

Summary: Adaptive Learning Resources Sequencing in Educational Hypermedia Systems

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Problem:

The adaptive educational hypermedia systems (AEHS) model attempts to address e-learner dissatisfaction by personalizing the learning experience. It is a type of web-based intelligent e-learning system that adaptively selects and sequences learning resources. In order to do this, the definition of adaptation rules contained in the Adaptation Model, is required. This looks good on paper, but the design of adaptive educational hypermedia systems requires significant effort, since dependencies between educational characteristics of learning resources and learners characteristics are too complex to exhaust all possible combinations when designing rules (there can be up to a million combinations). This complexity introduces several problems on the definition of the rules required namely:

Inconsistency, when two or more rules are conflicting.

Confluence, when two or more rules are equivalent.

Insufficiency, when one or more rules required have not been defined.

The author hypothesized that by using the proposed sequencing method, the system can generate almost accurate learning paths for a targeted learner. This method uses a complex algorithm for generating all possible learning paths that match the learning goal, and then, adaptively selects the desired one, based on the use of a decision model that estimates the suitability of learning resources for a targeted learner. The decision model mimics an instructional designer's decision model on the selection of learning resources.

Context:

The authors ran simulations to compare the produced learning paths of the proposed method with those produced by a simulated perfect rule-based AEHS. For the simulation of the learning paths produced by a perfect rule-based AEHS, they used the Computer Science Curricula of 2001. The extracted ontology consisted of 950 topics organized in 132 units and 4 areas. They used a stereotype of the Learning Goals Hierarchy from a list of learning objectives and

a stereotype model for representing learners' preferences based on the existence of a related certification for each node.

Findings:

In the simulations the authors compared the learning paths generated by the proposed methodology with ideal ones produced by a simulated perfect rule-based AEHS. The simulation results provide evidence that the proposed methodology can generate almost accurate learning paths avoiding the need to define complex rule sets in the Adaptation Model of AEHS, thereby avoiding errors in the selection and sequencing results.

Recommendations:

Educational Technologists can address the design problem of the rule-based Adaptation Model in adaptive educational hypermedia systems, by using the alternative sequencing method proposed by the author. By using a system that accurately selects and sequences learning objects, learners will be encouraged to use e-learning systems to address their learning needs.