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Semantic enrichment of models in DynaLearn learning environment.

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Abstract

In this work we present our contribution to the DynaLearn learning environment. DynaLearn is an interactive modeling tool for education based on the "learning by modeling" approach. DynaLearn allows students to build Qualitative Reasoning (QR) models to formally represent a domain of their interest. This process helps the students to get a better understanding of the domain and to predict the behavior of the modeled system in view of the possible changes.
Even though the isolated creation of models has significant benefits for the students, those benefits can be increased by a collaborative modeling approach. In this case, students have access to an increasing number of resources, which are the QR models created by experts or other students. This gives them the opportunity of reusing knowledge from those models to improve their modeling experience. In addition, the models built by experts can be used as reference to evaluate the students' models and generate valuable feedback to help them in the process.

In this context, we apply semantic techniques to facilitate the modeling process by exploiting the available models in order to identify the knowledge pieces that might be relevant to a specific student. These techniques allow the automatic generation of semantic feedback and recommendation, thus semantically enriching the models.

By means of techniques of ontology matching, we can automatically detect the semantic differences among the models. The types of differences we can point out to the students include differences in the used terminology, like the chosen names of the terms, terms that should be present in the student model or terms that should not be. Inconsistencies in the hierarchy of terms can also be detected. Finally, we can exploit the particular semantic of the QR vocabulary to perform more QR-specific comparisons between models. In fact, we can identify differences in the model structures that can modify the final behavior of the model. The final set of differences found during this process is used to generate feedback to the students. In DynaLearn, this feedback is provided by virtual characters in form of suggestions given along a dialogue with the student.