A Media Mixer for online learning

Making learning materials more valuable for their owner and more useful for their consumer

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Structure of the talk

- Trends in e-learning: more creation and consumption of video
- Required multimedia technology
- Media fragment creation, description and re-mixing in a case study: VideoLecturesMashup
- The MediaMixer offer for your content
Trends in e-learning
Online video is growing

- 78 hours of video is uploaded to YouTube per minute
- Online mobile video viewing

Video streaming accounts for 37% of all mobile traffic

Of all video streaming traffic, YouTube accounts for 45%

A Cisco study on mobile traffic growth expects
- 66% of all traffic by 2014 will be video
- having increased 66-fold from 2009 to 2014
Online education is growing

• Learners & teachers are using the Internet both as a complement and a replacement to traditional learning
  – 60 million downloads of Open University materials at iTunes U in 4 years
  – “classroom flipping”: watch the lecture at home, spend time in class on the exercises
Online video based learning

• Open content: Open CourseWare (20 000 courses)
• Massive lecture capture system: Opencast Matterhorn project (700 universities)
• Online portals specialised in video lectures:
  – Polimedia
  – VideoLectures.NET
    • 25 000 academic videos
Requirements on video-based learning

– E-learners need to be able to search and **retrieve** the material they are looking for (based on its subject)

– Consumption trends towards mobile and on-the-go means interest focuses on the **parts** of the material of particular interest
What about sharing & monetarizing content?

- Huge & growing amounts of valuable AV material but unable to effectively re-distribute or re-sell it.
- Media owners & platforms would like to continue to benefit from the (online) availability of (older, long tail) content – currently content to make a free distribution (cf. open video) or use ad-supported hosting (eg. YouTube)
The rise of MOOCs

- MOOCs: Massive Open Online Courses
  - 3 million user accounts, over 400,000 students registered within 4 months at edX
  - A learning „offer“ may be a remix of different content sources
- Cost saving against recording new material
- Tailored learning course for each learner
- Multiple value from a single learning unit
Needed media technology
Media metadata

As video collections grow, how to find again a specific video part?

• Computers can only automatically extract low level media features while humans tend to query with high level “concepts” or “events”
  – Query by Example (QBE)
  – Content based Media Retrieval
  – Computer Vision

“Semantic gap” an ongoing research issue!
Google creates neural network, teaches itself to recognize cats

By Rick Burgess

On June 27, 2012, 4:30 PM

Google engineers claim they've designed a computer network capable of analyzing, categorizing and ultimately teaching itself to recognize the content of images. The "neural network" was fed 10 million images from YouTube video thumbnails and -- without being told how -- created its own concept of what a cat is.

In fact, programmers found that the system had created a fuzzy, dream-like image of a cat's face from scratch (pictured to the right) as at least one generic reference used for identifying felines.

"We never told it during the training, 'This is a cat,' " said Dr. Dean, who originally helped Google design the software that lets it easily break programs into many tasks that can be computed simultaneously. "It basically invented the concept of a cat. We probably have other ones that are side views of cats."

Media metadata (3)

- Textual metadata has long been a key factor in media collections
  - Dublin Core has summarized the main fields for indexing and retrieval; different industries have developed richer metadata models
  - Manual entry by collection experts, varying terminology and interpretation
  - Increasing automated production of metadata from all available input sources (e.g. ASR, OCR, subtitling, transcripts, associated text...
Media metadata (4)

- Effective retrieval needs good query formulation
  - Controlled / known vocabularies
  - System learning, query suggestion or drill-down search
  - Term normalisation / mapping
- „Named entity recognition“ (NER) extracts distinct entities out of natural language text
  - Disambiguation & classification
  - Trend towards global unique identification
Media metadata: trade-off

- More metadata – better retrieval / computer supported re-use
  - More manual curation – more cost
  - More automated creation – less accuracy

Pre-annotate Using automatic techniques → Annotate Human oversight via intuitive tool
Pre-annotation

- Determine the fragments of the video material and their topics
  - Segmentation based on 'natural markers'
  - Concept detection in video
  - Topic identification from extracted text

Pre-annotate
Using automatic techniques

Annotate
Human oversight via intuitive tool
Annotation

- Model the video description in a structured and semantic way
  - Structured metadata format
  - Media fragment identification
  - Entities mapped into a knowledge domain
Storage and retrieval

- Metadata store alongside the media repository
  - Query by topic on the metadata store
    - Topic expansion via the knowledge model
  - Result set is a list of relevant video fragments
The MediaMixer hub

- Video analysis tools
- Video annotation tools
- Video metadata creation and publication
- Digital rights management
- Media search and retrieval
- Media negotiation, purchase and re-use

AV Content Provider

1) AV material analysis and annotation
2) Fragment Definition
3) Rights and Cost Assignment

4) Fragment Upload
5) Clearing (Sell)

AV Content Demander

6) Search, Browsing
7) Rights and Cost Assessment
8) Download

9) Composition of new AV materials
10) Clearing (Buy)

Media Mixer Repository

annotated & linked Media Fragments
VideoLecturesMashup

Use case and demonstrator developed in MediaMixer project

With Jozef Stefan Institut, Viidea and the VideoLectures.NET platform

Credits: Tanja Zdolsek and Ana Fabjan (JSI)
MediaMixer use case: VideoLecturesMashup

Extend e-learning video platform VideoLectures to mash up video fragments for learners to quickly browse across distinct collections on the same topic.
MediaMixer use case: Video fragment creation

Fragments were created based on the slide synchronisation timeline.

Transcripts (auto-generated by speech-to-text technology where necessary) were parsed and split across fragments.

... there are three Kingdoms of Life, Bacteria, Archaea and Eukaryota...
MediaMixer use case: Video fragment annotation

Fragments were then annotated by extracting topics from their textual metadata (slide OCR or speaker transcription).

Topics are connected to a global knowledge model (DBPedia).
MediaMixer use case: Video fragment management

Annotations are managed in a separate metadata store.

The store provides a semantic query endpoint returning lists of video fragments matching a query topic (including semantically related topics).
MediaMixer use case: Video fragment playback

- 5:35 - that chemistry has no relevance whatsoever to the life
- 8:35 - solid foundation for studying any kind of life science.
- 15:49 - chemistry every day and will for the rest my life.
- 16:06 - for the rest of your life.
- 21:31 - of your life.
- 8:59 - That’s an enormous skill in not only computing, but in life.
- 10:35 - Because life is way too short to do anything that’s
- 15:42 - have as few as, say, two a year, it dominates their life.
- 41:07 - program in your whole life.
- 4:41 - The Three Kingdoms of Life
- 5:12 - Basic Unit of Life: the Cell

The front end uses HTML5 or Flash. Both codebases are extended to support video fragment playout.

Individual playback can be modified to linear or non-linear channels (for e.g. a TV or mobile video experience)
I will start by giving a general introduction into Bioinformatics, including basic biology, typical data types (sequences, structures, expression data and networks), and established analysis tools. In the first part, we will focus on the three domains of life: Bacteria, Archaea, and Eukarya. Each domain has unique characteristics and ways of life, such as prokaryotes and eukaryotes. The slide also highlights different subgroups within these domains, showcasing the diversity and complexity of life as we know it.
The MediaMixer offer
Welcome to the MediaMixer community portal!

Making Media more valuable for its owner and more useful for its consumer

Free sign-up

**Intro to all technology at community.mediamixer.eu/about**

Updated with latest materials on all Media Mixer topics:

- Technology use cases
- Demonstrators
- **Tutorials, cf. Core Technology Set**
- Presentations
- Software
- Specifications

http://community.mediamixer.eu
MediaMixer Webinars

From September 2013 to February 2014 MediaMixer will offer streamed live at http://mediamixer.eu/live, and here you will a viewers may post their questions to the speaker via Twitter o TitanPad!

Categories
Top » Computer Science » Software and Tools
Top » Computer Science » Semantic Web

LIVE Webinars at http://mediamixer.eu/live cover all technology areas and use cases
RECORDINGS on VideoLectures.NET
Next live talk this Thursday 14.11. at 1100 CET

What is MediaMixing? – making media more valuable for its owner and more useful for its consumer
Lyndon Nixon

Describing Media Assets – media fragment specification and description
Raphaël Troncy

November 14th, 2013 CET
Fragmenting your Media Assets meaningfully – media analysis for fragment detection and extraction In this webinar we will discuss a set of video processing techniques for media fragment creation and annotation. These include techniques for the temporal segmentation of the video into shots and scenes, the re-detection of appearances of specific objects throughout the video, and the detection of concepts that describe the temporal video fragments. Such techniques are the first step towards converting the raw video material into meaningful media fragments.

Vasilikos Mezaris (CERTH)
MediaMixer Winter School

1st Winter School on Multimedia Processing and Applications

Dublin, Ireland, January 6-8, 2014
Co-located with MMM 2014

We are pleased to announce the 1st edition of the Winter School on Multimedia Processing and Applications.

The winter school aims at offering participants from all over the world – both PhD/MSc students and young researchers – training on the latest technological developments in the area of multimedia processing (media analysis, media annotation, media rights management) and of emerging multimedia applications (in the Sensor Web, audiovisual archives, TV broadcasting, digital preservation and e-learning domains).

Learn about and get hands-on experience with the media technology.
http://winterschool.mediamixer.eu
Thank you for your attention!

Contact us:

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Collaboration - email lyndon.nixon@modul.ac.at

Say hello @project_mmixer