Design and implementation of Adaptive Content Trisection System based on SCORM

Yang Rui1,a, Fan WenJie1,b

1China Meteorological Administration Training Centre, 10081 Beijing, China
a yangr@cma.gov.cn, b fanwj@cma.gov.cn

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Abstract: This paper proposes a new adaptive content trisection system based on SCORM to solve the problems in traditional trisection system such as lengthy browsing time, lack of content point structure, interaction and browsing process tracking. The newly designed trisection system set up a new content aggregation through designs of adaptive content trace and controllable browsing process. Three models based on SCORM, CAM, RTE and SN, are adopted in this paper to implement the new adaptive content trisection system.

Introduction

Trisection System is one of the most famous multimedia online systems which consists of video, PPT, and index section. While it often has a longer browsing time and a single linear information transmission which may let the systembe lack of interaction and the user be tired of browsing so that the efficiency of trainingis greatly reduced. SCORM (Sharable Content Object Reference Model) as one of the most popular technical specifications model provides a set of common and systematic organization of the curriculum and data transmission specification that realizes a highly controllable in the browsing process. This paper implements a new adaptive content trisection system by optimizing and upgrading the traditional trisection system based on SCORM.

SCORM

CAM: content aggregation model, is used to describe the structure of the browsing resources by the manifest file in an XML file.

RTE: run time environment, is presented for the browsing materials to send and receive information between the user and the LMS by API and Data Model.

SN: Sequencing and Navigation, allows the creator to create a content at design time that behaves in a user-centric way.

Design of Adaptive Content Trisection System

Traditional trisection system is subject to missing content points and administration out of control because of distracted content points, content without key points and lengthy browsing time which usually takes more than 45 minutes. This paper proposes optimized adaptive content trisection system by designs of content aggregation, adaptive content trace and controllable browsing process. This leads to monitor browsing process in real time and guide effective browsing.

Design of Content Aggregation. We have to reorganize the content points of original system and divide them into reasonable classes according to requirement. Then we aggregate them to a new activity tree. This paper split a standard system of 45 minutes into five parts of 9 minutes as an independent unit which is divided into three parts: module including basic module, general module and advanced module. The Adaptive Content Trisection System Activity Tree as shown in Figure 1:
Design of Adaptive Content Trace. According to the activity tree, we design pre-test and post-test unit to intelligently guide the user in adaptive browsing paths, which breaks the traditional single linear browsing mode. We assume linear model among A, B and C module and choice model inside B module in which the user must attempt the pre-test first. If the user passes the pre-test, he can skip BA. In BB module the user can select the child activities freely. After the user finishes the unit, he must take a post-test. If the user fails in the post-test, he must retry BA. The adaptive content trace as shown in Figure 2:

Design of Controllable Browsing Process. We control the behavior of users and record browsing time, exit time points and other key information by RTE which provide user with the opportunity to know about his browsing progress and to guide him continue at last time point. This also gives the administrators a chance to master, evaluate and analyze the whole picture of all users. RTEs primary data is shown in the following table:

<table>
<thead>
<tr>
<th>Data Model</th>
<th>Behavior Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmi.max_time_allowed</td>
<td>Maximum Time Allowed to control browsing time</td>
</tr>
<tr>
<td>cmi.location</td>
<td>Location to record the exit time point</td>
</tr>
<tr>
<td>cmi.session_time</td>
<td>Session Time to record the browsing time</td>
</tr>
<tr>
<td>cmi.objectives</td>
<td>Objectives to content working with other elements in SN</td>
</tr>
</tbody>
</table>

Implementation of Adaptive Content Trisection System

(1) We aggregate content to a new adaptive content trisection system by the elements called organization that defines a new content tree and resource that defines the resource in CAM. The content units and test units are defined as the SCO objects to facilitate subsequent controlled browsing process. Key code is shown in the following:

```
<organizations>
  <organization identifier="Adaptive Content Trisection System">
    <item identifier="A" identifierref="rA"/>
    <item identifier="PreTest" identifierref="rPr">
      ...
    </item>
  </organization>
</organizations>

<resources>
  <resource identifier="rA" adlcp:scormtype="sco" href="rA.html"/>
  <resource identifier="rBA" adlcp:scormtype="sco" href="rBA.html"/>
</resources>
```
We define the rules among modules by respectively inserting a SN element called sequencing in the Organization and B module which define the controlMode is forwardOnly= "true" and choice= "true", that is, browsing order is a linear mode among modules and free selection mode inside the B module.

(3) We define an objective obBA and map it to the global objective obPreTest by inserting a element called sequencing in the BA module. obBA’s success condition is defined as test scores is greater than 60%. If the user cannot satisfy the objective, BA module will be skipped. Key code is shown in the following:

```
<imsss:sequencing>
  <imsss:sequencingRules>
    <imsss:preConditionRule>
      <imsss:ruleConditions conditionCombination="all">
        <imsss:ruleCondition referencedObjective="obBA" condition="objectiveMeasureGreaterThan" measureThreshold="0.59"/>
      </imsss:ruleConditions>
    </imsss:preConditionRule>
  </imsss:sequencingRules>
  <imsss:objectives>
    <imsss:primaryObjective objectiveID="obBA">
      <imsss:mapInfo targetObjectiveID="obPreTest" readSatisfiedStatus="true"/>
    </imsss:primaryObjective>
  </imsss:objectives>
</imsss:sequencing>
```

(4) Similarly, we define an objective obBB and map it to the global objective obPostTest by inserting a element called sequencing in the BB module. obBB’s success condition is defined as test scores.
scores is greater than 80% and it’s postConditionRule is action="retry". If the user cannot satisfy the objective, BA module must be retried. Key code is shown in the following:

**Conclusion**

This paper has explored a new adaptive content trisection system based on SCORM by reasonable splitting and aggregation. It has improved the efficiency of browsing and made a controllable and personalized browsing into reality.

**References**


[3] Li Qing, Research on learning activity model, doctoral dissertation of East China Normal University, April 2005, pp.77-90

