

Introduction of Video Journals Archives in the Classroom

Alexander Haubold and John R. Kender
Department of Computer Science
Columbia University, New York
{ahaubold,jrk}@cs.columbia.edu

Overview

- Motivation
- Course Background
- In-class Milestones
 - Overview
 - Objectives
 - Difficulties
 - Our Solution
 - Feedback
- Milestones Outside of Class
 - Overview
 - Objectives
 - Difficulties
 - Recommendations

Overview

- Motivation
- Course Background
- In-class Milestones
 - Overview
 - Objectives
 - Difficulties
 - Our Solution
 - Feedback
- Milestones Outside of Class
 - Overview
 - Objectives
 - Difficulties
 - Recommendations

Motivation

- Video inherently entertaining
- Typically incorporated into classroom as:
 - History/Discovery Channel-like shows
 - Content supplement/replacement
- We explore as interactive medium:
 1. Archiving of in-class milestones
(equivalent to storing written midterm/final exams)
 2. Journaling of milestones outside the classroom
(equivalent to completing homework assignments)

Overview

- Motivation
- Course Background
- In-class Milestones
 - Overview
 - Objectives
 - Difficulties
 - Our Solution
 - Feedback
- Milestones Outside of Class
 - Overview
 - Objectives
 - Difficulties
 - Recommendations

Course Background

- First-year engineering design course (E1102 at SEAS, Columbia University)
 - Emphasis on:
 - Basic engineering design skills
 - Professional development (ABET)
(team interaction, communication skills within and outside of team, formulate problem, perform research, find solutions, produce drawings and/or prototypes, etc.)
 - Technical instruction on: Matlab (computational tool), Maya (3D design tool)

Course Background

- E1102 (cont.):
 - One-term project-based service-learning course
 - >160 students/semester, 4 course sections
 - Mandatory for first-year engineering students
 - 3 hour class/week (lecture + laboratory)

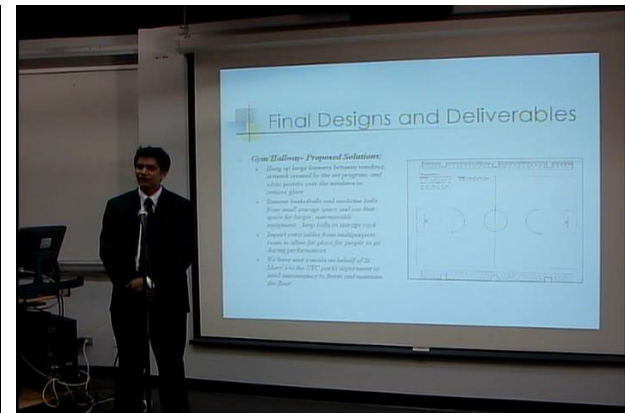
Overview

- Motivation
- Course Background
- In-class Milestones
 - Overview
 - Objectives
 - Difficulties
 - Our Solution
 - Feedback
- Milestones Outside of Class
 - Overview
 - Objectives
 - Difficulties
 - Recommendations

In-Class Milestones

Overview

- Student team presentations held twice a semester (midterm, final)
 - Formal presentation
 - Semi-professionally video-recorded (good equipment, but amateur operators)



In-class presentation with Q&A

In-Class Milestones

Objectives

- Learning resource for students:
 - Self assessment (in particular after midterm; preparation for final presentation)
 - Peer assessment
 - Archive of prior project work (research)
- Archival resource for instructors:
 - Review for grading
 - Interactive material to discuss performance with student(s)
 - Archival

In-Class Milestones

Difficulties

- Dissemination of video difficult
 - Naïve: physical formats; DVD, CD, VHS
 - Burden on staff for duplication of material
 - Workload grows linearly with number of students
 - Physical library-like setup for past material
 - Reasonable: “put it on-line”
 - What does that entail?
 - What are the implications?
 - Web server? YouTube?
 - How to search through growing collection?
 - Without indices, search is linear!

In-Class Milestones

Difficulties

- Videos are not documents
 - There exists no magical Google for video
- Manual indexing hard and burdensome
 - Ideally, human edits and builds indices:
 - Transcript of audio
 - Alignment to electronic presentation material
 - Segmentation by student speaker
 - Annotation with feedback and comments
 - Literature: 1 hr video = >10 hr annotation
 - Too expensive, no justification!

In-Class Milestones

Our Solution

- Automatic indexing possible
 - Borrow approaches from various fields
 - Automatic transcripts (e.g., IBM ViaVoice)
 - Very fast, very cheap, but highly inaccurate
 - Customization (speaker, language) burdensome
 - With filter, surprisingly good overview index
 - Visual segmentation (many approaches)
 - Divides visual material into distinct scenes
 - Thumbnail index
 - Fast browsing of video (super fast forward)

In-Class Milestones

Our Solution

- Automatic indexing possible (cont.)
 - Speaker segmentation
 - Divides audio material into speakers
 - Distinguish between students
 - Build visual speaker index
 - Not yet fully explored:
 - Optical character recognition: text index
 - Gesticulation detection
 - Intonation detection
 - Speech disfluency detection (e.g., interjections)

In-Class Milestones

Our Solution

- Large scale dissemination possible
- Our solution entails:
 - Alternative to web page “list of videos”
 - Leverage indices, provide search
 - Marginal cost for additional material
 - No cost for additional users
 - Platform independence with Java
(Windows, MacOS, Linux, Solaris)

In-Class Milestones

Our Solution

VAST MultiMedia Browser

E1102 Fall 2006 Midterm Section 1, Tape 1
Student Presentation 2006/10/24 1h 19'32"

E1102 Fall 2006 Midterm Section 1, Tape 2
Student Presentation 2006/10/24 0h 24'10"

E1102 Fall 2006 Midterm Section 2, Tape 1
Student Presentation 2006/10/24 1h 02'35"

E1102 Fall 2006 Midterm Section 2, Tape 2
Student Presentation 2006/10/24 0h 40'08"

E1102 Fall 2006 Midterm Section 3, Tape 1
Student Presentation 2006/10/30 1h 12'30"

E1102 Fall 2006 Midterm Section 3, Tape 2
Student Presentation 2006/10/30 0h 09'30"

E1102 Fall 2006 Midterm Section 4, Tape 1
Student Presentation 2006/10/30 1h 18'28"

E1102 Fall 2006 Midterm Section 4, Tape 2
Student Presentation 2006/10/30 0h 23'43"

statement task problem statement

statement ada called take into account vandalism hot tempered glass daughter cost safe client kind of fire code kind of c
set industry safe help therapy cost ventilation make covering ndray loss cost loss fall basic basic drainage two
data cultivation area school building reduce heavier list aluminum structure graph safe statement information
problem education temperature provided act pot extra covering model area glass greenhouse student maintaining
run greenhouse two wall greenhouse wall replace price graph life edge time new safety safety phys
and how feature take greenhouse exit possible that is frame and how research performance fellow disabi
feature fire make build school glass keep light visit light project come exit
looking purpose design remain greenhouse rigid cost different close dot issue make greenhouse
model minimal plot model proper keep glass easy set important american intended
legal air fall show purpose needed third mind disabled room school
accessible structure cost visit physical pleasing public time educational
quiet time disadvantage weekend disadvantage ground general typical
new low place noise translucent purpose specific back
amount existing weather color account project
people small translucent disabled
land task opposed back warm limited
space live group

0:01:30 | 0h 00'25"

0:01:50 | 0h 00'25"

0:02:16 | 0h 00'35"

0:02:51 | 0h 00'26"

0:03:19 | 0h 01'02"

0:04:22 | 0h 00'32"

0:04:55 | 0h 00'24"

0:05:19 | 0h 01'41"

0:07:00 | 0h 00'34"

0:07:35 | 0h 00'41"

Text Search (Meta Data, Filtered Text, Raw Transcripts):

Clear Search Meta Data Keyphrases Transcripts

Least Information Most Accuracy

Streaming Video Keyframe Player

Scene Segmentation 23 Zoom 25 Text Context 30 sec

Least Distinctness Most Least Information Most Least Context Most

Most Detail Least Detail Least

Enable/Disable Content: Thumbnails Timeline Video Audio Index Phrases Text Phrases

CLICK HERE TO BEGIN USER STUDY

Alexander Haubold admin 1600x1200 Ready

In-Class Milestones

Feedback

- Tool in use for 2 ½ years
- User studies after every semester
 - Targeted tasks to measure effectiveness
 - Surveys to collect feedback
- Considerations made for changes in tool
 - Improve speed at which material is found
 - Adjust interface to meet student and instructor needs
 - Architecture for off-campus connectivity

In-Class Milestones

Feedback

- Generally well-received
 - Students, instructors appreciate availability
 - Desire for more material
(e.g., lab lectures)
- Improvements always desirable
 - Annotations by instructors (interactive feedback)
 - Magic!? (Face recognition)

Overview

- Motivation
- Course Background
- In-class Milestones
 - Overview
 - Objectives
 - Difficulties
 - Our Solution
 - Feedback
- Milestones Outside of Class
 - Overview
 - Objectives
 - Difficulties
 - Recommendations

Milestones outside of Class

Overview

- Student teams journal their activity
 - Include various material:
 - Client interviews
 - Meetings
 - Team interaction
 - ...
 - Required to produce edited version
 - Granted full artistic rights



Team video: shot of project site

Milestones outside of Class

Objectives

- Learning resource for students:
 - Self assessment (external view of team interaction)
 - Archival of events for later review
- Short project promotion
 - Audio-visual guide through project (Problem statement, client interview and interaction, team interaction, solution)
 - Archival of student project material

Milestones outside of Class

Difficulties

- Shortcomings due to several factors
 - Varying video editing know-how
(range from pre-amateur to professional)
 - Varying artistic approaches
(creative Rap video vs. 10 minute shot of meeting)
 - Most productions miss objective regardless of creativity
(artistic freedom was inappropriate choice)



Team video, set up as a Rap Video

Milestones outside of Class

Recommendations

- Still believe team videos are good venue
- Somewhat strict structure required
(guidelines on good vs. bad elements)
- Artistic freedom within reason

Thank you!

Questions / Answers?