Retrieval of Presentation Recordings with Digital Camera Images

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ABSTRACT

A typical collection of presentation and lecture recordings may contain hundreds or thousands of recordings, making it difficult to retrieve particular presentations and find specific points in a presentation. This paper describes a retrieval system where the digital camera pictures taken during presentations can be used to retrieve presentation slide images and the associated video clips.

1. INTRODUCTION

Systems for recording presentations are becoming commonly available [1]-[3]. Also, it is becoming more common for attendees to take pictures of interesting slides in a presentation. More often than not, these images are not as useful as they could be because the context and the reason for taking them are forgotten. We have developed a retrieval method that allows users to submit presentation slide images as queries to a collection of presentation recordings and retrieve the audiovisual recording of the presenter talking about those particular slides, as illustrated in Figure 1. This way, the presentation attendee can refresh his memory about some particular presentation slide or share this information with others.

Most digital cameras attach time-stamps to the images they capture. However, in many cases it may not be practical for an attendee to keep track of the presentation sessions that he took each picture in. This is especially true when more than one presentation session takes place in parallel. We overcome this problem by employing a content based retrieval algorithm.

2. SYSTEM OVERVIEW

Our presentation room is equipped with an omni-directional audiovisual recorder and a presentation recorder. The audiovisual recorder captures 360-degree video at 30 frames per second and view selection is performed based on sound directions [2]. The presentation recorder automatically captures what is displayed on the presentation screen/projector. The VGA output of the presenter's machine is converted to NTSC signal, captured by a frame grabber and saved in JPEG format at 640×480 resolution. The outputs of the audiovisual recorder and the presentation recorder are copied to our *Intelligent Meeting Room Server*, where they are synchronized by post-hoc clock-skew correction. The presentation data is then copied to a *Presentation Media Server* where image feature extraction and indexing is performed and the presentation data is re-formatted for web viewing.
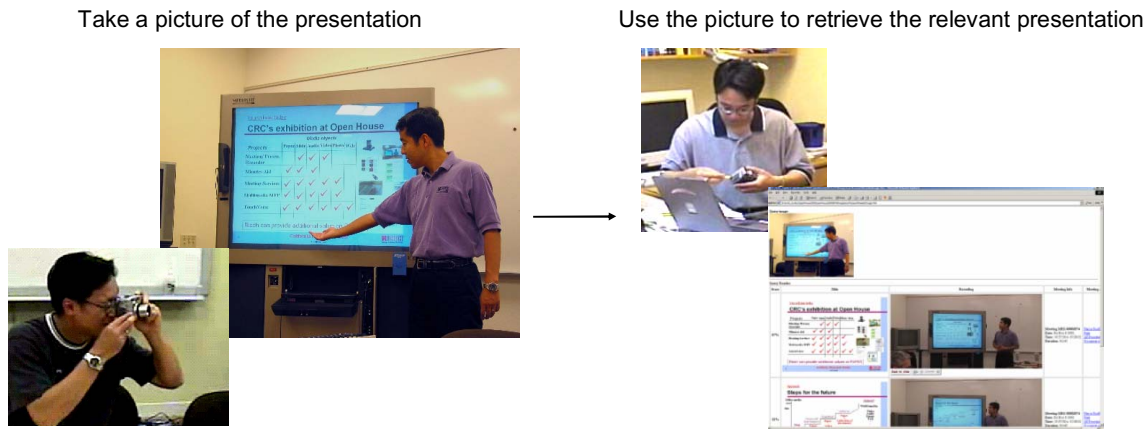
Take a picture of the presentation   Use the picture to retrieve the relevant presentation

Figure 1. Retrieving presentation recordings using Digital Camera images.

Recorded presentations are available through a web interface that supports calendar-based browsing of the presentation database and keyword search. Text for keyword indexing of the presentation recordings is extracted from the Presentation Recorder images via OCR.

Our retrieval interface also supports retrieval of presentation recordings, as well as individual slides, by giving a digital camera image of a presentation slide as a query, as illustrated in Figure 2. This is achieved by matching the slide content in the digital camera images to the slide content of the *Presentation Recorder* images. We utilize image features computed based on the slide text layout and the text content for similarity matching. More details of our matching algorithm can be found in [4][5]. We tested our method on a database of 41 presentation recordings with 4814 *Presentation Recorder* images. Our system yielded 87% retrieval rate, given 109 digital image queries, which were captured under a wide range of conditions.

After a query is placed, the retrieved presentation slides and their corresponding audiovisual recordings are displayed in a sorted order based on their similarity score.

The user can playback the audiovisual recording of the presenter talking about a particular slide. The user can also access the entire presentation recording through the same interface.

3. REFERENCES

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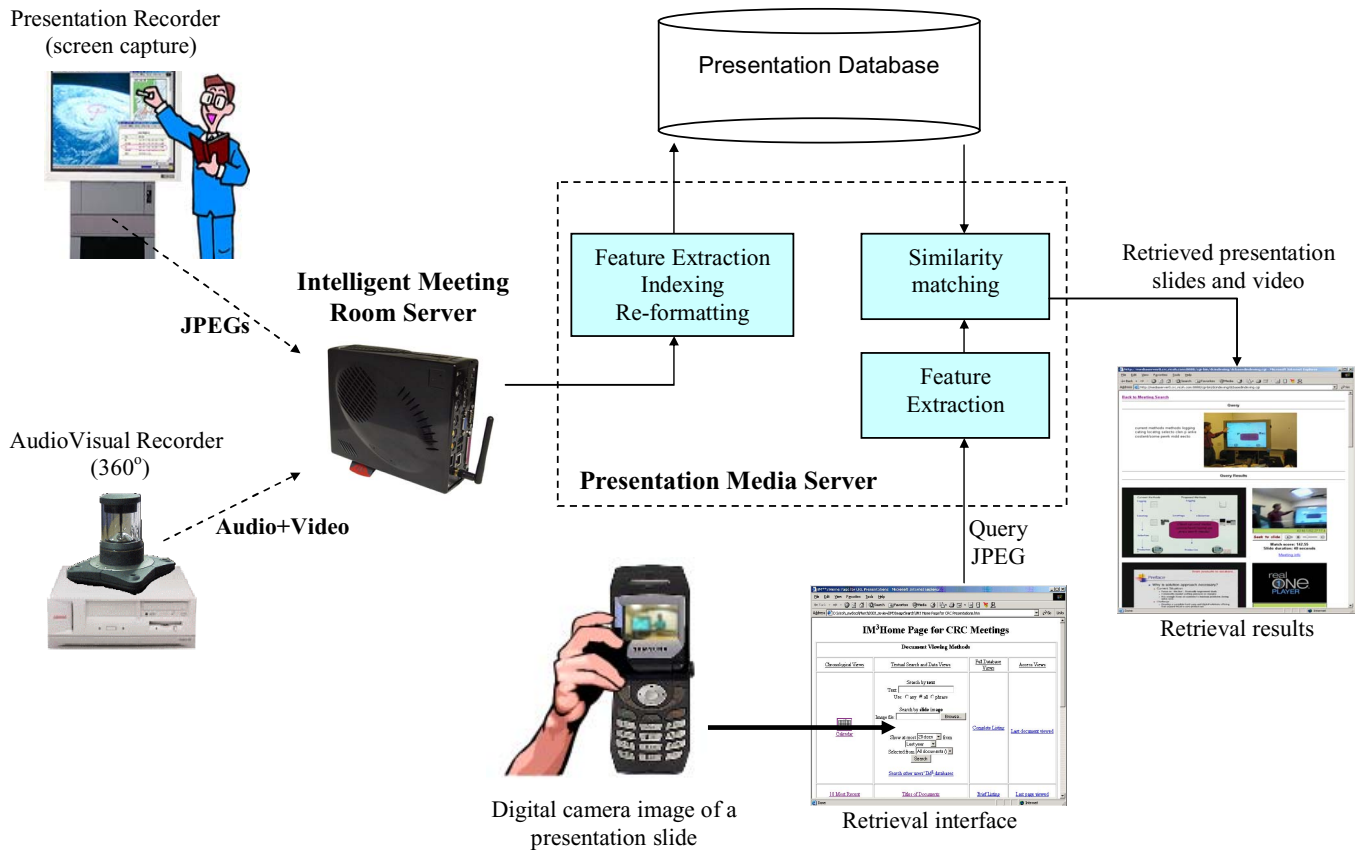[5] Erol, B, and Hull, J.J., "Linking Presentation Documents Using Image Analysis", Asilomar Conference, 2003.

Figure 2. System overview.