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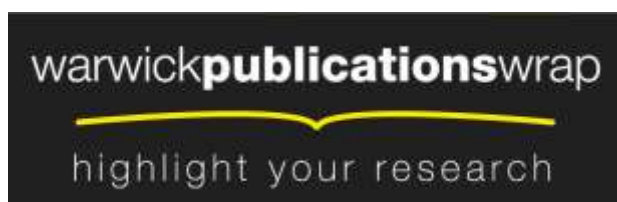
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My Online Teacher 2.0

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Abstract. This paper describes a new design of MOT, *My Online Teacher*, an authoring system for adaptive delivery of content, called MOT 2.0. The new design focuses on collaborative authoring and social annotation between communities of authors, as well as applying adaptivity based on users' activities. The MOT 2.0 observes authors' interaction patterns and suggests recommended/related materials and can recommend collaborators. Furthermore, it enables adaptive collaboration support by harnessing Web 2.0 and its characteristics (i.e., tagging, voting, commenting, and user-generated content), thus, allowing for group-based adaptation. In this way, MOT 2.0 combines the strength of Web 2.0 authoring with adaptive hypermedia –based authoring for personalization. Therefore, the paper answers the question of how to harness the strengths of Web 2.0 to provide group based adaptation for the authoring process.

Keywords: MOT, Web 2.0, Adaptive Hypermedia, Authoring.

1 Motivation

In this paper, we propose a new version of MOT [2], *My Online Teacher*, MOT 2.0. MOT is an adaptive authoring system that can be used to author adaptive courses. The new prototype focuses on including collaborative authoring and social annotation between communities of authors; as well as applying adaptivity based on users' activities. In this way, information collected from social annotation can be used to recommend adaptive materials for the authoring process. The aim behind including collaborative authoring and social annotation within MOT 2.0 is to define improved adaptive materials. Therefore, authors who belong to same community can cooperate in providing more valuable adaptive content within the community. Thus authors, who come from different backgrounds, with different levels of knowledge and interests; theoretically, can cooperate to augment the value of the information based on what they do and the way they collaborate. Additionally, traditional authoring tools for adaptive hypermedia lack of adaptation, as well as collaborative and social annotation.

2 System Architecture

This section describes the main modules of the new version of MOT, and how they are connected to each other. Figure 1 illustrates these modules and their main components. The models in MOT are: 1) user model; 2) content model; 3) group model; and 4) adaptation model.

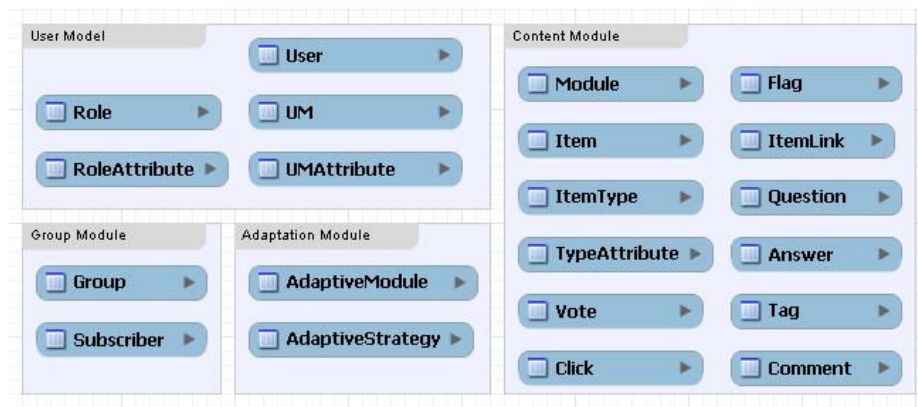


Fig. 1. The modules and their components in MOT 2.0

2.1 User Module

The User module has the following five components:

- 1). *User* component: for user's authentication (i.e., username, password, email, etc.)
- 2). *UM* component: this component is used to map between users and their user model attributes using a set of tags (keywords to describe the content).
- 3). *UMAttribute* component: this component is used for storing a user's knowledge level, skills, and preferences; the attributes are sorted as key-value pairs.
- 4). *Role* component: for user's authorization (privileges) in each group, i.e., privileges such as, can edit, can author, can tag, can comment, can vote, etc; these privileges are stored in RoleAttribute component.
- 5). *RoleAttribute* component: storing user's privileges as key-value pairs for flexible data presentation, and future use.

2.2 Content Module

The Content Module has the following nine components:

- 1). *Module* component: the actual course (module), it contains the hierarchical structure of items stored in XML format.
- 2). *Item* component: the smallest data unit, contains the actual content; it is also associated with the Item Type component.

- 3). *ItemType* component: the type of the content of the item (e.g., text, audio, video, image, etc). On the other hand, the item's type is associated with a set of attributes (properties) describing the properties of the item.
- 4). *TypeAttribute* component: stores the properties of the type as key-value pairs; for example, an item of type image, has the following attributes: image-resolution = 300px, image-width = 800px, image-type=JPEG, etc.
- 5). *ItemLink* component: stores the relations between the various items that are to be used in adaptive strategies.
- 6). *Flag* component: the user can flag inappropriate items (i.e., spam), and the flags can be used to report these items to the administrators.
- 7). *Comment* component: users can feedback into the items using comments, thus the authors (or course designers) can change their content. Comments can also be used as a method of communication between multiple users.
- 8). *Click* component: for storing how many times, the item has been read and by whom; this information can be used to adapt (recommend) related materials.
- 10). *Vote* component: users can vote (rate) the items using the vote component; thus, items with highest votes can be used as recommended content for the relevant items/users.
- 11). *Question* component: users can ask questions related to the items, which can trigger an adaptation strategy (e.g., suggesting visiting prerequisite items, other adaptive material, contacting appropriate users, or just waiting for an answer).
- 12). *Answer* component: this component is used to answer the questions raised by the users for specific items.

Item type components can also be used to define items of type 'adaptive', these items may have different set of attributes (such as adaptive parameters: weight, label, etc); and they can be stored in the Type Attribute component. Therefore, any type can be described and presented, including type's attributes (for example, an image item can have various attribute such as size, resolution, etc). These types and their attributes can be used for delivering adaptive modules using adaptive strategies.

2.3 Group Module

The Group module has two components:

- 1). *Group* component: groups can be created by users based on common interests, common courses, common topics etc. Users can have different privileges for different groups.
- 2). *Subscriber* component: users can subscribe to other users; thus subscribers can have updates when their targeted users post new content.

2.4 Adaptation Module

The Adaptation module has two components:

1). *AdaptiveModule* component: adaptive modules are defined by using (static) modules and adaptive parameters. For example, a (static) module might contain a set of items with various types (text, image, video, audio, adaptive item); each item has a set of attributes stored as key-value pairs. On the other hand, users have also set of preferences, skills, knowledge-levels, which are stored at key-value pairs in UM Attribute component.

2). *AdaptiveStrategy* component: adaptive strategies are used to define rules about a (static) module based on the related adaptive parameters (item type attributes) and the user profile (user model attribute).

Collaborative adaptive strategies can be defined using Group and Subscriber components. Example uses are highlighted using the following code scenarios:

1). For all users in the “Web programming” group who have an interest in ‘AJAX’ items; display the recommended ‘AJAX’ items (items with vote $\geq 90\%$).

2). For all users in the “Web programming” group who have an interest in ‘AJAX’ items, display the recommended users (authors of ‘AJAX’ items).

3). For all subscribers of any user ‘X’ in the “Web programming” group, display the recommended items (the user ‘X’ has voted $\geq 90\%$ for these items).

4). For two users, with the same set of subscribers, recommend them to each other.

5). For all users, in different groups, with the same interests, recommend the other groups to each other.

6). For users with a basic knowledge of ‘PHP’ in the “Web programming” group, recommend users with an advanced knowledge of ‘PHP’.

Additionally, these modules interact (implicitly or explicitly) with each other using their components as follows:

1). User module interacts explicitly with the Content module via the User and Role components: A user can create items, create modules, annotate items, flag items, etc. However a user should have the credentials (privileges) to be able to use any of these activities. These privileges are defined by the Role and Role Attribute components.

2). User module interacts explicitly with the Group module via the Role component: A user can join different groups; this will result in the inheritance of a new set of privileges.

3). User module interacts explicitly with the Adaptation module via the UM and UM Attributes components: A user is associated with the UM with a set of tags (keywords); and the UM is associated with the UM Attribute; thus, for each tag in UM, there are set of attributes describing, knowledge-level, preference, skill, etc. as key-value pairs.

4). Content module interacts with the Group module using the Role and Role Attribute components; thus, role attributes can determine who can do what within each group.

5). Content module interacts with the Adaptation module using the Adaptive Module component: any (static) module entity from the Content module can have multiple Adaptive Modules using different adaptive parameters (defined in item type attributes).

3 Discussion

In Web 2.0, teachers, course-designers and students are all considered as authors, with different levels of authorization (i.e., content creation vs. content annotation). Thus authoring becomes a blended process, which combines implicit and explicit cooperation between teachers and students. One of the main characteristics of authoring in e-learning 2.0 is the ease of content creation, which implies user-friendly interfaces using the technologies of Web 2.0 (i.e. Ajax). It is important to notice that e-learning 2.0 will not replace the traditional e-learning; however e-learning 2.0 will augment current e-learning systems by means of Web 2.0 techniques. Most likely, the instructional designing task will come to comprise of the re-use of materials in learning collections rather than content creation only.

On the other hand, Web 2.0 has encouraged the shift of e-learning from centralized content creation (by the teachers and/or course designers) to decentralized content creation (by any user depending on her privileges). Thus, the teachers become catalysts and facilitators of the learning process [1]. Learning by applying methods for collaborative and active learning are essential approaches to achieve the mission of e-learning [4], and Web 2.0 could be an active tool to help achieve this mission [1]. On the other hand, using Web 2.0 for e-learning might raise major risks such as: reliability, security, governance, compliance and privacy; however, these risks are beyond the scope of this paper.

Additionally, the term "collaborative learning" [3] refers to a common method in which learners collaborate together in groups toward achieving a common objective [5]. Additionally, collaborative learning aims at reducing a students' isolation in traditional e-learning environments. As e-learning 2.0 facilitates collaborative learning by means of Web 2.0 mechanisms (i.e., tagging the course, rating the content, and favourite materials), and group-based activities (i.e., activities of all users in same group). To conclude: collaborative learning and e-learning 2.0 are two faces of same coin. Both aim at providing working in groups or communicating with others.

4 Conclusion and Future Work

In this paper, we propose a new design for MOT (MOT 2.0) to exploit adaptive techniques in order to support user activities on Web 2.0. A characteristic of Web 2.0 is users' collaboration (i.e., two or more users cooperate together toward a common goal, where they engage in an activity-oriented procedure). The new design of MOT will observe these interaction patterns and suggest recommended/related materials and/or recommend suitable collaborators. Furthermore, the new design of MOT will support adaptive collaboration support by harnessing the Web 2.0 strength and its characteristics (i.e., tagging, voting, commenting, and user-generated content); thus, providing group-based adaptation. For the next steps, work has already started towards full implementation of the new version of MOT to cover adaptive collaborative support using the Web 2.0 features.

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