

Multimedia Information Systems



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Lecture 1: Applications & Trends

Definition

- **A computer hardware/software system used for**
 - **Acquiring and Storing**
 - **Indexing and Searching**
 - **Manipulating (editing and quality enhancement)**
 - **Distributing**
 - **Protecting**
- **large amount of visual information**
- **Images, video, animations, and associated meta-data**
- **Examples:**
 - **Web Media Search Engines**
 - **Mobile Multimedia Portals**
 - **Digital Libraries for Large Organizations**

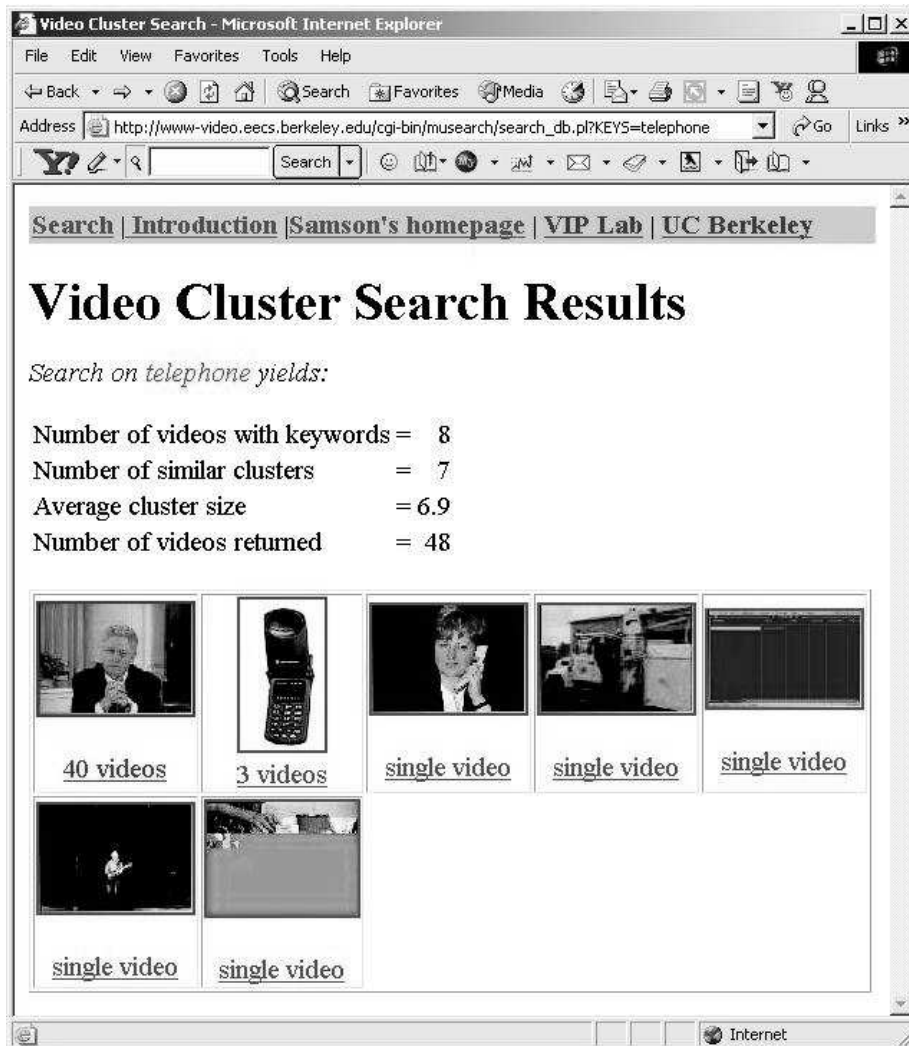
Why it's important?

- **New Content Creation**
 - **Multimedia authoring software**
 - **Diagnostic multimedia in scientific applications**
- **High-Speed Access Networks**
- **New Services and Devices**
 - **Multimedia Messaging**
 - **Multimedia Enabled Intelligent Archive**
 - **Media portals**
- **Standards become available**
 - **Digital TV, DVD, MPEG-4, MPEG-7, and IPMP**

Multimedia Web Search

- Google Image Search, Ditto, Altavista, 3Dup, Singingfish, AllTheWeb, Kazaa Media Desktop, Lycos Pictures and Sounds, MIDI Explorer, Picsearch
- Issues
 - Search keywords, display interfaces, more advanced search tools

Video Cluster Search



- Cluster near-duplicate web video clips
- Fast summarization of video using low-level features
- Issues
 - Search keywords, no semantics

Hermitage Museum

- Mixed media search tools: keyword and visual
- Virtual tour (using panoramic and 3D view)
- Zoom view gallery: multi-resolution
- Watermark protection (invisible)
- Balanced use of aesthetic, informational, and technical components
- Issues:
 - Acquisition, representation, user interfaces, search tools, copyright protection
- Link

Blob World

- Apply image segmentation to partition images into blobs
- Weigh importance based on color, texture, location, shape/size
- Issue: image segmentation is hard for general picture
- Link

Specific Domains

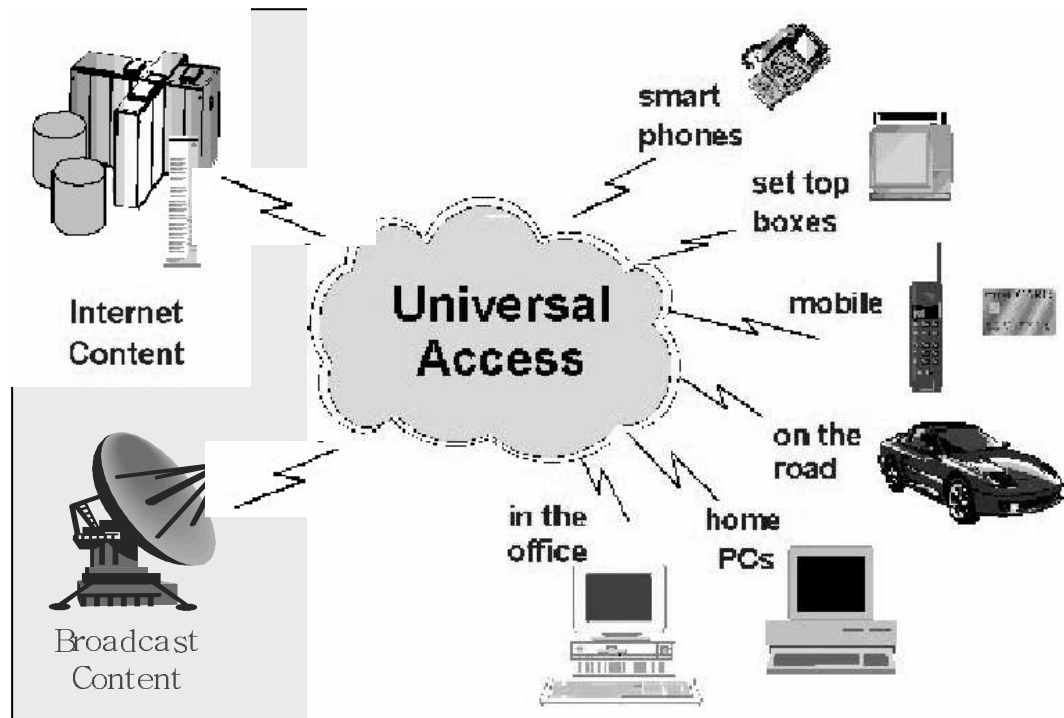
- **Geological Images**
 - Human settlement, forest, ... ([link](#))
 - Oil exploration
- **Medical Imageries**
- **Compare simulation vs. experiments**
- **Porn filtering ([link](#))**
- **Issues:**
 - Need domain experts, difficult to get data
 - Potentially very fruitful
- **Put human in the loop (relevance feedback)**



Any-Time TV (TiVo)

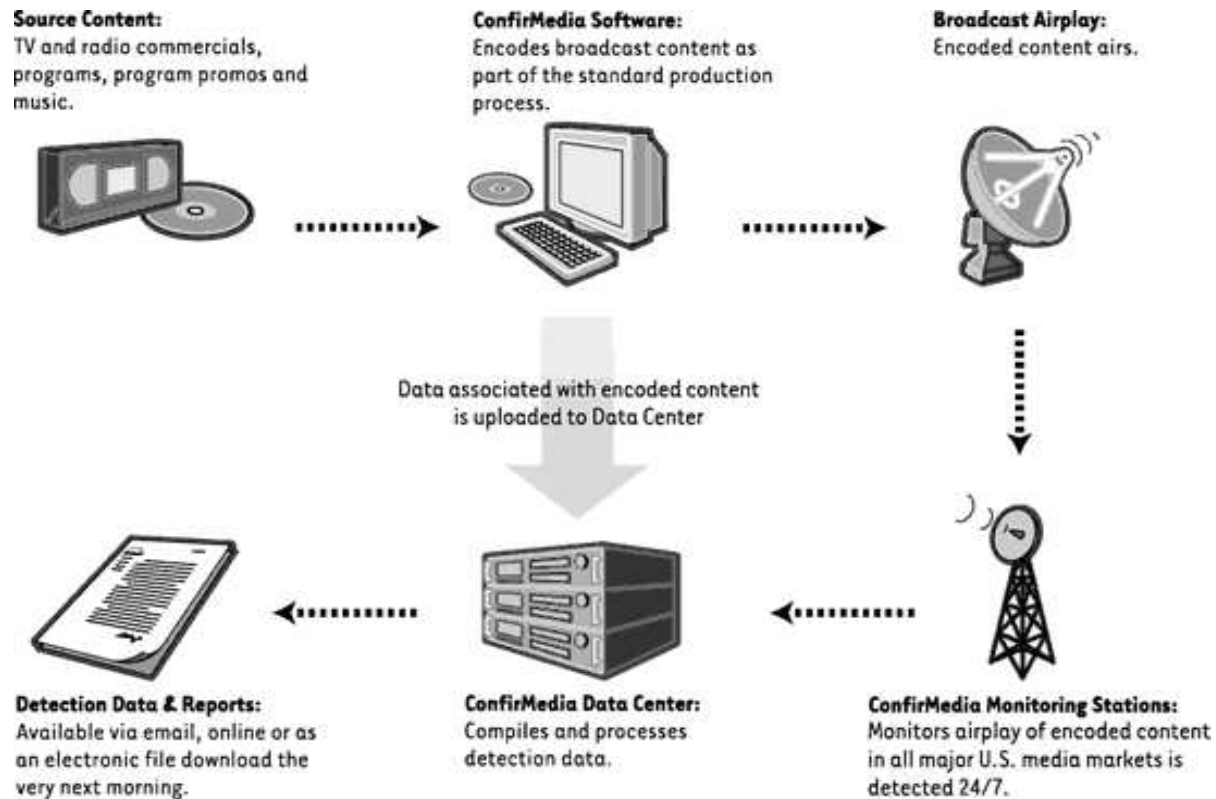
- Time-shift, local storage: 60 hours
- Skipping mode
- Instant record, live pause, simultaneous record/playback
- Highlight/trail viewing
- Search/retrieval, bookmarking, multi-source comparison/summarization
- Personal profile, multi-user profile
- Target services, ads, consumer usage data,
- Pay per choice e-Commerce

Any-Place TV: Universal Multimedia Access



- **Technical issues**
 - Scalable coding, skimming, bandwidth-restricted adaptive streaming

Broadcast monitoring



- Issue: Watermarking is expensive and the watermark may not survive the production process. Legacy content?

Virage News Video Indexing

The screenshot displays the Virage News Video Indexing interface. At the top, the address bar shows the URL: `http://abcnews.virage.com/cgi-bin/visearch?user=abc&template=template.html&query=internet`. The page features a navigation menu on the left with categories like HOME, NEWS, SUMMARY, U.S., POLITICS, WORLD, BUSINESS, TECHNOLOGY, SCIENCE, HEALTH&LIVING, TRAVEL, ESPN SPORTS, ENTERTAINMENT, WEATHER.com, REFERENCE, LOCAL, and ABCNEWS ON TV. The main content area is titled "Video Search Results" and lists three video entries:

- Congress Considers Endorsing E-Signatures**
World News Tonight
Date: 06-17-2000
Correspondent: Jim Sciutto
Transcript (unedited): THE INTERNET. >> IT'S
- 120 Arrested for Securities Fraud**
World News Tonight
Date: 06-14-2000
Correspondent: Aaron Brown
Transcript (unedited): THE INTERNET WAS USED TO
- Stock Fraud Flourishes on Internet**
World News Tonight
Date: 06-14-2000
Correspondent: Betsy Stark, Peter Jennings

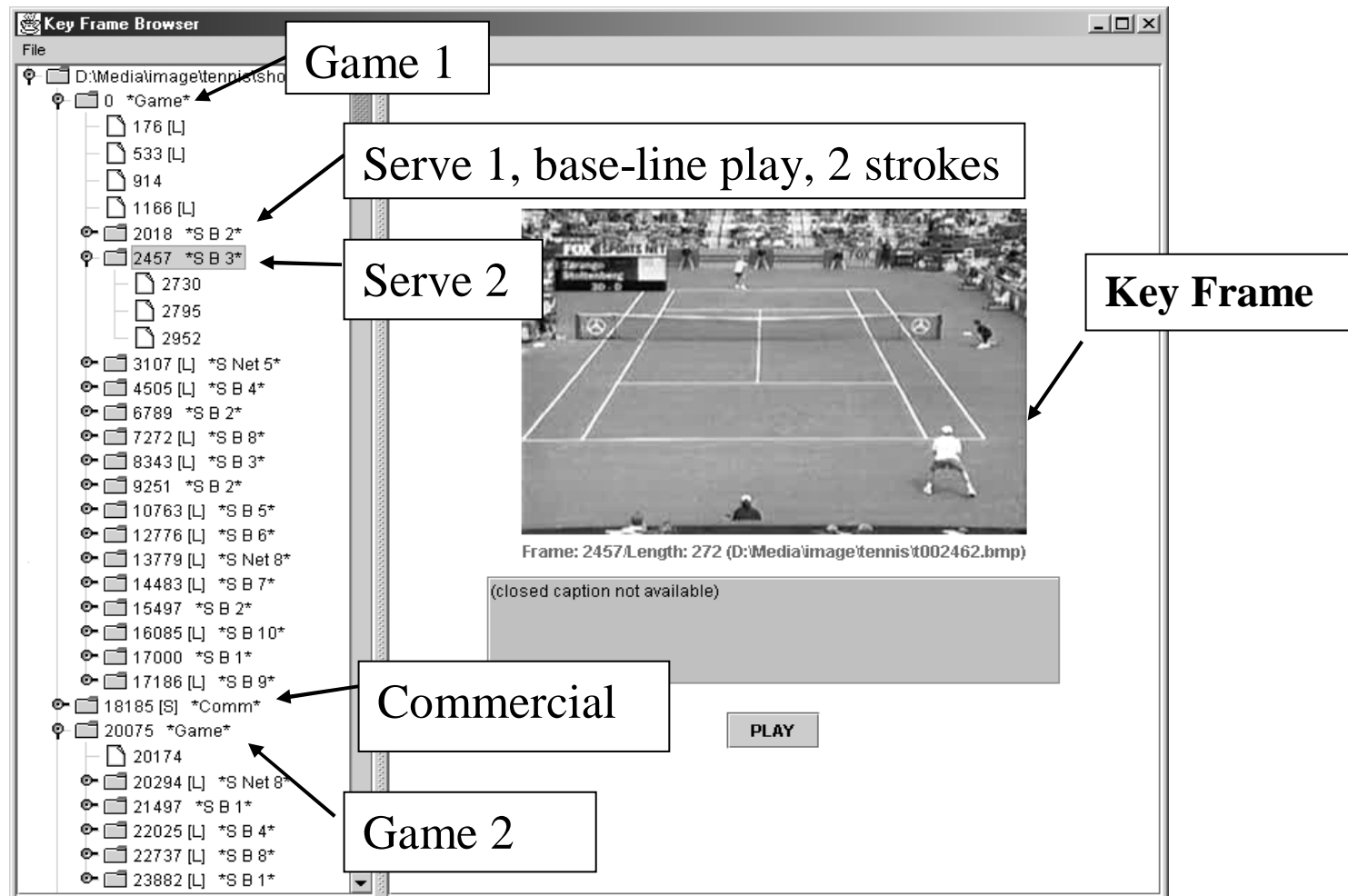
Each entry includes a "Play from beginning" button and a "View Entire program" button. A search box on the right contains the keyword "internet" and a "Search" button. A "VIRAGE VIDEO SEARCH" logo is also present. A "Tip" section suggests searching for specific terms like "health...". A "Feedback for Virage VideoSearch" link is provided at the bottom right.

Annotations on the image include:

- Key frames**: An arrow points to the "Play from beginning" button of the first video entry.
- Linking transcripts to video**: An arrow points to the "View Entire program" button of the first video entry.
- Keyword search**: An arrow points to the search input field containing "internet".

(Virage & ABC News)

Columbia's Sports Video Navigator and Streaming



3-D Search

- Hot topic
- Availability of 3D models
- High-dimensional unstructured features
- Issues: representation, efficiency, imperfection in modeling, IBR?
- Link

HP SpeechBot

- **Get sound clips from radio website**
- **Create time-aligned transcript based on speech recognition**
- **Index audio segments based on words**
- **Over 14K hours**
- **Issue: High speech quality with no music or noise, Poor recognition results**
- **Link**