

Relations Discovering in Educational Texts based on User Created Annotations

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To increase effectiveness of learning, web based e-learning systems employ tools to personalize the content, navigation and allow students to collaborate and contribute to the educational content. To efficiently utilize personalization tools it is necessary to maintain a domain model. However manual creation of the domain model requires expert knowledge of the domain and requires much effort. Once the model is created, it is also necessary to correctly link the learning content to the domain model. Therefore it is essential to support the authoring of the domain model and its enrichment with additional relations and concepts.

E-learning systems often allow students to create text annotations [2] to support participation of students within a learning course and enhance collaboration between students. Moreover, the annotations inserted into learning content are a source of feedback related to the learning content [1], and they can be used to guide students and encourage them to perform interactive and collaborative learning tasks.

Students typically search for additional information sources on the Web, collect links to most interesting and helpful content and share them among their friends. Inserting such links into related learning texts as annotations helps organizing the links to useful resources and makes the sharing of these links easier. Teachers may insert links to provide students with additional learning resources and/or to motivate the students to insert and share their own links.

To control the quality of inserted links we provide the students with the ability to rate the usefulness of the inserted external (re)sources. We distinguish feedback we receive from students from the feedback we receive from teachers. Ratings assigned by the students represent the resource's popularity, students can either like or dislike an external resource, expressing how useful is the resource for them. Ratings assigned by teachers are interpreted as approval or disapproval of the suitability of an external source in regard to the learning text. Approved sources are displayed at the top and can be further processed while the removed sources are no longer visible to students.

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Inserted external sources related to the learning course enrich the course with additional learning texts. However besides enriching the learning content, they better explain portions of the document where they are inserted, by the means of covering either similar topic as a part of the document, or wider range of topics, usually covering larger part of a learning course.

Using this information we derive relations between learning object and concepts from existing domain model. To process information sources in various formats and languages, we use an automatic translation service (Google Translate) and a text extraction service to extract readable text from documents and presentations. We analyze the content of external sources to link them with appropriate concepts and construct a graph from learning objects, external sources and concepts according to the known relations. We apply spreading activation algorithm on the graph to compute similarity of entities (learning object or concepts) to each learning object. According to the computed similarity score we create weighted relations and merge them into the existing domain model.

We have implemented a widget within the ALEF framework to collect external sources and explicit feedback regarding quality of sources from students and teachers. We collected more than 700 external sources from students during the Procedural programming course. For further evaluation we construct a subset of collected external sources which will be analyzed and used to derive relations. We will then separately evaluate analysis of external sources and creation of new relations.

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References

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