A study on the on-demand learning system which distributes multiple video streams

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As the computer networks evolve to form an infrastructure of the society, attempts to utilize this new infrastructure for education are gathering an attention. In most distance education system currently used, synchronized presentation of slides and a movie is frequently used as its contents.

However, since the video movie used in this type of contents is just a recorded movie of the lecturer which was taken in a classroom, it is hard for clients to understand the explanation of a lecturer. Moreover, in some cases lecturer does not use slides made with computers but uses a blackboard or OHPs. This causes the production of contents needs an effort which is almost equivalent to the preparation of the lecture itself.

In this research, a distance education system which utilize multiple video streams is proposed and evaluated. In this system, after recording a live lecture with two or more video cameras, they are distributed by an on-demand learning system which can provide two or more video streams simultaneously.

An experiment of comparative evaluation was made using the two types of distance education systems: one in the form using two or more video (i.e. proposed type) and the other is in the form using a video of lecturer and slides (i.e. conventional type). The experiment system was built on a local area network. The experiment results show that the proposed system is superior to conventional one in the presence and the visual display effect.

The production cost of each form was compared based on the number of work processes and working time required for each contents. The results show that the model which records a live lecture using two or more video cameras is more advantageous than any other models.

The user interface for displaying two or more video streams is also proposed. One type of the interface adopts a selection method which provides uses with the selection mechanism to choice the streams to be delivered to that user before the distance learning session begins. The other user interface enables users change a layout of display in real time, which also enables the dynamic selection of the streams to be delivered.

A system which distributes two or more video streams effectively on the wide-area network is also examined. The source of on-demand contents for distribution does not need to be an origin server, but can be the distributed cache servers. On the other hand, the transmitting source of the live streaming must be an origin server, but the route from the server to the clients for each streams are not fixed in one path. In any cases, it is necessary to re-synchronize the multiple streams before delivered to the client. As the solution for this problem, the intermediate synchronization node is proposed.