legal experts and students were interviewed and an empirical study on legal-case solving was carried out (Muntjewerff, 1993).

Crombag *et al.* (1972, 1977) emphasise that the lack of a method for teaching and learning case solving is the main cause of the problems experienced by law students solving legal cases. The interviews and the empirical study confirm this. The experts - and even the teacher - did not have an explicit method for solving cases, and neither had the students. For the experts this is no problem, since they can rely on their implicit

The commencement of proceedings according to the Dutch General Administrative Law Act[1]

The municipality X has serious parking problems with trucks causing nuisance. The relatively narrow streets house many drivers who park their trucks in these streets especially during week-ends and at night. The trucks cause many dangerous situations and are the source of complaints about noise and impediment of view. The residents of the houses in the streets where the trucks are parked are annoyed and decide to take action. They collectively write a letter (dated April 1, 1994) to the Mayor and Aldermen of X. They ask them to take suitable measures. Mayor and Aldermen answer by sending a notice in which they acknowledge receipt, state that the request is dealt with and that the residents will be informed as soon as possible. After three months the residents still did not receive an answer; they repeat their request in a letter dated July 1, 1994. On July 14, 1994 Mayor and Aldermen write that they will take a series of measures. Some of the streets where the trucks have no business are provided with a long-time parking prohibition for trucks. This calls for a parking excess regulation. Such a regulation however can only be established by the city-council. The letter of the Mayor and Aldermen also comes to the attention of the truck drivers. They are strongly opposed to the proposed measures. The truck drivers decide to take action. The removal firm Jansen also decides to take action. One of the truck drivers leaves it to her employer to take action. On August 15, 1994 the city-council draws up a parking excess regulation. This regulation is put into operation on October 1, 1994. The core provision of the regulation is article 2:
"It is prohibited to put a truck on any of the spots marked on the enclosed map. Mayor and Aldermen may provide exemptions."
Article 3 reads: "Mayor and Aldermen may establish specific rules."

1. What actions can be taken by the truck drivers and by the removal firm Jansen against the letter of the Mayor and Aldermen dated July 14, 1994?

Figure 1: An example case

strategies and heuristics, but for the students this poses a serious problem. They loose track of the problem solving process, will forget or oversee possibilities and jump to conclusions in order to cope with their task (see also below). These are typical novice behaviours when confronted with a complex task and no systematic method for tackling it (e.g., Winkels, 1992). Managing the information during the problem-solving process may be even more problematic for students solving legal cases, due to the fact that regulations are difficult to read, comprehend and apply because of their internal structure. Many articles within regulations should be read in interrelation; it is possible that a combination of articles should be used to find a solution. These articles may be found within the same regulation or in other regulations. References to other articles can be explicit, e.g. by using article numbers and act names, or implicit, by using terms which are defined elsewhere.

Furthermore, regulations can be complicated by 'exception structures'. First the standard situation is mentioned, followed by the exceptions for which the regulation does not apply (sometimes followed by an exception to this exception that makes the regulation applicable for that situation).

When legal practitioners solve an actual problem they do not consult the regulations exhaustively. They already understand the role of each regulation and have the structures of codes, laws and articles organised in the back of their head. Having a structure in mind makes it possible to select a proper procedure after recognising the situation provided in the case. A structure may clarify making references while reading codes, acts and articles. This structured approach is exactly what students are not yet able to do and therefore have to learn.

[1] Case from material of a post graduate course on new administrative law February-March 1995, presented by lecturers of the Departments of administrative law of the University of Amsterdam and the Free University of Amsterdam. The Dutch General Administrative Law Act is operational since January 1, 1994 (Algemene wet bestuursrecht, Awb).

Crombag *et al.* (1972, 1977) also stress that the cases used in teaching are not very realistic and that the way cases are used in legal education leaves out a number of issues that are important for students to learn. Issues as the search for facts, the assessment of facts, the balancing of alternatives, the construction of a plan to proceed and a written elaboration of the plan chosen. We think this is partly due to the lack of design principles for cases, which in turn is related to the lack of an explicit teachable and learnable method.

3 Related research

Crombag *et al.* (1972, 1977) propose the construction of a method for legal-case solving to be used in legal education to instruct students how to solve a legal case.[2] This method consists of a series of steps to be taken by the problem solver. The main steps are:

1. schematise the case;
2. determine main problem;
3. translate claim;
4. select legal rules that apply to the legal situation;
5. determine the conditions under which the claim is awarded;
6. apply rule;
7. determine consequences;
8. determine if the result is acceptable;
9. formulate result.

Although the method provides an inspiring starting point, the main problem with this method is that it does not make explicit what knowledge has to be used in taking a step and performing a step and how the knowledge should be used. It also remains implicit what the result of each specific step should be. Another problem is that the steps are too general and therefore the instruction that can be given is limited to statements as " you forgot to take that step", or " take the next step".

Scholten (1974) describes the task of determining law in a specific situation as the activity of legal practitioners that implies knowledge of the facts and knowledge of the rules. Knowing the facts and the rules, the rules can be applied to the facts. However, the rules are not always immediately available within the regulations. Especially Scholten emphasised the difference between a regulation and a rule. Open norms and the fact that different, conflicting regulations may be applicable make that rules are not always available, but need to be constructed. Interpretation methods and reasoning techniques are needed to be able to construct the rule from the regulations, before the rule can be applied to the facts. Scholten describes a series of methods and techniques for constructing a rule before rule application.

Fernhout *et al.* (1987) describe the construction of a computer simulation to learn students to gather the relevant facts. Referring to Crombag *et al.* (1972, 1977) they stress that this aspect is of major importance in legal practice and therefore should be part of teaching legal problem solving. The simulation covers the selection of relevant facts from a situation description. However, it does not provide the students with an explicit model of this task. Also the relation to the knowledge needed to perform the task remains implicit. Therefore the instruction remains rather shallow.

[2] The problem-solving process of legal practitioners (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. Crombag *et al.* (1977) proposed a theory of decision making by judges. The way this process was modelled was the point of departure for constructing a method to be used in legal education. The method described by Abas and Broekers-Knol (1985) is mainly based on Crombag *et al.* (1977).

Span (1992) developed an intelligent tutoring system with a representation of the knowledge of the legal doctrine it teaches.[3] The system, LITES, covers information gathering, solving the problem, and constructing an argumentation. The goal of the system is to learn students how to construct an argumentation in the specific doctrine it contains. The system does not teach an explicit model of how to solve legal cases in general and the task of legal-case solving remains, again, implicit.

Aleven and Ashley (1993) propose the construction of a tutorial program CATO. The goal of the system is to teach a legal reasoning process to beginners in such a way that students will become aware of the existence of argumentative strategies and criteria to help them to construct better arguments. Besides the fact that this proposed system is heavily based on case law, the main issue is to teach students to argue with cases. This is a different task compared to legal-case solving.

4 ROSA: a model-based computer coach for training legal-case solving

We propose a coaching system for legal-case solving. In a coaching system, such as ROSA, both the system and the student solve the case at hand. The system monitors the process and compares the solution of the student with that of the system. If there are discrepancies between the solution of the system and the solution of the student, the system will diagnose the cause of these discrepancies. Based on the cause a remedy is offered by the coach to the student by way of a hint, an explanation or some help, referring to subtasks and knowledge.

For coaching, however, an explicit model of the task to teach and learn is needed. Such a model appears not to be present in legal practice and literature. Therefore it needs to be constructed. The model should make explicit what the task of legal-case solving consists of, what knowledge is needed to be able to perform the task and how the knowledge should be used to accomplish the task. In that way instruction can be given about the task: *what* to do next, *how* to do it, and possibly even *why*.

The domain chosen to test the system is the domain of administrative procedural law.

4.1 Model construction

A model of legal-case solving is constructed with three major requirements in mind. The model should be teachable, learnable and executable for both humans and machines.

In model construction we follow a general framework used in research on coaching (Winkels, 1992). The model construction is both top-down and bottom-up. In a top-down fashion theoretical models of problem solving and of teaching-and-learning behaviour are used or constructed to interpret the empirical data. Empirical studies are carried out to gather data in a bottom-up fashion on these types of behaviour and to validate the theoretical model.

Contrary to typical experimental research, conflicts between the models and the empirical data do not necessarily lead to rejection of the theory or model. If the observed behaviour is deemed unsuitable or undesirable for teaching purposes, the theory prevails. In this sense the theoretical models are prescriptive for, rather than descriptive of, human problem solving and human teaching.

Normative assessment

The initial model for legal-case solving comes from research on typical problem-solving tasks as described in the library of interpretation models of the (Common)KADS methodology for building knowledge-based systems (Schreiber *et al*., 1993). The main tasks in legal-case solving appear to be assessment and planning.

[3] Article 3:86 Dutch civil code (3:86 BW) acquisition through an incompetent party and protection of third parties who are in good faith.

Valente (1995) developed a model for normative assessment. The model shows the sequence of subtasks or inferences, the resulting data and the knowledge needed and used to perform the subtasks or inferences (see Figure 2). The initial case description is first restructured, to collect information that belongs together. Next, the case is abstracted in

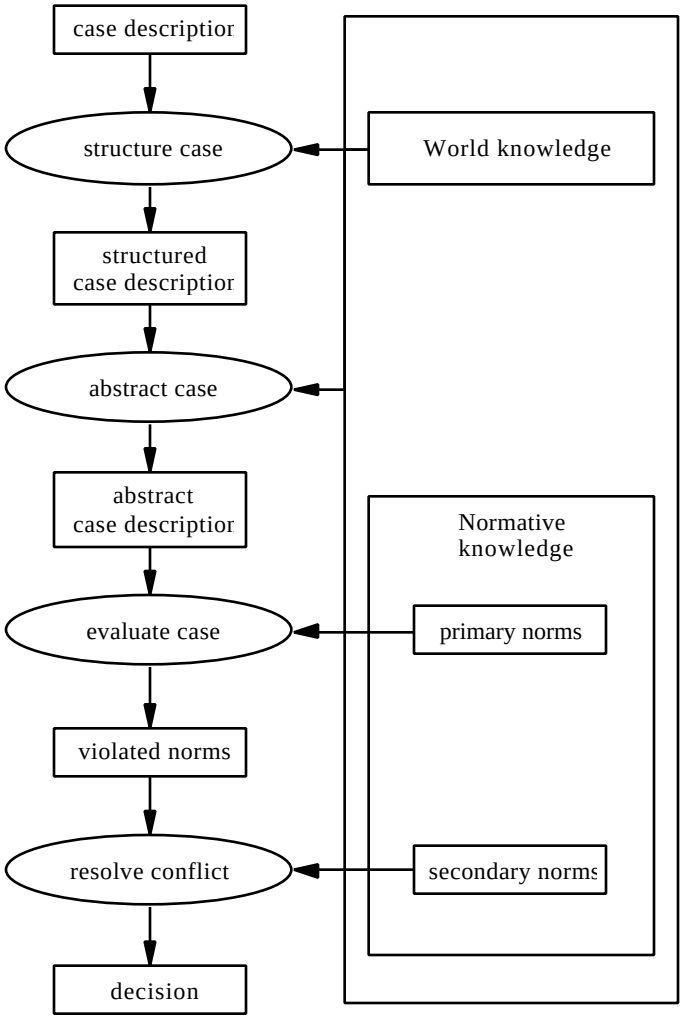

Figure 2: Model for normative assessment[4]

terms of the regulations (see below for examples). Now the norms as specified in the regulation can directly be applied to the abstracted case. Norms may qualify the case as " legal", " illegal" or may be " silent" about the case (Valente, 1995). When more than one norm applies to the case, conflicts may arise. These have to be resolved using secondary norms.

[4] The rectangles denote data, the ellipses denote subtasks or inferences.

This model is used as a starting point to construct a teachable and learnable model that can be executed not only by machines but by humans as well, and especially by novices.

Refining the model

The empirical findings and the notions from literature on legal-case solving are used to extend and refine the model for legal assessment.

In the empirical research stream we had both legal experts and law students solve cases in administrative procedural law, while thinking aloud. The thinking-aloud protocols of the experts are used to try to understand the experts strategies. Analysis of these protocols confirmed that their reasoning is mostly associative and heuristic in nature and that they do not really have a strategy, at least not a methodical one. Novices, however, do need a desired course of action or a prescriptive model for the specific task to help them. The thinking-aloud protocols of law students solving administrative law cases also show that students do not have all required support knowledge to perform the task, that they have a strong tendency to jump to conclusions and that they do not have a task structure other than a kind of trial and error approach (Muntjewerff, 1993).

Notions from literature (Crombag, 1972, 1977; Scholten, 1974) indicate that the model of normative assessment needs to be extended with (sub)tasks as, for instance, (re)constructing the original case that is input to the assessment task, assessing the facts, abstracting the specific legal question, selecting a regulation set, constructing an argument and planning a course of action. Furthermore, the way in which some of the subtasks or inferences in the assessment model are performed by a machine is not suitable for humans. A machine can try to apply all rules to a case and see which ones succeed, a human will (have to) perform this in a more structured way, e.g. by first selecting some part of the regulation and see which rules within that part apply. The same is the case with the way in which a machine may handle conflict resolution. In Valente's assessment model (Valente, 1995), the conflict resolution occurs after all applicable rules have "fired". Humans may need to resolve some conflicts during the process in order to manage their search space.

The fact that there is a continuous interaction between the selection of the facts on the basis of the regulations, and the selection of the regulations based on the selection of the facts, should also be taken into account when dealing with the *control* over the subtasks. In solving a case, a student is confronted with the description of the facts and events and the legal question(s). The student needs to structure the case and to identify and classify the objects and events in terms of the legal provisions, as well as to abstract the legal question to find out which regulations need to be selected. During the task performance, knowledge about the facts and the rules has to be selected, constructed, and applied.

The distinction between the identification of the facts and the selection of regulations, and the construction and application of the rule refers to different kinds of knowledge (Breuker, 1991; Valente, 1995). A model of the domain in which the distinction between kinds of knowledge is managed may offer support during task performance. Given the domain of the General Administrative Law Act the domain model consists of a separation between the knowledge of the objects and events in the world governed by the regulation (a world populated by administrative bodies and parties concerned, a world in which decrees play an important role) and the legal provisions from the General Administrative Law Act and related regulations. The representation of the world knowledge as described in the domain model supports the identification and classification of facts from the situation description.

For example, the student needs to identify and classify what kind of thing a letter of the Mayor and Aldermen is in relation to the applicable provisions. Is the letter an act? What kind of act, a legal act or a factual act? The student also needs to identify what kind of body the Mayor and Aldermen is, also in relation to the selected provisions. Is Mayor

and Aldermen a body of the administration? On the basis of this identification and classification, more specific provisions may be selected.

Before the rules can be applied to the abstracted situation they first have to be constructed (Scholten, 1974). In the rule-construction part the existence of open norms and the situation that a set of (conflicting) articles may be applicable at the same time are handled. This has to result in an abstract situation description on the one hand and a set of applicable rules on the other. The rules can then be applied to the abstract facts.

4.2 Managing Information

Part of ROSA, the tracer, is a tool that makes regulation structures explicit, visualises references and keeps track of these references by making a graph. Legislation will be presented to the student by way of hyper links. References to and by concepts, definitions, intermediate articles and provisions and explicitly named articles that refer to other codes, acts, chapters, titles, parts and/or paragraphs and articles are made explicit. The tracer also represents the content of the concepts and articles. Given the first question in a case the student may select for example the following regulation

Art. 8:1 -1. A party concerned may appeal a decree at the district court.

On the basis of this regulation the student has to identify if there is a party concerned in the described situation and hence the student may select

Art. 1:2 -1. A party concerned is: someone whose interest is immediately involved in a decree.

This may result in the need to determine if, in this specific case, there is an immediately involved interest as well as a decree, and the student may select

Art. 1:3 -1. A decree is: a written decision of a body of the administration containing a public legal act.

Now the student has to determine, if in this case, there is a body of the administration involved and if there is a written decision containing a public legal act. Hence, the student may select

Art. 1:1 -1. A body of the administration is:
a. a body of a legal person established by public law, or
b. another person or council invested with public authority.

The tracer monitors the search trace of the student and offers the opportunity to have a look at the content of definitions of concepts and articles (see Figure 3).

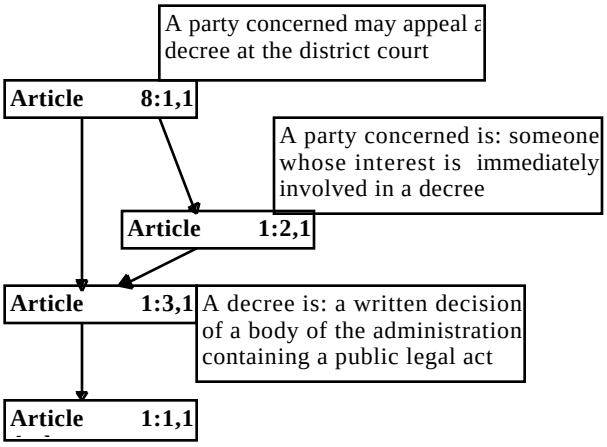

Figure 3: Example of a trace in the tracer

5 Conclusions and future research

The results thus far are an initial, explicit model for legal-case solving that can be used for teaching and learning. The model is further supported by a tracer to help managing all information during the problem-solving process. The model should be executable for both humans and machines. This needs to be tested in ROSA. The model also needs to be extended to incorporate the first and last phase of the legal-case-solving process: gathering the facts and constructing the initial case description, and building an argument to support the conclusion.

An aspect within the domain of administrative procedural law that needs further investigation is the fact that planning (over time) is important.

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