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Specification of Attributes of a Multimedia Presentation for Presentation Manager

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***Abstract*—**A multimedia presentation system refers to the integration of a multimedia database with a presentation manager which has the functionality of content selection, organization and playout of multimedia presentations. It requires high performance of involved system components. Starting from multimedia information capture until the presentation delivery, high performance tools are required for accessing, manipulating, storing and retrieving these segments, for transferring and delivering them in a presentation terminal according to a playout order**.** The organization of presentations is a complex task in that the display order of presentation contents (in time and space) must be specified. A multimedia presentation contains audio, video, images and text media types. The critical decisions for presentation construction include what the contents are, how the contents are organized, and once the decision is made on the organization of the contents of the presentation, it must be conveyed to the end user in the correct organizational order and in a timely fashion. This paper introduces a framework for specification of multimedia presentations and describes the design of sample presentations using this framework from a multimedia database.

***Keywords*—**Multimedia presentation, Temporal specification, SMIL, Spatial specification.

I. Introduction

INCREASING capabilities of today's computers enable us to create advance multimedia presentations from a pool of various types of multimedia segments in a multimedia database. A multimedia presentation consists of many types of multimedia segments such as texts, images, sounds and videos in various formats, whose organization and playout order are specified in terms of spatial and temporal constraints. These segments in a multimedia database are retrieved and presented on-demand in a presentation terminal [1] [2]. Multimedia presentations are widely used in many fields such as education, training, advertisement and entertainment. Multimedia segments of a presentation are stored on a server and actual presentation takes place at a presentation terminal. Since the presenter as a human is not physically available to hold the attention of audience, user-driven presentations must be stimulating. It must also maintain the attention of the user. Multimedia presentations are ideal for attracting the audience in the first place and then holding their attention focused with the help of creative uses of color, motion, sound, adaptive contents and interactivity. The organization of presentations is a complex task in that the display order of presentation contents (in time and space) must be specified. Suppose that an education technologist is developing a presentation for Training that contains audio, video, image and text media types. The critical decisions for presentation construction include (1) what the contents are, and (2) how the contents are organized (i.e., some parts of audio and video may be temporally related and have to be presented in parallel; some other parts can only be presented after certain subjects are covered, etc), (3) once the decision is made on the organization of the contents of the presentation, it must be conveyed to the end user in the correct organizational order and in a timely fashion [1] [2] [4]. In this paper, we introduce a framework for specification of multimedia presentations and design sample presentations using this framework from a multimedia database. Specifically, presentations from multimedia database are organized and prepared according to specifications.

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II. Related Work

In recent years, attempts to tackle preparing segments in multimedia databases into a multimedia presentation and conveyance of the resulting presentation for human users have gained momentum in the literature [1] [2] [4] [5]. Little and Ghafoor [4] made one of the earliest attempts to develop a temporal-interval based (i.e., TIB) model that captures the timing relationships among multimedia data segments. Inter-segment temporal relations are either imposed at the creation time of the multimedia segments (i.e., called live synchronization) or set up artificially (i.e., called synthetic synchronization). In their work, presentation of each multimedia data segment is represented by a time interval (start time, end time, duration). Using this model, they come up with a playout schedule for the segments with monotonically increasing deadlines' in order to present them in a timely manner. To this extent, they specify the temporal access algorithms to facilitate forward and reverse playout as well as partial-interval evaluation for pause-resume operations. In works [8], three distinct problems in multimedia presentations are identified as determining the contents as well

as the layout of the presentation in time and space. However, the main focus of the work is concerned with the description of temporal aspects of an abstract presentation behavior. Synchronization and control of temporally related actions are modeled by presentation frame types, sequentializer, parallelizer, splitter, combiner, and brancher. Event-based features and layout facilities of a presentation are provided in Synchronized Multimedia Integration Language (i.e., SMIL), a declarative XML language for distribution of synchronized audio, video and other media in the presentation [3]. All the temporal and spatial specifications of media segments in a presentation are defined through the timing and layout constructs of SMIL. Presentation of multimedia objects implies their delivery to the human user, not their retrieval from a depository (database). In general, user interaction with a presentation must be supported through some well-defined operations so that users may influence the course of presentation actions [8] [9]. Thus, the specification of temporal aspects of a presentation behavior takes into consideration the possible user input as well as the layout and synchronization issues of media data streams. The purpose of the synchronization is the temporal ordering of presentation actions and interactions. These temporal relations are defined through such primitives as Sequentializer, Parallelizer, Splitter, Combiner, and Brancher [8]. Having determined the actions in the presentation, the creator/user of the multimedia data has to specify the specific temporal relations between different actions, thereby defining a particular presentation order. Between two actions, there exists only one of 13 temporal relations: *before, meets, overlaps, during, starts, finishes*, inverse relations of these six relations and *equal* [4]. For presentation of multimedia contents and specification of the moment at which those contents gets introduced are supported in SMIL via timing, layout, linking and content control options [3] [6] [7].

III. Case Studies

In this section, we use two specific presentation applications to demonstrate usages of specific language features. These presentations are prepared in SMIL in order to determine language requirements of a multimedia presentation [10].

A. Case Study 1: A Course Presentation

The first presentation is prepared for undergraduate students who choose a topic in terms of time length, layout arrangement, delivery features and a subset of the contents. Available multimedia tools determine related multimedia segments for selected topics. Subjects are presented in meaningful and manageable segments. First, a course presentation is generated from single and composite media objects by combining a set of existing audio, video segments, texts and images. This set together with associated metadata, which define presentation order of individual media objects, constitute a multimedia presentation. After temporal relations are specified for all the segments in this particular course, the SMIL player delivers the desired multimedia presentation (which happens to be a lecture in Object-Oriented Programming) to the end users. This multimedia presentation combines media segments of types audio and video, as well as images and text from a textbook in Object Oriented Programming. Figure 1 below illustrates interface snapshot of generated lecture presentation.

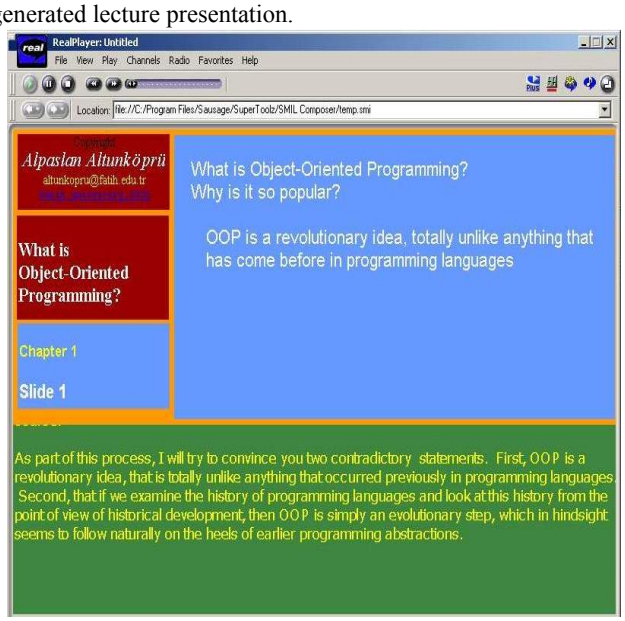
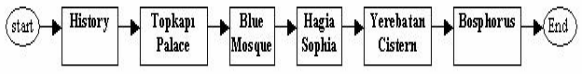


Fig. 1: Snapshot of generated lecture presentation

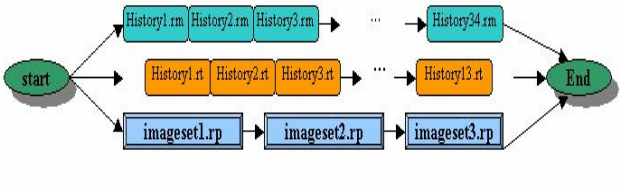
B. Case Study 2: Presentation of a Geographical Site

The second presentation introduces some historical places of a city, Istanbul. In this example, we imagine a multimedia presentation by a travel agency which organizes tours to different places for its customers. Such a presentation includes video clips, background music, images, and narrative voice. For each tour, places to visit are illustrated and commented. The agency presents its offerings and precise conditions for each location. We consider two options: *A brief presentation:* Instead of a full presentation, the user will see a short summary of the offer for each location. Since a potential customer may not be interested in allocating his/her time to such a long activity, we show a summary of important sites to visit in each tour. *A full presentation:* In this case, the body of the whole presentation takes place since customers are really interested in the offers and have allocated their times. These two options show the characteristics of the problem. We need a means for choosing alternate media objects in a presentation, specifying alternate temporal paths within a global temporal composition and associating descriptions with segments so that the user may choose the right contents. To illustrate, a 45-minute video describing the city has ten major parts with names History, Hagia Sophia, Topkapi Palace, Blue Mosque, Bosphorus, Covered Bazaar, Yerebatan Cistern, Istanbul by night, Kariye Museum and Spice Market. These parts are separated during capture process with the 25 frames per second in a conceptual manner. Each segment is associated with duration. Each video segment may have dependency to

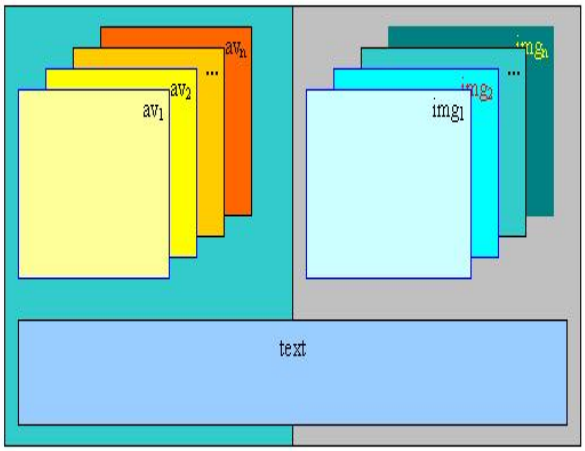
other segments that comes before or after and the meaningful order should be preserved. Figure 2 shows (i) ordering of the major segments of the presentation, (ii) detailed components of each segment, (iii) the screen layout of the presentation of these multimedia segments.



(i) ordering of major multimedia segment



(ii) detailed components of segments



(ii) Conceptual Layout of multimedia segments
Fig. 2: Features specified in Site Presentation

The segments should be presented in a logical order. To achieve this property, many systems give these segments meaningful names ending with consecutive numbers so that their presentation order is determined easily. All the durations must be recorded and calculated carefully and a time diagram would be appropriate to display these durations. Without assignment of time durations, text files are discrete multimedia types. However, within a multimedia presentation they are used as continuous media by assigning temporal behaviors. To coordinate texts in a time interval, a new media called Real Text are used. The narration of the video is obtained as a text file and is displayed as a subtitle. To make it meaningful, correct starting and ending times of the narration must be determined. All these timing information is used for assigning timing information to the text files. Synchronization between the video narration, comments and real texts is essential because delays would cause loss of quality in the presentation. The synchronization between the RealText and video can be achieved by preparing text for each video segment, and assigning starting and ending times for media segments inside text file. Images are also discrete media type without time dependency. When they are used within a presentation, each image is displayed for a certain period of time. Pictures are played in a sequential order and smooth transitions are established between them. The presentation area is divided into sub regions, which provide a modular layout environment. Regions of multimedia segments are well specified so that it is clear which part would appear on which region as in Figure 3.

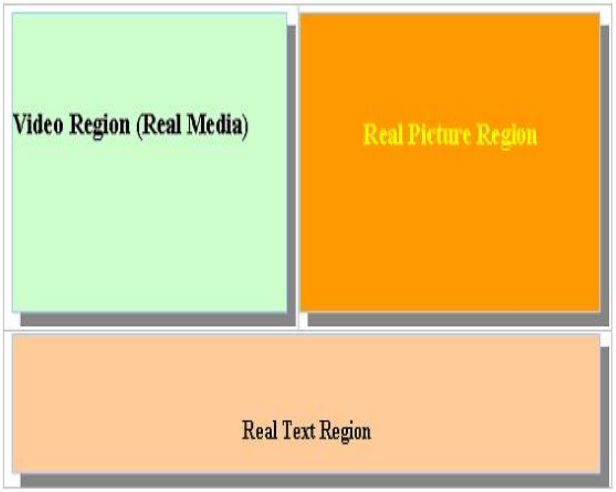


Fig. 3: Specified Regions of Multimedia Segments

Any picture is displayed for certain duration and leaves the view gradually. Next picture takes the same place afterwards. We combine these segments for the presentation. A snapshot from the resulting site presentation is displayed in Figure 4.

Fig. 4: A Snapshot from Resulting Presentation

IV. Features to Support

Temporal Specification: Support must be provided for specification of the durations of the media files and data to determine the times at which slide changes would occur. In this way, one can assign temporal specifications to the discrete data such as texts and images after considering the durations of the related audio and video segments.

*Overall Presentation Time***:** A time diagram for the playout of the multimedia segments would be helpful to visualize the overall temporal behavior of the entire presentation. As temporal information are associated with each segment to specify when to start, its duration, and when to end, representation of a multimedia presentation, integrating these synchronized audio and video and other segments, is drawn to indicate the overall presentation time.

Layout Specification of Presentation Regions: The presentation area is divided into sub regions, which will provide a modular layout environment. Decision must be made about the regions of multimedia segments by specifying which part would appear on which presentation region.

User Interaction with Presentation: Users should control an ongoing presentation to pose questions, make changes on certain parameters and other features during playout.

V. Conclusion

In this work, we described general requirements of a multimedia presentation. It has time-related and space-related features as well as user-specific constraints.

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