A Web-Based VOD Clipping Tool for Efficient Private Review

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Abstract. In this paper, we present a web-based tool for learners, to review the parts of the lecture contents that the learners have already attended. Each learner can efficiently review what they want to learn again independent of the scenario in each lecture. We assume that the contents of the lectures are stored in the internet based video streaming systems. The objects are automatically arranged on a screen of this tool, so that each object gets closer to its similar objects.

1 Introduction

Internet contents with video streaming data are increasing, and many kinds of contents become available freely for the internet people. As a matter of course, these kinds of contents are used for the distance learning and/or private study for students and pupils. We simply call these kinds of contents as *streaming contents*.

Now we reconsider the disadvantages of streaming contents in teaching or learning contexts. Even a lecture performed in a real class room is mostly tedium, at least in Japan. The problems are as follows; 1) each student should watch the lecture segments which they have already understood, 2) each student can not review a part of a lecture because lectures will progress independent of each student, 3) each student can not easily refer several parts of a lecture or the other lectures, which are related to a part of the lecture.

Although these problems can be overcomed by streaming technologies, students must directly use primitive functions such as indexing and hyper linking. An integrated tool enables the learners to overcome such problems efficiently. A web-based VOD clipping tool presented in this paper is one of such integrated tools. Our tool gives the following functions for the students; 1)each student can easily clip a part of a lecture, and they can append a label and an annotation to the part, 2)each student can deploy the clipping parts spatially on the screen, 3)each student can view and hear the parts of lectures independent of the lecture scenario.

The rest of this paper is organized as follows. In the next section, we review current technologies for the streaming contents. In section 3, we summarize the requirements of our tool. The design and implementation of our tool are presented in section 4. Section 5 shows the usage of our tool. Finally, we summarize the contribution of our tool and discuss the future works in section 6.

2 Video and audio streaming over the internet for education

Streaming is an on-demand media data transmission technology. Typical streaming systems are Windows media technology and Real Systems. Many systems have been implemented which record real lectures and store them as collaborated streaming data, and several lecture

libraries[1, 2] have been realized. The provided functions are primitive, so there are the following problems for educational use: 1)the synchronization must be done manually, 2)the collaboration unit is only WWW pages, 3)VODs have no index.

There are some researches and products about the above problems. WLAP project[1] developed a system for producing, editing, serving Web lectures, but editing functions are provided only for lecturers. We have also developed the VOD authoring system which makes the collaborated VOD semi-automatically using Windows media technology. There also exist some researches about VOD indexing[3, 4]. The objectives of these researches are to make general video databases, and their researches' focus is on automatic indexing and meta data definition. The aim of our research is to make it possible for each student that they make their personal notebook for review. Using our tool, it becomes possible for each student to make personal a lecture video library.

3 Personalized Contexts for Learning

As mentioned in the first section of this paper, we want to let learners free from fixed and uniform scenario for learning such as ordinary lectures, by using the video streaming technology. We first define a minimum unit for learning. We call such kind of unit as a *video object*. A video object should satisfy the following conditions; 1)a video object should have a part of a streaming content. We call such a part as *a video object content*. 2)a learner can understand a video object content without other video objects. 3)a learner can easily find a video object when he wants to view a specific topic. 4)a learner can easily view the neighborhood of a video object content. 5)a learner can decide the significance of a video object content. 6)a learner can categorize his video objects.

Based on these conditions, we have designed a video object with the following attributes; 1)label: The name of this object, 2)URL of streaming, 3)start and end point of this object among the streaming data, 4)annotation, 5)significance: this value is represented as a size of icon for this objects in the current prototype. 6)category: this attribute is represented as a color of icon for this objects in the current prototype.

The target of our tool is lecture videos. Lectures may be classified into some categories. The video object belonging to each category must be collected. We call such a collection of video objects as a *workspace*. Users can define several workspaces and classify each video object into the corresponding workspace. In figure 1, we show an example of the relationships among the streaming contents, video objects, and workspaces. In a workspace, video objects should be deployed along the understanding of a learner. Therefore, a distance between two objects is decided by the degree of these two objects' similarity, which is computed using the understandings of a learner.

4 Design and Implementation

Our tool mainly provides the following two functions to users.

- *Video indexing function*: Users pick up their focused video objects, index, and comment.

- *Indexed Video deploying and browsing function*: Users browse the collected video objects, which are deployed graphically on the screen.

We realized this system based on C/S architecture using IIS and ActiveX control so that users can index and browse lecture videos at any place/time.
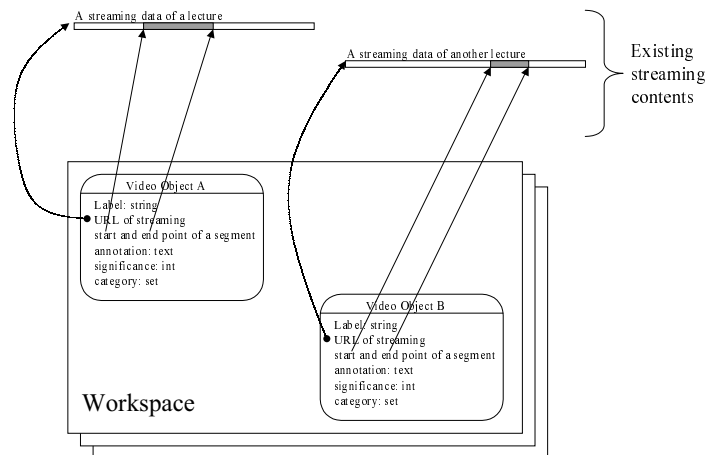
Figure 1: Streaming data, Video Objects and Workspace

Our tool has no automatic indexing function, and users must manually select their focused video object, because indexing should be done depending on each users level of understandings and interesting. Our video library is personal use and only the indexing data is stored personally. VOD is widely used for lectures, so it is very useful that VOD data on any site can be used as library. Our primary design decision is the presentation style of indexed video object. Main functionality of this component is as follows: 1)Visualization of significance and category, 2)Filtering, 3)Automatic deployment of video objects.

5   Usage of our tool

The following is the typical scenario to construct a personal lecture video library:

1. Users select a lecture from the menu.

2. Users scan the video stream, and select the starting and stopping point.

3. Users give the title for this video object.

4. Users give some comments for this video object.

After indexing, video objects are stored in the corresponding workspace. In order to browse video objects, users at first select the workspace, then the set of video objects will be displayed as shown in figure 2. Each video object is displayed as a rectangle with text string which has some color and size, and each video object is connected using similarity link. These color and size can be changed. If the display is so crowded, some filtering may be activated.

6   Example

Here we show a simple example of personal review. Suppose a student has attended two different lectures, one is C programming language and the other is Java programming language. From the lecture of C, the student clips three video objects entitled "C_Pointer", "Primitive_type" and "Array_type", and he annotates each object. From the lecture of Java,
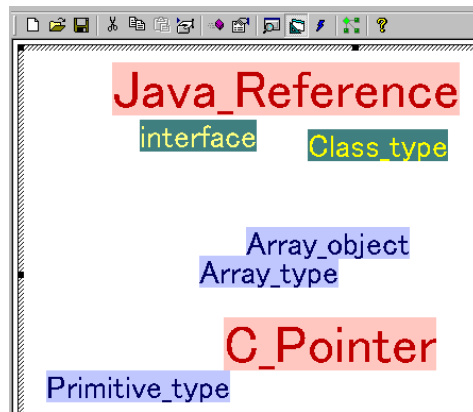
Figure 2: Deployment of Video Objects

he also clips four video objects entitled "Java_Reference", "interface", "Class_type" and "Array_object", and he also annotates each object. Then, our tool automatically deploys these video objects on a window as shown in figure 2.

7   Conclusions and Future works

In this paper, we present a web-based VOD clipping tool for learners to privately review the streaming contents. This tool enables learners to learn lectures freely independent of the predetermined scenario, and to combine related lectures as a private lecture library.

Currently, the deployment of video objects in our tool is decided using only the annotations of each video objects. We want to refine the deployment of video objects for various kinds of learners. Video objects and workspaces of a learner may be shared by the other learners if the learner approves. We should extend the design of video objects for sharing, because video objects are currently intended to be used personally. For better mining of the off-the-shelf video objects and workspaces, additional attributes, for example the reasons why the objects and/or workspaces are collected, are needed in our tool.

References

[1] `http://www.wlap.org/`. WLAP Web Lecture Archive Project.

[2] `http://audio.monash.edu.au/mlo/index.html`. Monash Lectures Online.

[3] S. L. Chan. et. al. Efficient methodology for automatic video-content indexing and retrieval of lecturers for cai systems. In *Edmedia'96*, 1996.

[4] Jane Hunter and etl. A Comparison of Schemas for Video Metadata Representation. In *8th WWW*, 1999.