Adaptive feedback for legal E-Learning

Michael Sonntag, Alexandros Paramythis

Johannes Kepler University Linz

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Abstract:

E-Learning is already actively applied in legal studies, with the acknowledged resulting shortcoming of lack of interactivity and feedback (e.g. in the common use of lectures on DVDs). Even when multidirectional tools (such as discussion forums, video conferences) are used, typically communication occurs between the teacher and a multitude of learners, but not amongst learners themselves. As a result, individualized tutoring and group-work between learners become difficult. This paper presents an adaptive generator of exemplary legal cases that aims to address both of these aspects, i.e., provide individualised feedback and foster collaborative group learning.

1 Introduction

Blended E-Learning has achieved large strides in recent years [3], but has thus far failed to address the negative effects of reduced face-to-face contact especially between learners. A large part of the success of the learning process lies with the opportunities of learners to interact with others: through group work, exchanging ideas, and helping each other, thereby learning themselves. With limited personal contact, learners receive little individualized feedback and cannot really formulate mental models of their own and other learners', skills, interests, disposition towards teamwork, knowledge, learning progress etc.
Adaptivity is an approach to achieve individualization in computer-supported education [4]. In this context, adaptivity refers to the capacity of intelligent systems to dynamically tailor content and behaviour to individual users' needs. Several systems employing adaptivity to facilitate different learning aspects exist (e.g., Interbook [1], AHA! [2]). However, it can be argued that current approaches often reflect a „teaching" perspective: material delivery is primary. In the legal area this resembles lectures teaching substantive law. Few efforts exist yet towards the „learning" perspective: modelling, guiding, or supporting group communication activities where learners engage before, during, and after „consuming" the learning material. This latter approach resembles learning laws by reading and discussing precedent cases.
The work reported herein addresses the problem of limited individualized contact between learners and teacher through the development of a generator for legal exemplary cases according to the model of problem-solving learning, while intensifying contact between learners is addressed through mutual computer-supported assessment by peers.

2 Legal case generator

This paper reports on a generator for legal cases, which adaptively composes content (a case and its solution) from several small individual elements (text fragments). A part of legal learning is solving cases on your own or in cooperation with other learners followed by a comparison with an exemplary solution and its discussion. As cases are a lot of work to create, currently only few are designed and posed as a problem to all learners alike. When every student receives a different case, dynamically tailored to specific previous mistakes, feedback is personal. Communication becomes more difficult (different cases), but simultaneously more likely regarding common elements, basic strategies for solving, or disagreements with the exemplary solution or the assessment of the own solution.

Creating legal cases automatically has two main problem areas: (a) the automatic derivation of the final outcome, and (b) the generation of cases that are possible both factually and legally. To reduce the first issue this generator is restricted in its scope: It produces only cases containing material problems related to the Uniform Domain-Name Dispute-Resolution Policy (UDRP) [3] (mark holder vs. registrants of an identical / similar domain name). This area is of large practical importance and requires exposing learners to a multitude of examples. These cannot be real cases as these often include aberrant decisions (with strong variations in quality as there is no appeal / upper instance) and individualized selection based on learners' knowledge would be extremely difficult.

The generator creates cases by assembling small „template" text fragments, classified according to an ontology representing selected material problems in the UDRP (domain model). Based on rules within the ontology and in the generator, only possible (e.g., a website cannot be a fan site and a parody simultaneously), although not necessarily always completely sensible, cases are generated. This approach is in line with a lot of the recent work in the area of Intelligent Tutoring Systems [6]. The four topmost classes of the ontology represent the four elements deciding the end result for this type of case: similarity of domain name and mark, legitimate rights of owner, bad-faith registration, and bad-faith use. The end result in this area can solely be a binary one: transfer of the domain name or no action. This renders calculating the final „result" of the case easier, as we only have to check whether three of these classes are fulfilled and the fourth (legitimate rights) remains unfulfilled (three positive and one negative criterion necessary and sufficient for transfer).

All text fragments must be independent of each other: Two fragments individually may not change the outcome if occurring together. Any sort of „emergent influence" is disallowed. This is grounded in the method of calculating whether one of the four top classes (see above) is fulfilled by the text fragments selected from its subclasses for a specific case: For each fragment a „fulfilment" value in the range of -100 (prevents fulfilling it) to +100 (alone sufficient to confirm this elements) exists. These are summed up (some special cases omitted here) and if and only if the threshold value of +100 is reached, that element is considered to be proven.

Currently natural language processing is not at a level to allow automatic correction of legal case solutions written by learners, even when a correct solution to compare with exists, as in such texts a single word and its meaning, or the specific wording, may be decisive. So a different approach is required to provide feedback.

Beside the generation of the case an exemplary solution is created too. After learners have written their own solution, these two are presented side-by-side. Learners then match the parts of the „official" solution by drag&drop with their own one and rate correctness (whether their solution is the same) and completeness (if they considered all aspects or left out some arguments). In this way self-assessment becomes possible through the support by the computer.

3 Adaptive case generation and facilitating peer learning

The adaptive part of the generator consists of a user and a group model (representing all learners), which are both overlays [7] of the domain model ontology described above. Special care is taken that text fragments are not repeated, as students only solve a limited number of cases and would therefore remember past problems.

The user model is employed to generate cases for solving by learners based on the evaluation (i.e. mistakes and omissions) of previous ones. Problem classes solved incorrectly receive greater weight during the generation of cases. The group model is employed in two ways: As feedback for the teacher to identify generally problematic areas (because of problems of understanding, or because text fragments or their solutions are unsatisfactorily formulated), and for influencing the fragment selection for all learners. Especially for a learner's first cases the latter is important (cold-start problem): Problems which are more „general“, i.e. affect more students, are probably more difficult and should therefore be presented to students more frequently. Additionally, all students should have received such a problem at least once. However, a random part is also contained as the first case should not solely consist of very difficult problems, which would render the introductory case very hard.

The overlay user model stores for each ontology class (=problem area) how „good“ the student is. In detail, the number of problems presented from this class as well as the average and standard deviation of both correctness and completeness are stored. The overlay group model contains similar global ratings calculated as the average of all learners. Updating of both models is based on the assessment of correctness and completeness of previous cases.

To better match the individual learner's knowledge, the difficulty level of a case can be coarsely assessed during creation. The basic metric is the number of fragments, and therefore material problems, in the case: the more individual problems that occur in a case, the more difficult it is. This is modified by the general value of correctness from the group model, which is simultaneously a difficulty measure: a fragment from a class often solved incorrectly receives increased weight, as it is more difficult than one from a class often solved correctly.

Facilitating peer learning is another application the user model is the basis for. If learners do not correct the solution themselves, another student is selected. To improve the quality of correction the system selects „experts“ for comparing the learner's solution with the exemplary one. An expert is another student who has already successfully solved cases containing similar problems. These might either be exactly the same or, as a perfect match is unlikely, from the same problem area. Here the generalization possibility of the domain model (classification hierarchy), which is reflected in the user model, is helpful. For the automatic final selection an additional aspect is important: The workload should be spread evenly. So generalization helps finding learners which are still a „reasonable“ match, but have not corrected too many cases yet. Balancing task assignments is important in reverse too: Students learn from correcting other's work so every learner should at least at some time serve in this capacity as well. If these corrections are not perfect, they become a source for discussions between the students.

Such communication and discussion is important for law practitioners and therefore must be taught in E-Learning too. Here shortcomings in case generation can even be advantageous: If learners think the automatically produced solution is partly wrong or doesn't consider interrelations of elements, this provides a topic and incentive for peer discussion. Adaptivity can help identify such peers: Normally all learners solve the same case, so discussing it is possible with all others. But when each learner receives an individually tailored case additional help is required to find a matching partner for discussion. So when a learner solves a case incorrectly, the area of the problem can be identified (and generalized if needed). The system then identifies students with appropriate knowledge to contact, similar to when searching for a learner for correction. In this way two (or three if peer correction is used) learners become engaged in one discussion: The solving student, the correcting one, and the external expert.

Likewise students can request assistance on problems independently of a specific case and the system suggests „best fit” candidates to contact. Such candidates can be experts, having proven their knowledge through successfully solving cases including such problems, or learners with similar problems. Which approach to use can be selected by the learner through the search configuration. The ontology is in this application presented directly to users who then select a „profile“ of others they are interested in communicating with.

4 Implementation state

The generator for legal cases has been implemented and populated with text fragments. It was successfully tested informally by students for understandability of the generated cases. More fragments will be added to extend variability and scope and reduce repetitions. As the research project is yet in an early phase, user interface and peer correction mechanisms are currently under development. It is being implemented as an applet to allow drag&drop in a user-friendly, fast and efficient way, and integrated into the learning platform Sakai.

5 Conclusions

E-Learning is possible in the legal area too. Even though this topic should be especially suited as its main tasks involve purely text, it is currently still in a comparatively underdeveloped stage of E-Learning.

That improvements in providing individual feedback through adaptivity are realistic has been shown through the automatic generation of example cases accompanied by exemplary solutions. Further extensions in this area towards larger and more complex legal matters are possible through explicit modelling of the legal structure of the cases to be generated.

The decisive factor for the success of peer learning is the incentive for contacted persons: If a complete case must be analysed before answering, willing respondents will be rare. But as the specific problem can be isolated (text fragment) and an exemplary solution is available, this problem is reduced by the approach selected.

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Author(s):

Michael Sonntag, Mag. Dipl.-Ing. Dr.; Alexandros Paramythis, MSc
J. Kepler University Linz, Inst. of Information Processing and Microprocessor Technology
Alternbergerstr. 69, A-4040 Linz, Austria
{sonntag, alpar}@fim.uni-linz.ac.at