

technical OUTLINE

Intelligent Research Environment
for the Tate Online Event Archive

Main Objectives

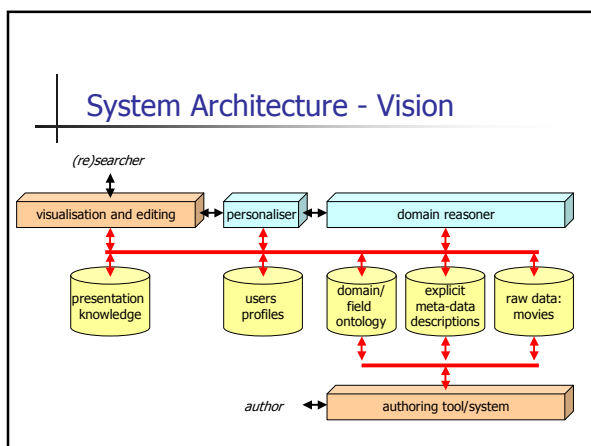
- a user/researcher should have the ability to
 - effectively retrieve the information that is relevant to a task at hand
 - organise results in a manner suitable to a task at hand

Main Objective

- the provision of **intelligent behaviour** in the retrieving/research interface – searching and browsing environment – whereby the user is **guided** and **helped** to find and organise **relevant** material in an **effective** manner
 - the system will be user driven, but the effort (knowledge, time, etc.) required from the user will be reduced, as compared to a direct interface to the database/archive
 - the system could be described as a searchable database/archive which provides users with intelligent personal assistants

General Requirements/Objectives

- effective **fragmentation**, including rich fragment descriptions
- comprehensive **representation schemes – languages** – that could capture the aforementioned descriptions
- useful **“intelligent” behaviour modes** at the interface with the user, on the bases of the employed representation language
- **quality** aspects – quality of delivery, time delays, etc.



Subsystems – Behavioural Level

- 1 retrieving/researching
- 2 interface concept
- 3 authoring (fragmentation and meta-data description)

Retrieving/Researching

- basic features
 - 1.1 search
 - remove the user as much as possible from the structure of the internal (to the system/database) structure of meta descriptions
 - results sets should not include irrelevant material
 - 1.2 browse
 - provide context dependent concise but comprehensive snapshots (different levels of detail, different topics, etc.)
 - present information from different perspectives (views)
 - edit results
 - immediate: shopping basket, summarise previous activity
 - long term: organise own growing list of selected fragments
 - user-driven creation of annotated (user specific) structures

Retrieving/Researching

- advanced features
 - summarise
 - sets of selected resources(archive objects)
 - topics
 - suggest
 - the system takes initiative, guessing the user's intentions, and suggests further (believed useful) material

Search

- search facility
 - normally used by users who have (at least partial) knowledge of the specialist jargon and have a good idea about what they intend to find
 - users (in particular if new to the system) may not be aware of the exact terminology employed in the (meta-data) description of the archive objects
- search support
 - presentation of the exact terminology in the search interface
 - free term search: employ thesauri, domain definitions and NL techniques in order to allow the user to employ search terms beyond those explicitly used in (meta-data) descriptions
 - retrieval through association with other (previously retrieved) objects – content based search – through relationships like “similar”, along different classification criteria
 - presentation of search results (see 3D hierarchies – browsing)

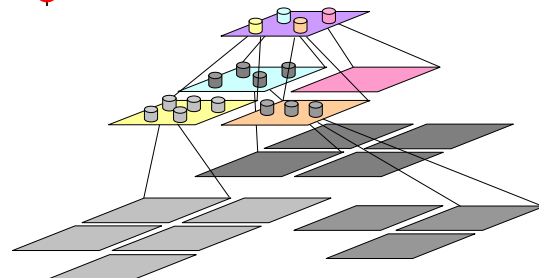
Search Support – Examples

- presentation of terminology
 - ability of user to view meta-data description of selected/retrieved objects
 - explicit descriptions
 - automatic compilation of implicit descriptions (from the definitions contained in the domain ontology)
- free term search
 - natural language wrappers (grammars) for structured search terms
 - infer structured term from sequence of words
- retrieval through association
 - “like content of video-object A, but from a similar perspective as that in adopted in video-object B”

Browse

- browsing facility
 - normally used by users who do not have a clear idea of what they intend to find (it is a discovery process) or who do not know the domain jargon (whereby the search is implemented)
- browsing support
 - provide **overviews** on different **criteria** and at different **levels of detail**
 - an overview consists of objects that are all representative for the selected main criterion and, at the same time, each of them is representative for a sub-criterion (or a deeper level of detail)
 - such overviews are structured in three dimensional hierarchies
 - technical challenge: automatic/intelligent compilation of such hierarchies (i.e., when they are not *explicitly* represented by meta-data)

Browsing – 3D Hierarchies

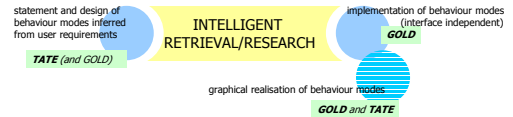


1 Retrieving/Researching – Intelligence

- in searching and browsing the intelligence of the system may be transparent to the user
 - the methods of searching and browsing may seem/be similar to other's systems, yet the results provided are/should be much better

1 Intelligent Retrieval/Research

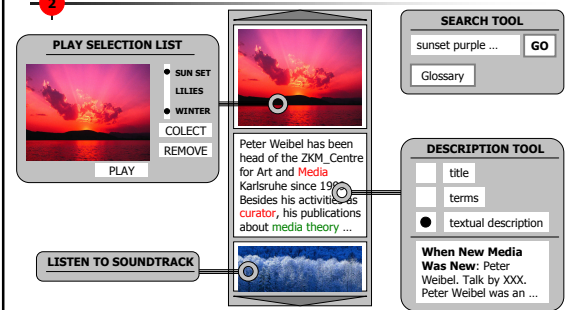
RESPONSIBILITIES



2 Interface Concept

- access to glossary of search terms
 - needs thinking
- results
 - view indicators in a brief format (thumbnails, title, speaker, summary description, ...) that allows visibility in juxtaposition
 - play fragments in short and in context of larger event
- presentation/investigation tools
 - play fragments in short and in context of larger event
 - listen to soundtrack
 - view detailed textual description
- further searches ("researches")
 - content based (like/unlike)
 - term based : highlighted keywords (see above)
- summaries of results

2 Interface Concept (floating tools)

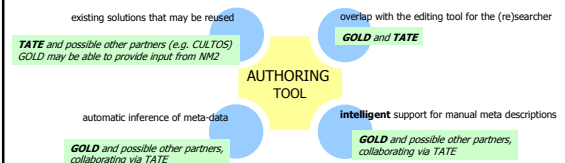


3 Authoring

- development of relevant ontology
 - devise **fragmentation criteria** relevant to the Tate's archive of online events
 - devise (reuse and infer) an **ontology** relevant to the Tate's archive of online events
- authoring tools/systems
 - reuse, for manual authoring
 - research: intelligent support for manual authoring
 - research: automatic inference of meta-data descriptions

3 Authoring Tool

RESPONSIBILITIES



Realisation/Implementation

- 4 ontologies and meta descriptions
 - 4.1 characteristics of raw material
 - 4.2 fragmentation
 - 4.3 fragments description
 - 4.4 domain ontology
- reasoning engine
- quality of delivery
- 5 prototype

Core of System: Meta Descriptions

- 4 the representation-scheme/language for meta descriptions
 - meta descriptions include
 - field specific knowledge
 - field/domain ontology
 - user models and profiles
 - user ontology
 - presentation knowledge
 - function/purpose/presentation ontology

Meta Descriptions: Development

- 4 approach: application driven
 - design/contrive useful behaviour modes in interface
 - from them, infer requirements for (meta) descriptions (in unstructured language)
 - specify ontologies in informal languages
 - from them, refine feasible machine-understandable notations that can support such descriptions
 - formalise ontologies

Ontology Refinement

- 4 criteria considered
 - required behaviour modes
 - characteristics inherent to the archive material
 - existing related ontologies
 - existing formal support for their representation

Raw Material

- 4 characteristics
 - what content-based characteristics/properties of the raw material need to be captured?
 - what structural characteristics/properties are inherent to the type of filmed material in Tate's video archive?
 - content is mainly in audio track, not in video
 - how much (reasoning) can be based on audio?
 - what is the significance of the image?
 - categories of movies/recordings/films/filmed-events
 - seminars, talks, questions and answers, ... ;
 - what main content characteristics do they have and what structure?
 - ...

What is a Fragment

- 4.2 what aspects do they need to capture?
- for what purpose?
- how many in a movie? sparseness?
 - estimate as a result from the present raw data
- overlapping or not
- fragmentation : audio based?

Fragmentation

- a fragment may represent an aspect/facet of a large movie
 - viewing of such a fragment may lead to the decision to view the whole movie
- a fragment may represent an aspect/facet of the archive
 - viewing of such a fragment may lead to the decision to view all the fragments (composed) that represent the respective facet
- fragments can be made of non-contiguous fragments and/or from parts from different movies
- fragments may overlap
 - problem: avoid showing overlapping parts more than once, when applicable – could annoy the user
- consider quality of a fragment when extracting from movie
 - when cuts are not made in key frames
- fragments are *logically* defined/stored
 - references to frames

Fragments – description formats

- stills
- completely unstructured text
- unstructured text with highlighted keywords
- structured
 - **properties** and **relationships**
 - how structured?
 - **the more structured the better the description tools and the greater the authoring effort has to be**

Unstructured Text

- drawback
 - *Peter Weibel, is closely linked with the ZKM_Centre for Art and **Media** Karlsruhe since 1999, although in his work he uses only "traditional" **media**. He is an artist and a writer who was never interested in **curating**. The focus of his work is on devising **new** forms of expression that refer to our digital era, but without employing **digital media**.*
 - search phrase: "curating new media"
 - a term based search will identify the above fragment as being relevant to the search phrase

Towards Structured Descriptions

- solution to drawback
 - a better representation of the search phrase would be "curating(new-media)"
 - 'new-media' is one concept (not two, 'new' and 'media')
 - 'new-media' is the object of 'curating'
 - a similar representation would have to exist in the meta-data set of the video fragment in order to be correctly identified

Unstructured Text – Research

- automatic compilation/capture of keyword phrases in a given meta-data text/description on the basis of an explicitly stated (semi-)formal ontology
 - similar to a search action, but
 - done when objects are added to the database
 - done for all the terms in the ontology
 - (a kind of pre-compilation)

Structured Descriptions

- extensive vs intensive descriptions/definitions
 - extensive
 - descriptive terms are associated explicitly with video fragments
 - e.g., "the speaker in the video fragment A100 is Peter Viebel"
 - intensive
 - definitions denoting links between descriptive terms made independently of specific video fragments
 - e.g., "*modern art* implies *new forms of expression*"

Structured Descriptions

- extensive definitions
 - simple terms associated with fragments
 - complex terms associated with fragments
 - (composed) qualifiers/functors
 - modern(art); controversial(contemporary(painting))
 - terms of more than one parameter
 - critique(text(Text1), author(Author1), context(discourse_analysis))

Extensive Definitions

- somewhat inherent to material (therefore objective)
 - precedence relationships
 - must_be_shown_before(f_1, f_8)
 - amount of information
 - detailed_description_of(f_3, f_6)
 - critical accounts
 - critical_account_of(f_4, deconstructivism)
 - response_to(f_4, f_8)
- subjective
 - evaluations
 - evaluation(f_6, 'important to new-media theory', 'by Peter Weibel')

Extensive Definitions

- pragmatic (to enhance behaviour of system)
 - relevance of fragment to the main category to which it belongs
 - relevance(f_4, deconstructivism, 90%)
 - difficult to decide upon figures
 - useful in browsing, when representative objects have to be used
 - amount of information

Extensive Definitions

- issues
 - aim to use few extensive definitions of relationships
 - relationships should be inferred
 - from individual descriptions and the domain ontology
 - possible problem
 - may be inferred incorrectly or may even never be inferred
 - obviously, the largest the set of extensive definitions is the better

Structured Descriptions

- intensive definitions (part of domain ontology)
 - refinements/definitions
 - term (as in element of vocabulary) refinement
 - is_a(surrealism, modern-art)
 - predicate refinement
 - overview_fragment(Fid, Topic) **IF** in(Fid, List) AND topic(Topic, List) AND representative(Fid)
 - could be
 - context independent
 - see above
 - context dependent
 - overview_fragment(Fid, Topic) **IF** in(Fid, List) AND topic(Topic, List) AND current_user_model(UM) AND representative(Fid, UM)

Intensive Definitions

- part of the domain ontology that can be used in reasoning
 - e.g., precedence relationships
 - show_before(A, B) **IF** provides_context_for(A, B).
- the size of the set of intensive definitions can be quite substantial

Domain Ontology

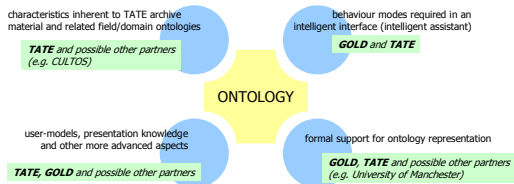
- what
 - introduces all the terms used in extensive definitions
 - includes all the intensive definitions
- how
 - informal vs formal
 - informal
 - has meaning for user (based on NL descriptions)
 - not suitable for automatic reasoning
 - meaning embedded in software routines
 - formal
 - has meaning defined by formal languages (logics)
 - suitable for automatic inferences/reasoning
 - formal languages for the representation of the ontology

Domain Ontology

- possible uses
 - in conjunction with unstructured textual meta-descriptions (Google-like)
 - in conjunction with structured textual meta-descriptions

Ontology Refinement

RESPONSIBILITIES



Prototype

- TATE and GOLD
- ontology (& fragmentation)
 - content: TATE
 - representation: GOLD
- behaviour
 - specification: TATE and GOLD
 - implementation: GOLD
 - visualisation (GUI): GOLD and possible TATE

Prototype

- features
 - "intelligent" searching
 - "intelligent" browsing
 - juxtaposition (e.g. visual maps) of relevant and interconnected results
 - user specific editing (e.g., story map) and reporting (annotated history)
 - intelligent help (e.g., suggestions)

Prototype – Architecture

