

Event-based Annotation and Exploration of Media

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Abstract. This document is a proposal for an Integrative Research Project (IRP) to be considered by the PetaMedia consortium. It aims at developing a model and tools for event-based annotation and exploration of media content and for enhanced sharing of images and videos within users social networks. It gathers the following partners: EURECOM (France), CWI (The Netherlands) and Koblenz University (Germany). The proposed duration for this IRP is 9 months for a requested budget of €60,000. The outcome of this IRP proposal will be a deliverable and a demonstrator based on the WeTV and Near2Me PetaMedia scenarios. This IRP proposal can be attached to the SIGs 3 and 4 defined by the NoE.

1 Motivation and Project Goals

People primarily think in terms of events when referring to an action or occurrence taking place at a certain time and at a specific location, or simply when talking about (past) experiences. This notion is potentially useful for connecting individual facts with media (images, videos) in order to document those experiences for sharing among friends, family or other social circles.

This Integrative Research Project (IRP) proposal aims at developing an approach for **event-based annotation, exploration and sharing of media** based on an explicit model of events supported by rich knowledge bases of events automatically extracted from web resources and tools for the discovery, annotation and exploration of media collection. Our goal is therefore to create an environment that facilitates end-users connected in social networks in sharing and exploring images and videos, and in discovering meaningful, surprising or entertaining connections among the events where the media have been captured, through underlying knowledge of the descriptions of the items, their relationships and related background knowledge.

The PetaMedia Network of Excellence (NoE) advocates a new paradigm, the so-called *triple synergy* among user-contributed tags and metadata, social peer-to-peer technology and multimedia content analysis, for pushing forward the research in the area of multimedia access and retrieval. Hence, one of PetaMedia's missions is to promote research at the intersection of these three disciplines. We

believe that this IRP proposal fits perfectly the PetaMedia’s vision by further investigating and developing event-centered tools:

- **Tags and metadata:** users often search media content using dimensions such as *space* and *time* (where and when the media has been captured), *participation* (who is depicted in the media), *type* (what this media is about), *causality* and *influence* (why this media has been captured). These dimensions can be seen as the constituent parts of an **event**. Our approach will be to advocate the use of common tags⁴ and more generally to embrace the linked data principles⁵ in order to increase the interoperability of the tags, and hence their value to the end-user.
- **Social dimension:** users are connected via symmetric relationship (such as the friendship relationship offered by social network sites) and asymmetric relationship (such as the followers/following relationship offered by microblogging sites). These relationships can be seen as another dimension associated with an event (through the participation property). Our approach will be to extend the event model in order to represent the user’s social network and his/her acquaintance and use this data for discovering more complex relationships between users and media.
- **Multimedia content analysis:** media collection can be searched and explored through their underlying descriptions that can be manually obtained when users provide tags, and automatically completed using multimedia analysis processes. An event-centered interface providing support for annotating, searching and exploring media collections should also be powered by rich knowledge bases of events. Our approach will be to automatically extract structured data from large databases of scheduled events such as Upcoming⁶ or Eventful⁷ and link this information to the larger LOD cloud. Multimedia content analysis will enhance search results by retrieving media content similar to the visual representations of each event provided by these sites.

We describe in the next section how this IRP proposal specifically targets two of the three scenarios defined by the PetaMedia consortium and how it is related to the Special Interest Groups (SIGs) that have been created.

2 Relevance for PetaMedia

2.1 WeTV Use Case Scenario

The WeTV scenario aims at providing a tool that will allow a user to assemble personal narratives of an event using his/her personal media enhanced with related user-contributed content available via a social peer-to-peer network. At

⁴ <http://www.commonstag.org/>

⁵ <http://linkeddata.org>

⁶ <http://www.upcoming.org>

⁷ <http://www.eventful.com>

the core of this scenario, a model for describing multimedia content – linked with factual data about an event – must be used. We propose to develop such an event ontology, represented in OWL/RDF, and capturing the various dimensions composing an event. A large knowledge base of interlinked events scraped from event databases such as eventful.com and upcoming.org will also be generated. We will design and implement web-based interfaces for annotating media content with events and for exploring media collection across the social network using both user profiles and the dimensions that composed an event. We will provide a final demonstrator using the content gathered by PetaMedia researchers for the field trials, for example, the concert video acquired by EPFL.

2.2 Near2Me Use Case Scenario

The Near2Me scenario aims at visualizing video clips in social spaces and at discovering related content because of social user proximity or semantic content similarity. We believe again that a powerful event model can be the pillar for the realization of such a scenario. For example, for a multimedia collection composed of a number of YouTube videos related to travel and tourism, the user will be able to explore information related to the location depicted, the interesting things that are scheduled to happen, etc. We plan to work closely with the coordinator from the Technical University of Berlin of this scenario.

2.3 Relationship with PetaMedia SIGs

This IRP proposal is mainly related to the PetaMedia SIG3 (Indexing: User-derived Tags) and SIG4 (Social Content Retrieval). Research work conducted within the SIG3 includes the design and development of annotation tool for describing multimedia content using events, and the use of common tags and datasets from the LOD cloud based upon the linked data principles of the Semantic Web. Research work conducted within the SIG4 includes the use of linked data technologies for representing user profiles (e.g. FOAF) and open identification protocols (e.g. OAuth, SSL) in order to interact with data across various platforms and social networks following the recommendation of the W3C Social Web Incubator Group⁸.

3 Methodology and Workplan

The term “event” has several meanings. It is used to mean both phenomena that have happened (e.g. things reported in news articles or explained by historians) and phenomena that are scheduled to happen (e.g. things put in calendars and datebooks). Various standards and formats have been proposed for representing the latter as structured data, usually for personal information management purposes⁹. In this project proposal, we focus on the former category: phenomena

⁸ <http://www.w3.org/2005/Incubator/socialweb/>

⁹ E.g. the iCalendar specification, <http://tools.ietf.org/html/rfc2445>

that have happened in the past. Hence, we assume events to be unique entities that, while they may have been part of a series of similar events, occurred only once. Various event models have been proposed in the literature [1, 4, 10]. The Linked Data effort seeks to publish and connect RDF data sets on the Web using dereferenceable URIs for identifying web documents, real-world objects, links between them and/or other pieces of information. Yet, while standard and widely used vocabularies have emerged for representing people, places, and other types of entities as Linked Data, none has yet emerged specifically for events. We propose to build such a model based on the F-model [2, 6] and LOD [7, 8].

Nowadays, there is a tremendous amount of data published under the form of linked data¹⁰. The challenge is now to build applications that can use these open datasets for annotating and exploring rich media collections. We propose to develop an event-centered tool supporting the annotation, exploration and sharing of multimedia content based on our experience in designing such application, being Cliopatria [3, 9, 11], a Semantic Web search server, winner of the International Semantic Web Challenge in 2006, and SemaPlover [5], an application for interacting with semantic data and media based on a federated cloud infrastructure, winner of the International Billion Triples Challenge in 2008.

This IRP proposal is for a duration of **9 months** and will deliver to PetaMedia:

- an event ontology, represented in OWL/RDF, together with a knowledge base of events populating this model, obtained from large databases of events and interlinked with the LOD cloud;
- an interface for annotating media content with events and for exploring media collection based on the dimensions composing an event and social user profiles.

We plan to provide PetaMedia with a Deliverable describing the event ontology, the acquisition of the knowledge base of events and the design and development of the annotation and exploration interfaces. A demonstrator using PetaMedia multimedia content showcasing one of the PetaMedia scenarios will also be proposed.

4 Resources and Budget

We request a funding from PetaMedia of a total of k€60 for realizing the above project proposal over a period of 9 months (Table 4).

CWI is part of the Dutch National network (coordinated by the PetaMedia core partner TUD) and Koblenz University is part of the German National network (coordinated by the PetaMedia core partner TUB). EURECOM would qualify for short visits of senior researchers program¹¹ proposed by PetaMedia.

¹⁰ http://www4.wiwiiss.fu-berlin.de/bizer/pub/lod-datasets_2009-07-14_colored.svg

¹¹ <http://www.petamedia.eu/outreach.html>

	Personnel Cost	Research Visit Cost	Travel Cost	Total
EURECOM	€16,000	€4,000 (4 * 3 days visit)		€20,000
CWI	€15,000	€2,000 (2 * 3 days visit)	€3,000 (1 * int. conf.)	€20,000
Koblenz Uni.	€15,000	€2,000 (2 * 3 days visit)	€3,000 (1 * int. conf.)	€20,000
Total	€46,000	€8,000	€6,000	€60,000

Table 1. IRP Proposal Budget

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