Introduction of Video Journals Archives in the Classroom

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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)
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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)
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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 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
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)
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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
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?