I-Views: a community-oriented system for sharing streaming video on the Internet

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Abstract

Streaming media is pervasive on the Internet now and is continuing to grow rapidly. Most streaming media systems have adopted the model of broadcast. Unfortunately, the nature of the broadcast-like one-to-many communication model is not able to foster interaction and collaboration among people. In this paper we discuss a community-oriented communication model for sharing streaming video and introduce a prototype, I-Views. This is a system that permits individuals to use published, communally-owned media clips in order to author narratives by assembling clips, and to build communities of similar interests based on comparison of these narratives. By offering shared authorship, tools and virtual environments, I-Views demonstrates some potential directions for 'sharable video.'   © 2000 Published by Elsevier Science B.V. All rights reserved.

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1. Introduction

From the earliest civilization, news and stories have been perpetually shared and retold. Recent story technologies — movies, radio, TV — offer a one-to-many channel for broadcast of stories but lack back channels for modification or discussion of these stories by the audience. The technology separates the teller from the mass audience. Lacking an obvious channel for interchange, it is very difficult for participants to comment on news, present their own interpretations of fiction, add their own material, or share their thoughts, experiences and impressions with other audience members (Fig. 1).

The decentralized Internet infrastructure provides an efficient means for people to distribute and discuss digital content. There are at least three ma-

jor reasons we believe that the adoption of sharing video-based content on the Internet will grow rapidly. First, the infrastructures are developing rapidly. According to RealNetworks, more than 70 million users have registered to use the RealPlayer [22]. By 2003, almost 26 million broadband subscribers will be connected to the Internet [9] and these connections will ease access to video material. Second, the penetration of low-cost PC cameras and digital video cameras is increasing daily. IDC's research [12] suggests that worldwide PC camera shipments will surge from 606,000 in 1997 to 9.2 million in 2002, a compound annual growth rate of 72.3%. These low-cost video cameras in combination with powerful personal computers will facilitate individual creation and publication of video stories. Third, people have used a variety of tools and systems to share text-based information. Chat Room [15], ICQ [11], Newsgroup, and Third Voice [19]

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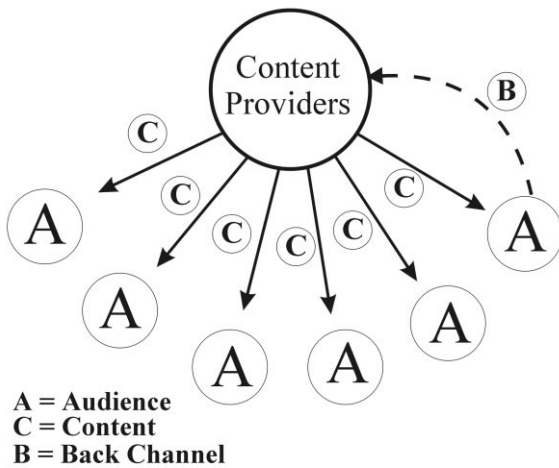
A = Audience
C = Content
B = Back Channel

Fig. 1.

have attracted multiple millions of users to exchange information, impressions and feelings on a daily basis. Applications in the domains of training, distance learning, and entertainment also need to share video-based content on a daily basis. We imagine that, in the very near future, millions of hours of streaming video will be shot by $200 digital video cameras, edited on 5000 MHz computers and distributed over gigabyte fiber Internet connections.

Further, broadband today is ill-suited to the requirements of either learning or entertainment. Most broadband programming is fragmented by advertising and the full window interface of current cumbersome broadcast-like models [9] requires viewers to seek the narrow text-based channel of today's Internet if they wish to share their impressions or ideas. New approaches to communication suggest that the integration of interaction can help us create, learn and collaborate more effectively. Inspired by the 'intercreativity' idea [1], a term coined by Tim Berners-Lee, we have addressed the following questions. What type of interchange might be developed to encourage people to share streaming video on the Internet? Can we create easy-to-use models that facilitate sharing and reusing available content which exists or will exist on the Internet? What are the best mechanisms for people to initiate conversations around streaming video-based content? How can video foster virtual communities or sub-communities?

In the past two years, we have focused on designing a system for asynchronous sharing of streaming video on Internet-like distributed networks. We have built a prototype, called I-Views, which allows widely distributed groups of people to view, edit, compare, evaluate, and discuss streaming video material over the Internet. I-Views presents the user with two types of tools: Web-based video editing tools and virtual community-building tools. The former allows the user to view, select, save, re-sequence and publish video clips; the latter allows the user to initiate dialogues by matching common interests and assumptions and to build virtual communities around stories. In marrying these two types of communication — streaming video-based viewing/editing tools and email tools — audience members are able to create and share content. By creating active dialogues around reconfigured sequences, the audience can enjoy an entertaining and intellectual interchange (Fig. 2).

Currently, we are evaluating the prototype system of I-Views using video footage documenting the Junior Summit '98 [18], which was a cross-cultural, cross-geographical and multi-language project involving thousands of children, Junior Summit staff, volunteers, sponsors, and MIT Media Lab faculty and students. The content reflects children's think-

A = Audience
C = Content
P = Content Provider
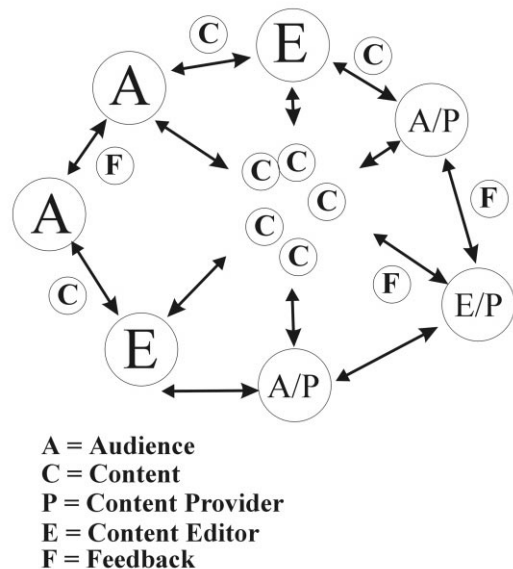E = Content Editor
F = Feedback

Fig. 2.

ing about world culture, child labor, kids banks, telecommunications access and environmental responsibility. Specifically, an international group of filmmakers including four junior filmmakers have contributed more than one hundred hours of footage. The current video database includes eighty streaming video clips selected and edited from the footage shot. We will use this particular example throughout this paper.

The paper is organized as follows. We first present a context section in which we discuss related work and our approach. We then describe the structure and implementation of I-Views, its client/server architecture and the tools developed for shareable video. The third section presents a preliminary evaluation. Finally, we draw conclusions about our contributions and offer future suggestions.

2. Context

In this section, we basically discuss two questions: what the participant is able to share and with whom s/he can share. We also discuss research works related to our studies.

2.1. What to share

The concept of 'Sharable Video' should not be limited to sharing video content only. We need to rethink 'Sharable Authorship' and 'Sharable Tools' on the Internet. A decade ago, Professor Glorianna Davenport developed a 'Sharable Video' project, New Orleans in Transition [6], on a UNIX workstation supported by a bank of video disc players. The purpose of the project was to give students of Urban Planning an insider view into the process of change. Students using this material could make use of an editing tool which allowed them to excerpt from the available segments, re-sequence and compile movies. These movies could then be imbedded into the systems which they developed for the class. On using the systems, first without the video and then online with the video, Professor Denis Frenchman at MIT commented that the video clips added enormously to the overall argument of the systems. Nowadays, millions of families and friends share a variety of still pictures and video. Recycling or

sharing other peoples' work is more efficient than each person repeating similar work. For example, one person has shot a beautiful landscape of Paris from an eagle-eyed perspective. His or her friends traveling to Paris would like to reuse the same shot and make their own travel stories about Paris. As mentioned above, ubiquitous digital cameras and fast Internet connections will definitely produce millions of hours of video content on the Internet. Sharing video content as well as sharing authorship will be widely accepted by mutual consent.

Some related work has been developed in the Web-based editing field from varying perspectives. In VideoFarm.com [20], users can download a Java-based Premiere-like editing software, edit their footage, then upload final cuts to VideoFarm's server. VideoFarm [20] is a combination of a Web-based editing application and video content hosting service. VideoFarm is developed mainly from the content author's point of view. Mimicry [2] is a system allowing users to create links to and from temporal (video and audio) media on the Web regardless of the users' ownership of the Web pages or media clips involved. Mimicry demonstrates additional features for current media players. Unlike VideoFarm, Mimicry is created mainly from the audience's point of view.

In I-Views, we rethink the roles of the author and the audience in sharable media environments on the Internet. In these environments, the distinction between the author and the audience becomes blurred. All participants are able to share authorship, video content and on-line tools. The participants can save and edit their favorite video clips and publish their new sequences back to I-Views without applying for permission from the authors of the original clips. The sharable authorship offers each individual freedom to retell stories from different perspectives and assumptions. On the other hand, all retold sequences record the original information about the sequences, such as who the authors of the original clips are, when the clips were made, etc.

2.2. Who will share with whom?

In her doctoral dissertation, Professor Judith S. Donath comments "The problem [has been] designs for data, not people." She stated how "visitors to a

site are likely to share common interests, yet they cannot communicate with each other, nor are they aware of each other's presence" [7]. The most critical mechanism lacking in current networked storytelling systems is the mechanism of initiating conversations around streaming video-based content such that it fosters the construction of virtual communities. A very real question we must ask in constructing an environment for sharing video is: Who will share video with whom?

The Junior Summit '98 generated an on-line conversation of over 2000 children; one hundred of those children later convened at the MIT Media Lab. The first night these children were given pagers for real-time messaging. Different people have different skills, interests and passions. Some children at the Summit loved playing LEGO while others focused on children's rights. Building matchmaker-like agents for their real time communications (see previous case study of ICQ) [16] was a useful approach to bringing individuals with similar interests together. In our first case-study of I-Views, we built a database of over 100 short movies representing the diverse activities of the Junior Summit. The children of the Summit were our test users. Having been at the Summit, they had an interest in the video representation of the event. Would they edit and message with it?

The question of "who will share with whom?" is informed by examples in the growth of various virtual communities, as well as by research in collaborative filtering techniques. Pascal Chesnais' Canard [4] thesis takes a constructionist approach and outlines the ASE framework, which represents the three attributes which contribute to usability within a shared technological environment: Ability, Support and Effort. Amy Bruckman's MOOSE Crossing [3] encourages interactive chats through the use of 'rooms' and 'objects' for building communities. Rooms are similar to chat channels and objects are artifacts transported from one room to others. Both studies are inspiring in terms of understanding how virtual communities emerge and grow. In I-Views, the objects are the video materials and the email messages.

Once we have a database of users, how do they find each other? The basic goal of collaborative filtering is to cluster people who have similar interests in order to grow the community itself. In I-Views, the mechanism of the comparison algorithms is able to

analyze the sequence that is made by the participant and compare that sequence to all other sequences in the database. I-Views then presents the ten most similar sequences to the participant. A user might watch some of the ten sequences and decide whether or not to initiate conversations. The comparison tool is a means for participants to match their common interests and foster new communications with others. The comparison algorithms look similar to prior collaborative filtering methods [8,13,14]. However, there are a few significant differences in terms of user data retrieval, objectives, and procedures. We compare our algorithms to that used in Ringo [14]. Ringo is an on-line music recommendation system which has mechanisms to recycle word-of-mouth knowledge by matching common interests among users.

2.2.1. Data retrieval

In Ringo, users have to vote which song is good or bad. The processes to retrieve users' feedback are very time-consuming and subjective. I-Views takes a different approach. We assume that the clips that the user selects make sense to that user. Participants need not vote. The process of retrieving participants' feedback is transparent in I-Views.

2.2.2. Objectives

The objective of Ringo is to make personalized recommendations. The users expect to get accurate recommendation results. However, because of the nature of the algorithm, the method cannot work well if the user base is not large enough. In I-Views, the comparison tools offers a means for participants to find other people with whom to initiate dialogues. Our focus is on matching people. The comparison tools also work even when there are very few participants using the system.

2.2.3. Procedures

In Ringo, the procedure of recommendation is static and black-boxed. The user votes on a set of songs, then Ringo gives out a list. I-Views' comparison tools are dynamic. The participant can move the scroll bars to justify the criteria and define the similarities. The movements of thumbnails react to the changes of scroll bars simultaneously. The participant is able to perceive the interconnection among these sequences. We are still testing and improving

our comparison algorithms and interface design. We believe that meaningful comparison tools can bring distributed participants closer together.

Other related work of interest includes XML and SMIL. While World Wide Web Consortium is rapidly developing new languages and standards [21], SMIL 2.0 [17] is supposed to have more compelling features than the 1.0 version [10]. Unfortunately, few features have been proposed which will facilitate collaboration. Collaboration might involve one video editor working with two composers on a soundtrack for a movie which will be shown on the Internet. The new version of SMIL should enable multiple audio tracks to be shared, synched and unsynched in a distributed exchange such that the editor can listen to a mixed track incorporating changes from both composers even while commenting on the effect. We would like to see that World Wide Web Consortium pay increased attention to the user's point of view which is different from that of the broadcaster. It is useful to remember that in interactive expression, a single person will alternate between the role of the author and the role of the audience.

3. Implementation

I-Views has evolved monthly. In this chapter, we present the version of July 1999: client and server side modules, database modules, net work architecture and data flow. We also discuss the comparison algorithms.

3.1. Modules on client side

There are seven major components on client side:
(1) User registration and login;
(2) Viewing original video clips;
(3) Editing video clips;
(4) Comparing video sequences;
(5) Finding the most popular sequences;
(6) Contributing video content;
(7) Searching for content.
In this paper, we discuss the following three components: viewing original video clips, editing video clips and comparing video sequences. For the other components, please read Pengkai's Master's thesis.

3.2. Viewing original video clips

In our test application, approximately eighty thumbnails are loaded into the Viewing applet (Fig. 3). Each thumbnail is linked to a video clip in the video database. The participant is able to move the yellow oval scroll bar to browse the images. The sizes and positions of the images change based on the movement of the scroll bar. In our first implementation, the presentation of images is random; ideally, the scroll bar would allow the user to browse the material according to certain criteria, such as chronology, subjects and characters. The participant can double-click on any thumbnail, and a Real G2 player pops up and plays the associated video clip (Fig. 4). If the participant finds any of the clips interesting, s/he can single-click on the clips and save them into her or his personal archive. The selected images have a thin yellow outline around them for ease of selection. After the participant selects his or her favorite images, s/he can click on the Next Page button and go to the editing page.

3.3. Editing video clips

This applet is a simple on-line, real time sequencing tool (Fig. 5), which allows the participant to drag and drop images into the editing box to sequence video clips into a longer assembly. The participant can modify this sequence by inserting, deleting, and switching clips. To preview the sequence, s/he clicks on the preview button and the G2 player pops up. When the participant is satisfied with the sequence, the participant gives the sequence a name and broadcasts it. To offer the on-line real time sequencing tool, we adopted SMIL language. The language is able to precisely synchronize the timing of diverse media elements as well as the presentation of these elements through a SMIL-enabled player such as a G2 player, which is also used in our environment. When the participant links some clips to make a sequence, the Java server and Perl scripts automatically generate SMIL tags and call the G2 player. The G2 player is able to play these clips seamlessly one by one according to the tags. Because of the nature of SMIL language, we will be able to add more features such as fade in/out and trimming clips later. The simplicity is the beauty of this tool.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

About this section: This section shows more information about your sequence including the individual clips in the sequence. Click on any snapshot to view the videos of any individual clip. Click on the "Go" button to send email. The email will include a link to this sequence.

Send Email with a link to this sequence: GO.

Sequence Information

Title:	sequence3
Author:	ppk
Creation Date (MM/DD/YY):	04 / 07 / 1999
Creation Time:	04:33.57
Duration:	0:45

Individual Clips in Sequence

Snapshot   Video Name

Different People

Make Education Better

Fig. 7.

3.4. Comparing video sequences

After the participant broadcasts the sequences, he or she is able to view the sequence by clicking on the STEP TWO button. There are three columns on this page: Snapshot, Sequence Name, and Comparison (Fig. 6). To view the sequence that the participant produced, the viewer clicks on the associated snapshot and a G2 player plays the video clip. To find out more information about the sequence, the viewer clicks on the name of the sequence and a new window pops up (Fig. 7). The window presents the related information: the author, the clips contained in the sequence, the date the sequence was produced, etc. To share the sequence with friends, the viewer clicks on the Go button and a message window pops out. The viewer can send out an email to his or her friends, who will receive a URL link to that sequence. By clicking on the URL, the receivers are able to view the sequence via a G2 player. We provide a comparison tool for the participant to find other participants who have similar interests. Clicking on the Compare button, the participant is able to

explore using a radar-like interface. We have adopted radar as a metaphor in interface design to provide a useful means for very distributed participants to interact.

In the middle of the applet, there is the sequence that the participant selects as a metric for comparison with other sequences in the database (Fig. 8). Around the selected sequence, the ten most similar sequences are displayed. On the right side of the applet, there are four criteria: Clips, Keywords, The Beginning, and The Ending. The criteria allow the participant to determine what it means to be similar; similarity is communicated in a display where thumbnails of the movies appear nearer to or farther from the center. The distance between the selected sequence and another sequence suggests how similar the two sequences are based on different criteria. For example, if the participant wants to find out which sequences have the same beginning as the selected sequence, he or she can move the scroll bar of The Beginning to the position of one hundred percent (Fig. 9). Three sequences that have the same beginning move closer to the center. Or, the participant can use a combina-
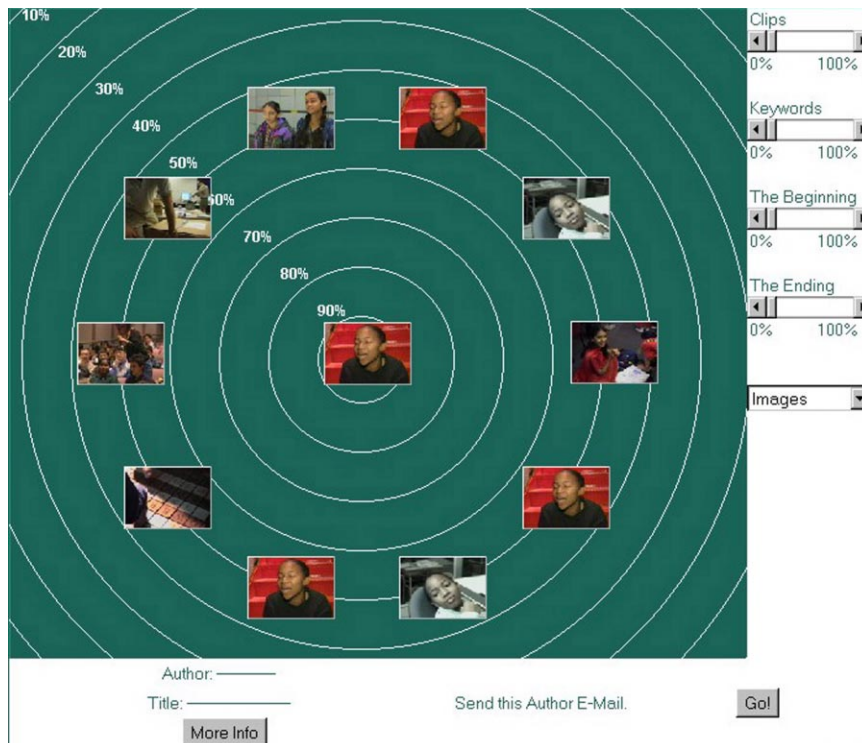
Fig. 8.

tion of the four criteria: for example, the scroll bar of Keywords can be positioned to fifty percent and the scroll bar of The Beginning to one hundred percent. Or, by setting all scroll bars to one hundred percent, the participant can easily see the movies which are most different, hence farthest away. As the participant discovers sequences that s/he is interested in, s/he clicks on the sequence to learn the author and title of the sequence. In the example (Fig. 10), the author is Vincent and the title is Interview with Nic. If a participant wants to initiate a dialogue with Vincent, s/he can click on the Go button to get a message window from which to send a message to Vincent. So far, email is the only means that we provide for participants to initiate dialogues. We are considering of designing a synchronous communication system in future versions of I-Views.

3.5. Comparison algorithms

Here, we briefly introduce the algorithms that were used to implement the comparison scale in I-Views. The comparison scale helps the participant find out which sequences are similar to the sequence that they selected as a metric. Two factors determine how similar two sequences are: the subjective factor and the objective factor. The subjective factor is determined by the percentage of a criterion; the objective factor is determined by the number of common clips or keywords between two sequences. The high level algorithm is as follows.

$$W = \sum_{j=0}^{n-1} \left(\left(\frac{1}{n} \right) * (Sf_j * Of_j) \right)$$

where W is the weight for measuring the similarity between two sequences; n is the number of criteria (in I-Views' case, there are four criteria;) Sf is the percentage of the subjective factor; Of is the percentage of the objective factor.

For example, say we have a metric Sequence A which includes Clip 1, Clip 2 and Clip 3 and two other Sequences to be compared with it: Sequence B, including Clip 1, Clip 2 and Clip 5, and Sequence
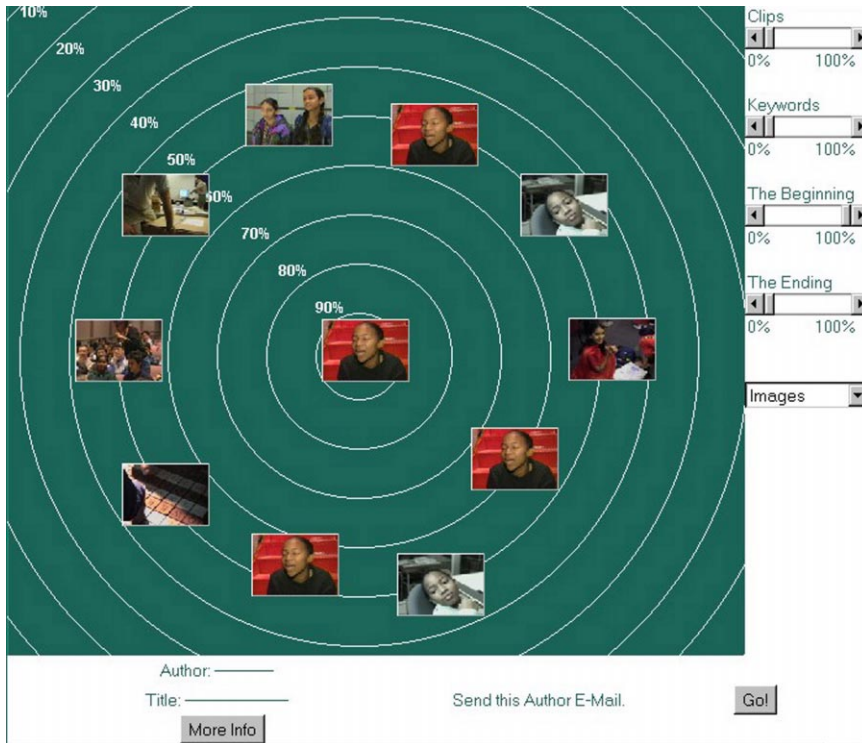
Fig. 9.

Fig. 10.

C, including Clip 3, Clip 4, and Clip 6. Let's say that we only want to make the comparisons based on similar clips between two sequences. So we move the scroll bar of the Clips to one hundred percent. *Of* is a variable determined by the number of common clips between two sequences.

$$Of = \frac{\text{the number of common clips}}{\text{the number of clips in the longer sequence}}.$$

The number of Sequence B's *Of* is: $Of = 2/\text{Max}(3, 3) = 0.667$, while the number of Sequence C's *Of* is: $Of = 1/\text{Max}(3, 3) = 0.333$. Now, *n* is 4 and *Sf* is 100%.

The weight of Sequence B is:

$$W = (\tfrac{1}{4}) * (1 * 0.667) = 0.1667.$$

The weight of Sequence C is:

$$W = (\tfrac{1}{4}) * (1 * 0.333) = 0.0833.$$

The weight of Sequence C is smaller than the weight of Sequence B, since Sequence A and B share two of the same clips while Sequence A and C share only one. The keyword-based algorithm is the same as the one described above, while the process of matching a similar beginning is similar to the one above.

3.6. Modules on server side

I-Views is a multimedia-based multi-client/server system built on various computer languages and using a variety of tools. We took a client-oriented approach in the design of the server side modules [5]. The design and implementation of server side modules are primarily based on the client side needs. We also considered the performance of communication and computation as certain limiting hardware and software resources exist. The whole system is built on freeware, such as Linux, Java, Perl, Apache, MySQL, etc. To present the system's back-end, we discuss the system architecture, then briefly describe Perl script modules.

All modules and data exist on three machines: wwwic.media.mit.edu, fellini.media.mit.edu and Yimou.media.mit.edu. On the three machines, there are four servers running simultaneously: Web Server, Java Server, Database Server and the Real Video Server (Fig. 11). The diagram shows the locations of all servers, contents, applet classes, Perl scripts, etc. Generally speaking, the IC Web server is in charge of static HTML files and contains a mirror copy of the thumbnail images; Fellini contains Java
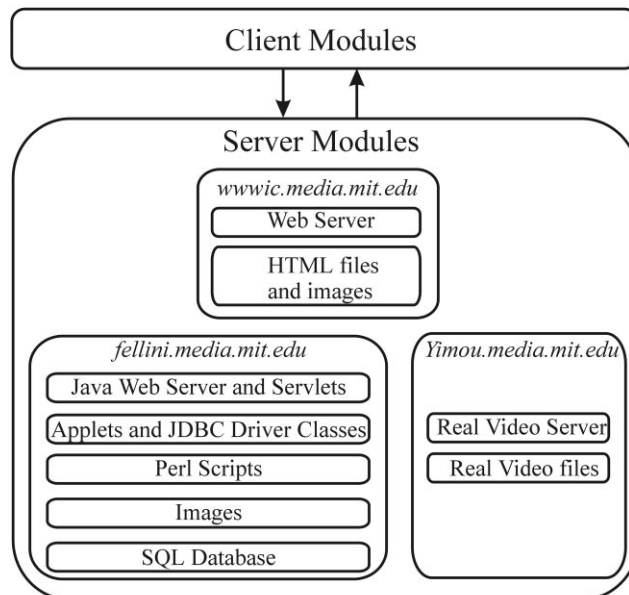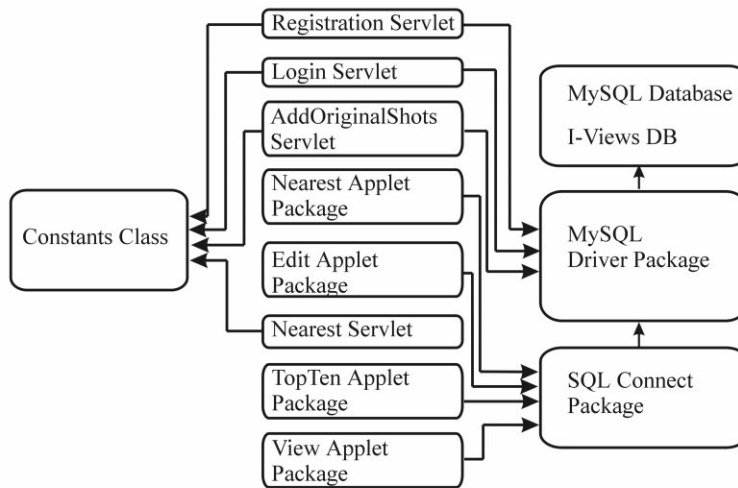

Fig. 11.

Fig. 12.

Web server, Servlets, Applets, JDBC driver classes, Perl programs, MySQL Database, etc.; Yimou is the streaming video powerhouse.

Fig. 12 represents the Applet-Servlet modules for I-Views. On the left of the diagram, there is a Java Constants class, which contains all of the URLs and pathnames in Servlet codes. In the middle of the diagram, there are eight independent Servlet and Applet modules, which have different functions. Registration Servlet handles new participants and transfers their registration information to the database. Login Servlet deals with the participant who already has registered. If the participant logs in successfully, their browser is given a cookie which includes the participant's identification number. The View Applet package contains the View applets that allow the participant to browse and watch the original video clips. The applets in the Edit Applet package deal with editing, previewing and broadcasting events. Nearest Servlet automatically generates the appropriate HTML tags, which have the Comparison applets in the Nearest Applet Package. The TopTen Applet package does the computation to find the most popular sequences based on hit rates. On the right of this diagram are the database related modules. All applet codes are associated with the JDBC driver: MySQL Driver Package. The SQLConnect Package works as an interface to the MySQL Driver Package. In I-Views, Perl scripts perform two types of jobs: generating the SMIL tags and processing support-

ing work such as searching keywords and sending email.

4. Evaluation

In our preliminary evaluation we engaged two small groups of users, a group of eight Junior Summit delegates who used the system remotely and a group of Media Lab students and faculty. Our evaluation focused on two objectives:

(1) Will users, who are portrayed in a particular set of observational video content, engage with that content to the point of creating their own video sequences from the set, publishing their sequences to their friends and developing discussion communities around this material?

(2) Can we improve the workflow and interface design of I-Views? Should aspects of I-Views be redesigned to better accommodate the community building objective?

4.1. The evaluation participants and methods

Group A: Our most interesting evaluation draws on observations about how a group of eight Junior Summit delegates used the system remotely. This user group was critical to evaluating our main hypothesis, that people presented with a system in which they can share, reedit and publish video will
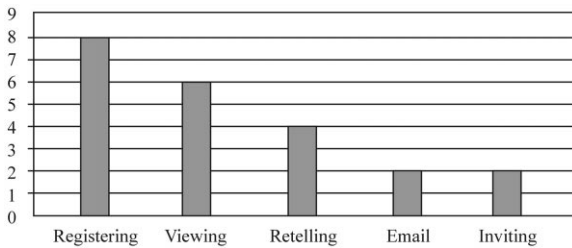
Fig. 13.

do so. All members of this group had participated in the six-month on-line forum and the one-week Media Lab Summit. They knew each other and worked together through a variety of projects, discussion groups and email lists. From June 12, 1999 to July 12, 1999, they volunteered to test I-Views. Eight of them successfully registered in I-Views and six of them were able to view video clips from I-Views. Four participants retold stories and two of them sent out email and invited other people to join in I-Views (Fig. 13). We discuss the details later.

Group B: Our second group of users, while not engaged in community building, were selected to comment on the actual design of the systems at the MIT Media Lab. During the on-site evaluation processes at Media Lab, six participants were able to register in I-Views and watch video clips. Four of them tried to retell stories. Three of them tried the email function; none of them invited other people to watch or discuss their reedited segments (Fig. 14).

Following the hands on portion of the evaluation, we talked to participants to understand more fully their engagement with the system. Our evaluation results relate to three topics: accessibility, workflow and interface design and virtual community building.

4.1.1. Accessibility

To engage with I-Views, the participant needs a fast Internet connection such as a cable modem, a
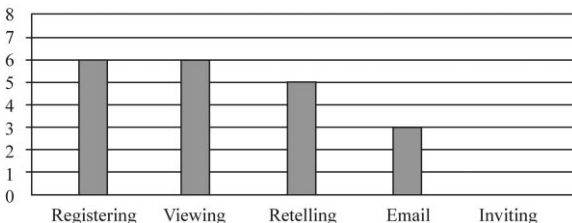
Fig. 14.

DSL, ISDN or T1. The cost of Internet connection and low data rates are two major reasons why they couldn't use I-Views. For example, one participant said:

Sorry but I don't think I'll be able to use I-Views as I'm not allowed to pay in order to download the G2 real player. I wish I could help. (Konstantina)

The bandwidth is a big barrier for most people experimenting with I-Views.

4.1.2. Workflow and interface design

We have received many valuable comments on workflow, function design and interface design. Most people like the interface design and explicit work-flow design. However, some users were confused by some parts of I-Views, particularly, the View applet and the comparison tool.

Maybe because I was using a portable, but many were very small I'd no sooner locate one and view it and mark it then I'd lose the place where the next one for my sequence was. It was a lot like those memory games where you have to remember where the face down cards are in order to turn a pair over... As I said before, I didn't like those pictures moving around — kind of neat in the beginning to watch but very frustrating to work with. I would have preferred something more static and larger. I think that I would have then made many more sequences and sent them to people. (Vincent, age 13, Paris)

Children of different ages respond quite differently to the comparison module. Children from 10 to 12 years old don't understand the comparison tool at all. We assume the reason is that the design of the tool is not clear and compelling enough. However, we found that the older children from 13 to 16 years are more willing to try the comparison tool, retell stories and send out messages to their friends and family than the younger children are. They also enjoy receiving the comments that their friends send back.

4.1.3. Community building

We have not had a large enough group using I-Views to comment on its ability to build community. In the Junior Summit database, participants retold stories focused on only two topics: LEGO and the international fashion show. While they did share

their stories among themselves and their friends through email, the system did not encourage them to submit new materials, nor would many of them have had the means to shoot, edit and upload video. Obviously creating a system that grows community requires the right mix of content invitation and tools. Neither is sufficient on its own.

As one reader of this paper commented "aside from having discussions about the finished product, get users to collaborate and/or help each other during the production process. For example, set up a competition. Divide people into groups and have them collaborate for the competition." Competition in conjunction with a constructive environment represents a critical aspect of World Wide Web initial popularity.

Within our small user group, we observed that different participants assumed different roles. Three basic roles are: observer, builder and leader. Among eight testers, about four participants were observers, two of them were builders and two of them were leaders. We also had a few new users who were invited by the two leaders. These leaders played a key role in terms of self-organizing virtual community. For example, Vincent not only watched a lot of video clips, retold stories with extreme patience, but he also sent sequences to his moderator, Julia, and invited her to join the test of I-Views. When Julia had problems with using I-Views, he immediately sent email to us and tried to solve her problems. Since the leaders played extremely active roles in growing a community, we will in the next redesign focus on functionality to promote the leader role for building up and organizing sub-communities.

5. Conclusion

In this paper we have examined a hypothesis: Can we design and implement a distributed system for video that encourages the social use of back channel to build a sense of community? Inspired by Tim Berners-Lee's 'intercreativity,' we have built I-Views, a prototype of Sharable Video that presents the stories of a global event, the Junior Summit '98. Specifically, there are two major contributions of this aspect of the work:

(1) A democratic sharable storytelling model which enables very distributed participants to share au-

thorship, tools, spaces, impressions and experiences around video stories on the Internet. Stories about the Junior Summit '98 were used as our video database as the children and parents who participated in this event offered an existing community of interest.

(2) A dynamic similarity scale: this tool attempts to match common interest through various metrics of similarity. By identifying common interest, such a tool can bring participants together who might like to engage in conversation around a topic. In turn, this could encourage the social use of back channel to build the sense of community.

Our hypothesis has been explored through the implementation of I-Views and on-site and remote tests and evaluation. This Sharable Video environment invites participants to use the back channel to build a community of interest. In our limited case study, we observe three types of participants: Observer, Builder and Leader. These types may prove useful in the construction of a tiered application in which complexity is matched to the type of user.

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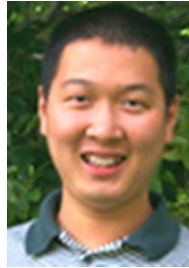
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