

Carnegie Mellon University

Entertainment Technology Center

Improving Access to Video Oral Histories through Informedia Technologies

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Talk Outline

- Introduction to oral history opportunities
- Overview of Carnegie Mellon University's Informedia research
- *The HistoryMakers* African American oral history archive
- Field tests with *The HistoryMakers*
- Lessons Learned

Why Oral Histories?

- Oral history has been embraced as a useful tool for:
 - “...giving voice to those who have been excluded from the historical record”
 - “...adding richness and personal perspective to the historical record and engaging students and scholars in a lively study of history”
- Contextual inquiry has found that oral history recordings are considered a central historical artifact
- Significant hurdles in oral history access are brought upon by the linear nature of speech and the extended length of some interviews: Jong, F. D., Oard, D. W., et al. 2008. Access to recorded interviews: A research agenda. *J. Comput. Cult. Herit.* 1, 1 (Jun. 2008), 1-27



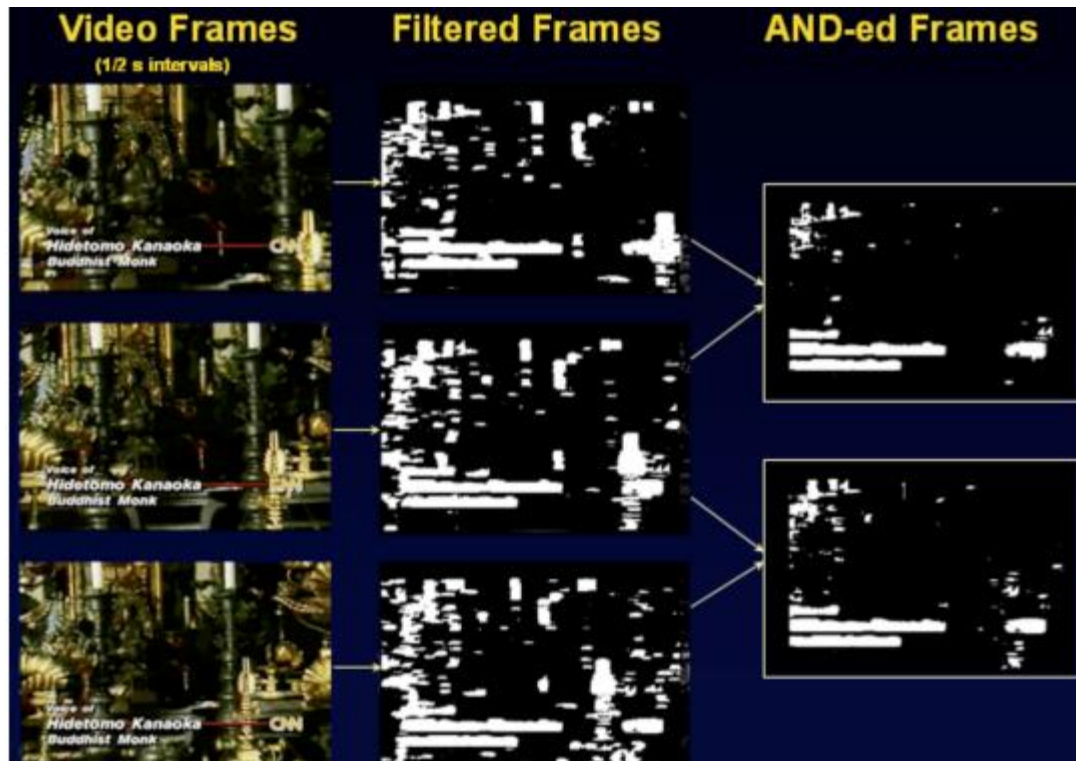
Informedia: Find within Video

- Founded in 1994 with Howard Wactlar, Takeo Kanade, Alex Hauptmann et al.

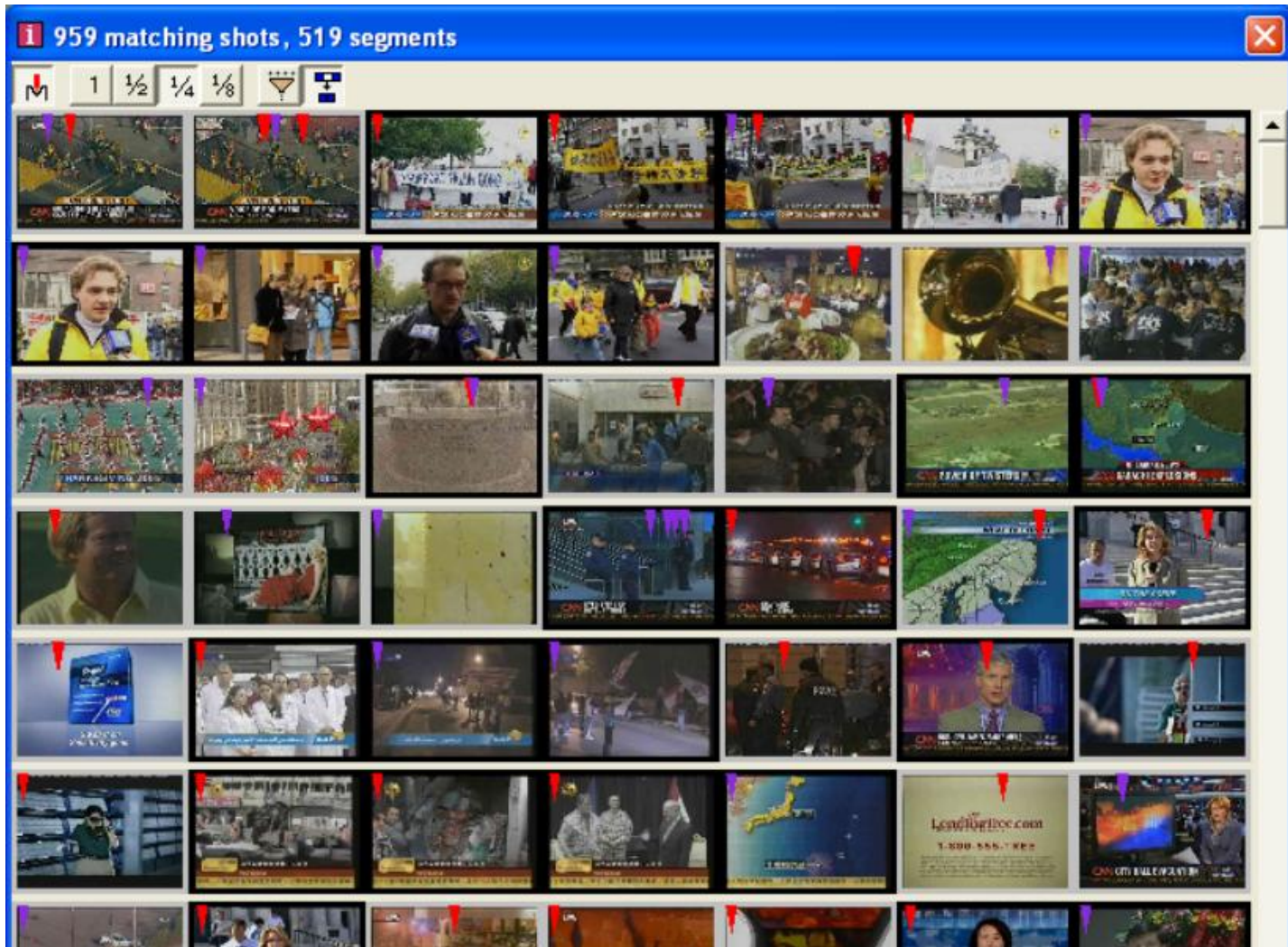


Informedia: Integrating Technology

- Speech recognition, language technologies, computer vision
- Leveraging visual redundancy in video



Infomedata: Interface Work



Infomedica: Interactive Sliders



- Thousands of automatic classifiers
- Some (e.g., face) work quite well: *PittPatt* company was acquired by Google

Informedia: More than Storyboards

The HistoryMakers interviews presented with Carnegie Mellon Informedia technology

File Search View

"Korean War" "Vietnam War"

Enter text above or drop a picture here, and click "Search." [Advanced Search](#)

All data | (Hillary Clinton) (Bill Clint... | Obama "Korean War" "Vietnam War" |

View Controller ("Korean War" "Vietnam War")

Lemur Search: 130 segments, "Korean War" "Vietnam War"

Segment Grid (one image per story segment)
 Nested Lists (grouped by interview)
 Shot Thumbnails (all shots in the top stories)
 VIBE Plot (plotted against query terms)
 Timeline View (plotted against a timeline)
 Map View (plotted against a map)
 Common Text (text lists of common phrases, etc.)
 Named Entity View (people/place/organization)

Score: 10.2 to 100
 Interview Date: 12/7/1999 to 8/5/2005
 Duration: 01:03 to 10:51

Interview groupings of 130 active segments

- John Britton interview, tape 5 (1)
 - John Britton describes the impact of the Vietnam War on Motown F
- Brooke, Edward William (2)
- Brookins, Howard (1)
- Brooks, Harry W. (2)
- Brown, Dorothy (2)
- Brown, Oscar (1)

Named Entity Connection view of 130 segments (39 active), from 16 entities

People
 Place
 Organization

15 Nodes

Vietnam
 New York
 Chicago

Grid of 130 segments

Ramona Edelin recalls stories of the terrible struggles black soldiers endured during the Vietnam War, 3:01 07/14/2003

Named Entity Connection Diagram

Informedia Recap

- CMU research project: 1994 to now (current work via Alex Hauptmann)
- Speech recognition, image processing, named entity tagging, machine learning
- Synchronized metadata
- Tested via a research community benchmark: TRECVID



Community Benchmark: TRECVID

- Investigate content-based information retrieval from digital video, with focus on video shot as the information unit
- TRECVID conducted 2001-2006+ with growing corpora and participation (since 2007, expansion beyond news as well):
 - 2004: 24 topics, 61.16 hours U.S. news (33,367 shots)
 - 2005: 24 topics, 165 hours U.S., Arabic, and Chinese news (146,328 reference shots)
- Given a multimedia statement of the topic and the common shot boundary reference, return a ranked list of up to N shots from the reference which best satisfies the topic, where N=100 for 2002, N=1000 since 2003
- More information at <http://www-nlpir.nist.gov/projects/trecvid/>



Why Community Benchmark?

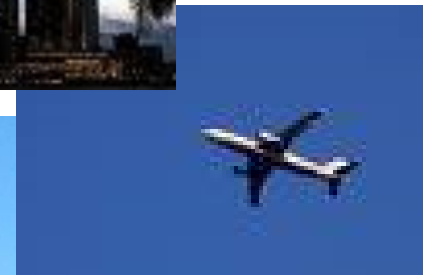


Why TRECVID?

- TRECVID provides an open, community benchmark
- Without it, we might get more “eagle detector” issues....



False Negatives
(missed eagles)



False Positives
(counted as eagles
but are not)



Informedia: Leveraging the Human User

The HistoryMakers interviews presented with Carnegie Mellon Informedia Technology, release 0.99/August 2008

File Search View

father mother brother sister

Enter text above or drop a picture here, and click "Search." [Advanced Search](#)

All data

Text/image/map search, browsing by categories or list of HistoryMakers produce sets of video

Total Shots: 0

79 / 18254

<1899 1900s 1910s 1920s 1930s 1940s 1950s 1960s 1970s 1980s 1990s 2000s

Art Bus Civ Edu Ent Law Mda Med Mil Mus Pol Rel Sci Spo Sty

Interviewee birth year:

Starting at

Ending at

Unknown

Select female segments whose time references include (1940s) AND of category (ArtMakers OR EntertainmentMakers OR MusicMakers)

M F

Select All Clear All Load Selection as New Tab

MapSearchForm

16 shots, 16 segments

1 1/2 1/4 1/8

Capture shot F1

Launch image-based search... F3

Show video F6

Show movie info F12

Bio from HistoryMakers web site...

Ability

Aeronautics

Africa

Africa-foreign public opinion

The screenshot displays the HistoryMakers Informedia interface. At the top, there's a search bar with the text 'father mother brother sister' and a search button. Below the search bar, a large brown box contains the text 'Text/image/map search, browsing by categories or list of HistoryMakers produce sets of video'. The main area shows a list of names on the left, including 'Avery, James', 'Bacon, Gloria', 'Bailey, Lee', 'Baiocchi, Regina', 'Banks, Ernie', and 'Banks Ernie 01'. In the center, there are two bar charts showing the distribution of interviews by decade (1900s to 2000s) and by subject category (Art, Bus, Civ, Edu, Ent, Law, Mda, Med, Mil, Mus, Pol, Rel, Sci, Spo, Sty). The '1940s' and 'Mus' categories are highlighted. Below the charts, there are filters for 'Interviewee birth year' and 'Select female segments whose time references include (1940s) AND of category (ArtMakers OR EntertainmentMakers OR MusicMakers)'. A map of the world is shown in the bottom left, with several regions highlighted in pink. On the right side, there's a vertical list of video thumbnails, with the top one highlighted in red. The interface also includes a 'MapSearchForm' window with a map and a '16 shots, 16 segments' window with a video player and a context menu.

Informedia: Screen Shot 2

"Jimmy Carter" "Ronald Reagan" "George Bush" "Bill Clinton" "George W Bush"

Enter text above or drop a picture here, and click

All data "Jimmy Carter" "Ronald Reagan..."

Different views (default grid, Common Phrases, Visual Info. Browsing Environment [VIBE]) for video set

View Controller ("Jimmy Carter" "Ronald Reagan...")

Lemur Search: 352 segments, "Jimmy Carter" "Ronald Reagan" "George Bush" "Bill Clinton" "George W Bush"

- Segment Grid (one image per story segment)
- Shot Thumbnails (all shots in the top stories)
- Timeline View (plotted against a timeline)
- Common Text (text lists of common phrases, etc.)
- Nested Lists (grouped by interview)
- VIBE Plot (plotted against query terms)
- Map View (plotted against a map)

Score: 12.3 to 100 Color-code

Interview Date: 12/15/1999 to 7/11/2005 Color-code

Duration: 00:05 to 14:21 Color-code


Common Phrases: 352 segments

- White House
- Bill Clinton
- African American
- U. S.
- New York
- United States
- Jimmy Carter
- D. C.
- first time
- Ronald Reagan
- African Americans
- black people
- civil rights
- President Bill Clinton

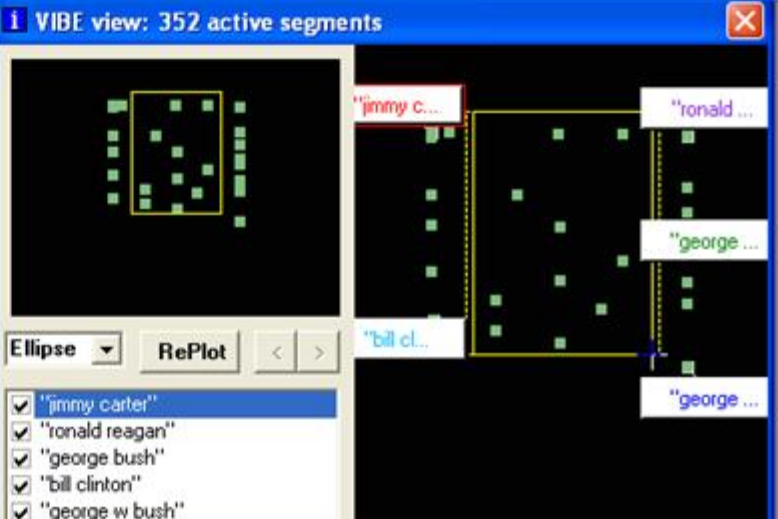
Words per phrase (at least): 2 Sort: Alphabetically

Segments per phrase (at least): 6 By Frequency

Grid of 352 segments



VIBE view: 352 active segments



Ellipse

- "jimmy carter"
- "ronald reagan"
- "george bush"
- "bill clinton"
- "george w bush"

Informedia: Screen Shot 3

Default grid, Common Phrases, Visual Environment (VIBE) for video set

Common Phrases: 352 segments

- White House
- Bill Clinton
- African American
- U. S.
- New York
- United States
- Jimmy Carter
- D. C.
- first time
- Ronald Reagan
- African Americans
- black people
- civil rights
- President Bill Clinton

Words per phrase (at least): Sort: Alphabetically By Frequency

Segments per phrase (at least):

VIBE view: 352 active segments

RePlot

- "jimmy carter"
- "ronald reagan"
- "george bush"
- "bill clinton"
- "george w bush"

Lemur Search: 20 segments, filtered : "Jimmy Carter" "Ronald Reagan" "George Bush" "Bill Clinton" "George W Bush"

Grid of 20 segments

Video with synchronized text and matches

Through interaction with VIBE view, 352 stories filtered to 20 that discuss at least one each of listed Republican and Democratic former U.S. presidents (yellow-boxed area in VIBE plot).

From News to Oral Histories

www.idvl.org

Informedia Digital Video Library

SUSQUECENTENNIAL
1860 2010

The John Novak Digital Interview Collection

Immigration Migration Civil Rights

SCIENCE MAKERS

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The Informedia research group at Carnegie Mellon University has worked with speech recognition, image processing, and language technologies through the years to facilitate machine understanding of video materials. This site, idvl.org, is devoted to aspects of Informedia research especially pertinent to Digital Video Libraries for cultural assets, with NSF funding supporting the application of Informedia technologies for oral histories. Hosted at idvl.org are examples of Informedia Digital Video Library (IDVL) interfaces that build from automatic alignment of transcripts to video, named entity detection, geocoding to support map search, and other multimedia indexing and interface technologies. The IDVL interfaces are built with Adobe Flex, producing a Flash application. Users armed with the Flash plug-in for their web browser can explore the IDVL data sets on their own.

See [PUBLICATIONS](#) for papers, slide sets, and more information, including OHA 2012.



The HistoryMakers

www.thehistorymakers.com

LEARN ABOUT OUR HISTORYMAKERS



ArtMakers

ArtMakers have produced creative work in the areas of visual art, graphic art and...



BusinessMakers

BusinessMakers have been recognized for their accomplishments in leading, managing,...



CivicMakers

CivicMakers have contributed substantially to their communities either by working for...



EducationMakers

EducationMakers include teachers, professors, education administrators, and education...



EntertainmentMakers

EntertainmentMakers are known and celebrated for their work in film and television...



LawMakers

LawMakers have made significant and influential contributions to the legal field and...



MediaMakers

MediaMakers are involved in publishing and broadcasting, and include, but are not...



MedicalMakers

MedicalMakers have dedicate their professional lives to addressing and improving...



MilitaryMakers

MilitaryMakers have taken on the responsibility of defending and providing security to...



MusicMakers

MusicMakers compose, perform, and promote music ranging from country to classical to...



PoliticalMakers

PoliticalMakers have run for elected office or have been appointed to positions in...



ReligionMakers

ReligionMakers have providec spiritual leadership at both loc and national levels....



ScienceMakers

ScienceMakers have made advances in scientific research and include chemists,...



SportsMakers

SportsMakers have demonstrated outstanding athleticism, competitive skills, and...



StyleMakers

StyleMakers include HistoryMakers who have promoted, designed, or otherwise...

SEARCH
All Biographies



The HistoryMakers

- Funded in part by Institute of Museum and Library Sciences and the National Science Foundation



- Purpose:
 - To educate and show the breadth and depth of this important American history as told by the first person
 - To highlight the accomplishments of individual African Americans across a variety of disciplines
 - To preserve this material for generations to come
- Committed to exposing the archive to the widest audience possible, making use of new technologies as appropriate



Corpora Characteristics

- *The HistoryMakers Digital Archive*
 - Current digital archive contains over 32,000 stories and thousands of hours of content
 - Life oral histories (656 fielded) with historically significant African Americans, interviewed between 1999 and 2013
- Harrisburg PA Highmark Blue Shield Living Legacy Series
 - 150 interviews 2009-2010, 2130 stories, 144 hours
- The ScienceMakers
 - Snapshot of growing digital archive at www.idvl.org; full archive available at thehistorymakers.com with registration
 - ScienceMakers recorded between 2001 and 2013



Development History

- Workshops to set requirements, 2007-2008
- Stand-alone .NET Windows interface for The HistoryMakers, field-tested 2008-2009
 - Users frustrated with closed delivery infrastructure
 - Users wanted 24/7 access from their own computers
- Flash application on openly accessible web site, www.idvl.org, with a Harrisburg PA oral history corpus added to test generality of the methods used
- Case studies reported at annual Oral History Association meetings from 2008 through 2012



June 24, 2014 Announcement

- The HistoryMakers archive to be hosted at the U.S. Library of Congress
- <http://www.loc.gov/today/pr/2014/14-045.html>
- "The collection is one of the most well-documented and organized audiovisual collections that the Library of Congress has ever acquired," said Mike Mashon, head of the Library's Moving Image Section. "It is also one of the first born-digital collections accepted into our nation's repository."



Metrics Collection

- Transaction log data (e.g., tens of thousands of actions logged for *The HistoryMakers*)
- Comments volunteered by users through email and through comments interface in the web portal
- Novice and expert commentary at workshops and at the Oral History Association demonstration session



Transaction Log Breakdown

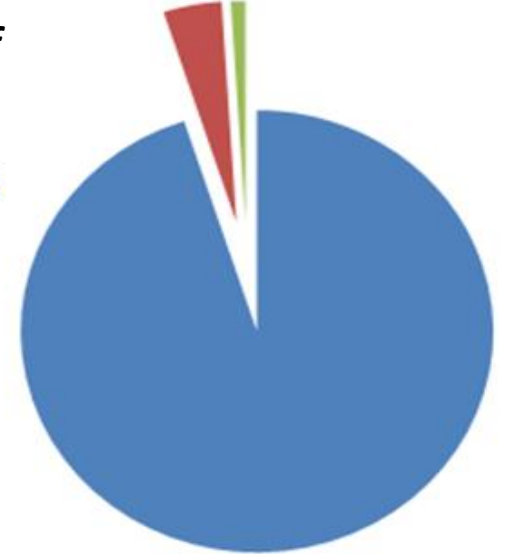
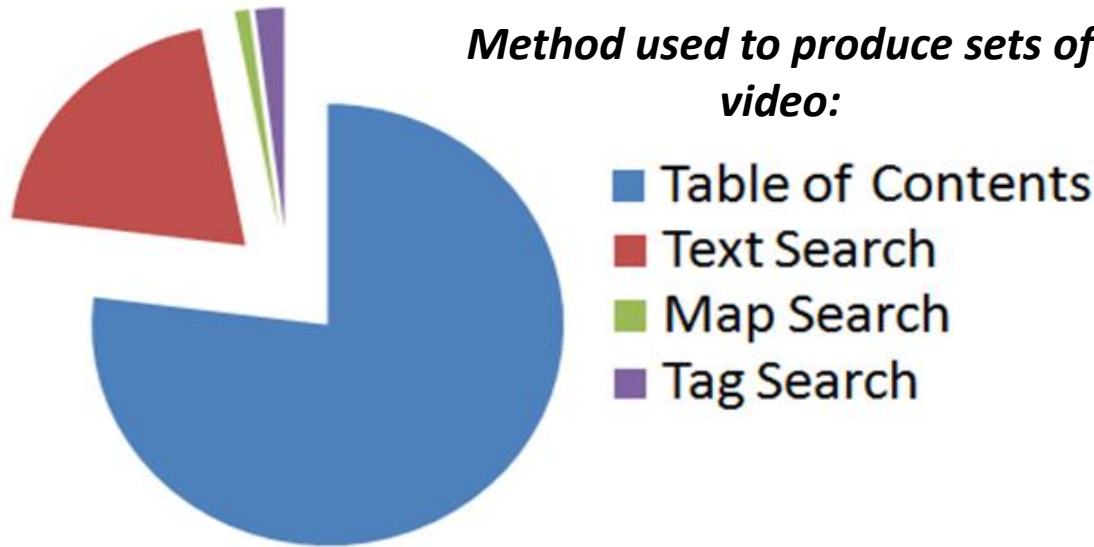
HistoryMakers logs

61% Play Video
2% Search-in-Search
<1% Personal Lists
<1% Filtering

Harrisburg logs

64% Play Video
<1% Search-in-Search
<1% Personal Lists
<1% Filtering

Method used to produce sets of video:



Simpler Navigation and Bookmarking

- Three open source projects provides better URL bookmarking (users can share video sets and stories)
- Menu bar added to provide breadcrumb-style navigation (tell users where they are)

[Main](#) : [Results \(488\)](#) : [Subset \(68\)](#) : [Video](#)

[Comments](#) | [Help](#)

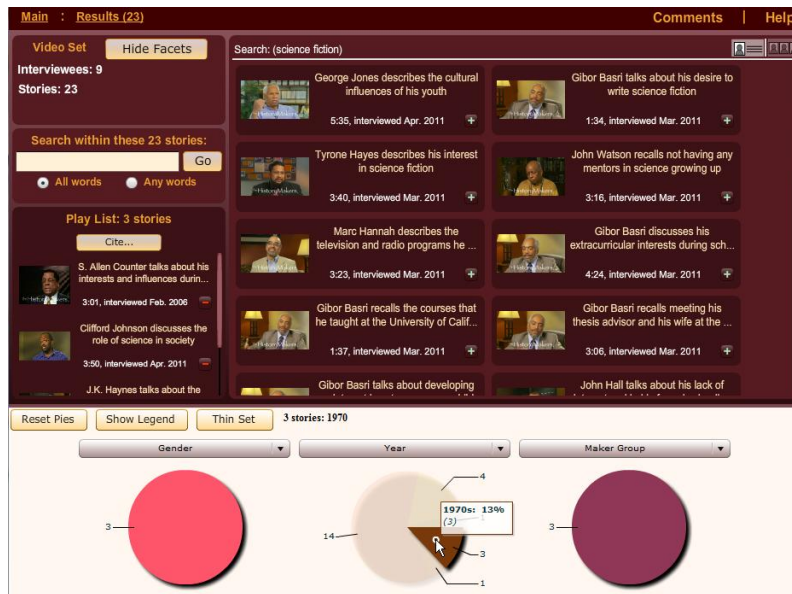
J.K. Haynes

TheHistoryMakers_®



Better Facet Communication

- Facets are presented along with the data
- Table of contents updates dynamically
- Facets described with short descriptor



Improved Information Seeking

- “Berry picking” (gathering bit of info at a time) better supported with Play List area
- Support for mixing analytic search strategy with temporal chaining



Video Set

Interviewees: 23
Stories: 68





Search within these 68 stories:

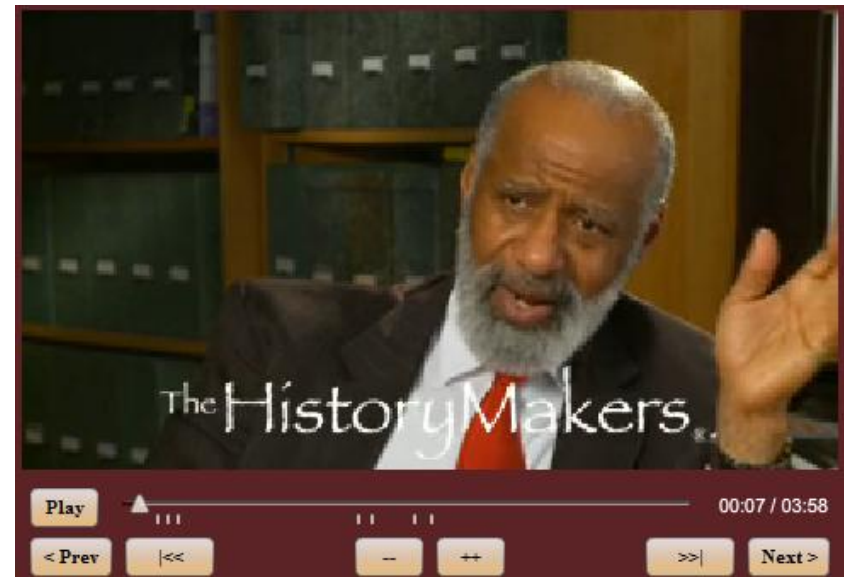
All words Any words

Play List: 2 stories

	S. Allen Counter talks about his interests and influences durin...	3:01, interviewed Feb. 2006	<input type="button" value="x"/>
	Clifford Johnson discusses the role of science in society	3:50, interviewed Apr. 2011	<input type="button" value="x"/>

Search-within: biology into 488 from {Search: science}

	J.K. Haynes talks about the influential science faculty at Moreh...	3:57, interviewed Apr. 2011	<input type="button" value="+"/>
	Edwin Cooper explains his parallel interests in biology and art	4:43, interviewed Apr. 2011	<input type="button" value="+"/>
	Edwin Cooper talks about his interest in art	3:12, interviewed Apr. 2011	<input type="button" value="+"/>
	Edwin Cooper talks about his high school	4:26, interviewed Apr. 2011	<input type="button" value="+"/>



Oral History Interface

[Main](#) : [Results \(132\)](#) : [Subset \(30\)](#) [Comments](#) | [Help](#)

Video Set Show Facets









Interviewees: 11
Stories: 30

Search within these 30 stories:

Go

All words Any words

Play List: 2 stories

Thumbnail	Title	Duration	Interviewed	Thumbnail	Title	Duration	Interviewed
	Walter Hill recounts the history of the Tuskegee Airmen	3:58	interviewed Sep. 2003		William Thompson expresses concern about the image of theTu...	2:57	interviewed May 2000
	William Thompson discusses the Air and Space Museum's Tuskege...	3:25	interviewed May 2000		William Thompson recalls Tuskegee airmen Hannibal Cox a...	4:15	interviewed May 2000
	Walter Hill describes popular areas of study on African American histo...	5:49	interviewed Sep. 2003		William Thompson calls for individual mentoring and advises ...	3:11	interviewed May 2000
	Alice Palmer details her family history in Boston and Indianap...	8:30	interviewed June 2000		Earl Strayhorn describes being drafted into the Tuskegee Airmen	8:55	interviewed Jan. 2003



Video Story Playback

Main : Results (11) : Video Comments | Help

Rusty Owens

remembers coaching Olympic swimmers.

User-given collection name and story title

User-given abstract

MP4 video optimized for web

Buttons to sequence to matches or prev/next story

Ticks on timeline showing match times

Citation generated via MDF data

About

A Harrisburg native, in school, young Owens was confused by Harrisburg's racial segregation. As student council president at John Harris High, he successfully integrated black girls on the all-white cheerleader and majorette teams. Owens earned a football scholarship at Lebanon Valley College, dropping out sophomore year to join the Marine Corps, where he became a swimming instructor. He returned to Harrisburg in the early 1960s and formed the Harrisburg Swim Club, open to all children.

Citation

Rusty Owens (Harrisburg_9), interview by Julie McKenzie, 04/02/2009, Highmark Blue Shield Living Legacy Series (Harrisburg, PA). Story 8, Rusty Owens remembers coaching Olympic swimmers.
<http://www.idvl.org/HarrisburgLivingLegacy/iCoreClient.html#&i=1635>

Transcript

Let's go back to the Olympic swimmers. So, you had a chance to go around to some of the other pools. You saw some of the parents from the Harrisburg club. So, --, again, tell me a little bit about your experience with those two swimmers that eventually went on to the Olympics.

They, --, you could have been made their coach. You know, I mean, they were the first ones to practice, Jeremy Linn, --, was, --, he didn't like to lose. Oh, boy, he was a McDevitt man and he didn't like to lose. Anita Knoll, --, was a natural type of swimmer. But they went on. --, Jeremy really got good when I left, --, in the high school program in Central Dauphin, and then he went to

IDVL Oral History Processing

1. User-Directed Story Segmentation
2. Speech Alignment Processing
3. Web Video Segmentation and Keyframe Extraction
4. Additional Automated Text Processing (OpenCalais for location extraction)
5. Searchable Index Generation (Indri – Lemur)
6. Deployment to a Web Site



Opening Steps

- User-Directed Story Segmentation
 - Human user supplies transcript broken into story segments with story titles
 - Automated tool checks for required fields (e.g., name)
 - Checks for correctness (e.g., balanced [] marking unspoken text in given transcripts)
 - Input text or Word doc converted to XML
 - XML processed by Windows scripts that write data to Microsoft SQL Server MDF database file
- Speech Alignment Processing
 - Windows Speech Recognition provides pseudo-transcript
 - Scripts produce time-aligned transcript words; this synchronization data stored in the MDF data store



Web Video Generation

- Web Video Segmentation and Keyframe Extraction
 - FFmpeg transcodes subsections of the source video into smaller web-ready MPEG-4 files, one per story
 - Resulting MPEG-4 AVC video with AAC audio stored in an MP4 container
 - Optimized for HTTP streaming via qt-faststart tool
 - Representative frame from each story extracted from video and stored with database
 - For audio-only corpora (like the Marygrove College data set), a visual reference can be given along with the audio



Text Processing

- Additional Automated Text Processing (OpenCalais)
 - Geocoding identifies common place names within the transcript
 - Thomson Reuters provides OpenCalais web service
 - OpenCalais limited to 50,000 transactions per day, with a story transcript processing counting as one transaction; in practice, this limit has not been restrictive
- Searchable Index Generation
 - Indri search engine used from the Lemur toolkit
 - Easy to use “and” (all words), “or” (any words) and adjacency (phrases) search
 - Index files must also be deployed to IIS web server hosting the service accessing data in the MDF file



Deployed to a Web Site

TheHistoryMakers[®]
ScienceMakers Video Archive

[HOME](#) [INTERVIEW LIST](#) [TERMS AND CONDITIONS](#) [PRIVACY POLICY](#) [FOUNDATION WORK](#) [HELP](#) [FAQ](#)

Albert Antoine (Finding Aid)



1925 -

Favorite Color: Purple

Favorite Food: Grapefruit

Favorite Time of Year: Spring

Interview Length: 114 minutes

Interview Date(s): March 18, 0004

Interview Location(s): Cleveland, Ohio

Abstract

Albert Antoine was born on January 14, 1925 in New York City. His mother, Wilhelmina Marie Antoine, was born in 1904 and his father, Emmanuel Evans Antoine, was born in 1896. Both of his parents grew up in the British West Indies but moved to New York, New York for opportunities for a better life. His family attended the Seventh Day Adventist Church. The church community was very strong but the rules were very strict as the church forbade dancing, and there were dietary restrictions like not eating pork or shellfish. The rules relaxed over time and the family danced on his older brother's, Lawrence Nathaniel Antoine, twenty-first birthday in 1944. During elementary school at Public School 184 and Cooper Junior High School, his mother always encouraged him to get good grades. Antoine attended Townsend Harris High School, which was a preparatory school for City College of New York.

Albert Antoine says he received a high quality education at Townsend Harris High School that prepared him well for life. He lived far away and took the train to attend high school and City College of New York. Most of his fellow students commuted as well, so there was a limited sense of community. Antoine joined the Frederick Douglass Society where he and other black students learned about African American history. He was drafted into the Army at the end of college and trained to be an Infantry replacement for the 92nd Division, however, he was never sent into combat. The Army tested him and he qualified for the Officers Candidate School and the Army Specialized Training Program (ASTP). Antoine chose the ASTP because it provided language or engineering training. He asked to have language training, but the Army sent him to Ohio State University to study civil engineering.

Albert Antoine served in a segregated military during World War II because black chemists were not allowed in the chemical warfare units. Antoine and a few other black soldiers accidentally desegregated a restaurant at Ohio State University by sitting down at the lunch counter and eating without realizing they were not allowed. After the military and after obtaining his Ph.D. degree, Antoine experienced more racism during his job search. He applied for a job through the mail and the company paid for his flight to come interview in person. When he arrived, they were shocked he was black and did not offer him the job. Antoine went to Clark College to teach chemistry, in Atlanta, Georgia. He enjoyed teaching and taught for one year but left to find a job in research.

Albert Antoine started as a research chemist at the National Advisory Committee for Aeronautics, NACA, which was the predecessor of NASA. It changed from NACA to NASA when space research was added in the 1960s. Antoine's research focused on fuel efficiency for aircraft, alternate hydrocarbon fuels, alternate fuel sources, and batteries and fuel cells. He worked at NASA for forty-two years, the last thirteen as an employee of Cleveland State University as a research associate at the NASA Laboratories. Antoine has four children, and though he did not push them toward the sciences, they all became engineers: a chemical engineer, a civil engineer, a mechanical engineer and an electrical engineer. He has five grandchildren. Even though he is retired, Antoine still reads chemical news magazines and research about renewable energy sources.

27 Stories (See Ordered Story Set)

- [Slating of Albert Antoine's interview](#)
- [Albert Antoine shares his favorites](#)

Navigation

- Home
- Terms and Conditions
- Privacy Policy
- Foundation Work
- Interview List

Interviews

by Last Initial

A B C D E F G
H I J K L M N
O P Q R S T
U V W X Y Z
Help

- Help
- FAQ




Program that extracts information from MDF to generate sets of html pages

Such html pages can be tuned by archive holder to share none, some, or all of interview metadata, e.g., allowing transcripts to be fully web-search-engine visible or tucked away within Lemur index and Flash interface



Summary of Tools, www.idvl.org

- Processing Tools
 - Start with oral history video; transcripts, titled stories as XML
 - Define facets of meaning for your corpus as XML (e.g., occupation, gender, birth year, “favorite color”, ...)
 - These XML files fed into software that runs on Microsoft Windows systems (written in Visual Studio C# and using SQL Server and Microsoft Windows Speech Recognition) produce time-aligned multimedia database
 - OpenCalais used to generate linked locations (map search)
- Interface Code
 - Adobe Flex used to generate Flash front-end interfaces
 - Other open source tools used to allow deep linking into Flash
 - CSS used to allow for styling the application
- Future Work: responsive, HTML5 interfaces





Credits

Many members of the Inmedia Project, CMU research community, and *The HistoryMakers* contributed to this work, including:

Inmedia Project Director: Howard Wactlar

***The HistoryMakers* Executive Director:** Julieanna Richardson

Original HistoryMakers Beta Testers: Joe Trotter (CMU History Dept.), SUNY at Buffalo, University of Illinois (3 campuses), Drexel University

ETC Students: Andy Korzik, Xiaoxi “Cici” Liu, Srinavin Nair

HistoryMakers Primary Contributors: Kathryn Stine, Dan Johnson, Alison Bruzek, Marta Grabowski, Paul Mackey

Inmedia Library Essentials: Bryan Maher

The NSF sponsored significant activity for Inmedia foundation work and the application of Inmedia processing and interfaces to oral histories.

