INTELLIGENT CONTENT AND SEMANTICS ALGORITHMS: THE NEXT DIGITAL ARTISTS?

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Information Technology continues to foster the confluence of multimedia, web technologies, and knowledge representation and reasoning. The goal is to promote original approaches and techniques for empowering creative usages and enabling interactive experiences based on an understanding of the content itself. This paper presents an overview of the of the projects on-going.

1.   Introduction

New media has emerged as a distinct category in Art in the late twentieth and early twenty-first century. New media art practice is being refer as a new avant-garde, an art practice of the future, ahead of its time and, as yet, not fully capable of being recognized or accepted. Thus its role would be of pushing the boundaries of the medium of art itself.

In 2003, Christiane Paul proposed two classes of digital art, one that uses digital technologies as a tool for creating traditional art objects, and a second class that uses digital technology as the medium itself (works are stored and displayed exclusively in the a digital environment).

Cooperation between artists and scientists have been promoted as a way to grant access by artists to computational systems that are found in industrial research laboratories and university centers, where scientists carried out their work.

This cooperation has been intense due to the know-how that scientists hold in these areas. Nevertheless there is a lack of knowledge about the most recent advances that are radically transforming the artistic field, while IT experts often have little or no background in the humanities or the arts fields.

2.   Intelligent storage and retrieval

The availability of digital media content such as video, audio, images and metadata (data that describes the content) increases the possibilities to create and share media. To efficiently support these new application techniques such as intelligent storage and retrieval have been further developed. To design these systems several issues are usually considered such as storing and preserving the content and metadata, search for the proper content, distributing content to local devices, guaranteeing property rights and content, and global system management.

The volume of digital media that has been produced and stored, and the exponential rate that keeps being produced and stored, has by now become uncontrollable without the support of computational systems. Low-level approaches, to describe digital content, based on signal analysis, have demonstrated to be particularly restrictive in allowing media database systems to be accessible and useful to computer

user. Also low-level descriptors based on content are distant from what users use as a means to recognize media description. Therefore, research has begun to center on semantics and fill the gap that subsists between the conceptual and the end-user regarding the content based on high-level descriptions.

One solution to overcome this gap is knowledge-based techniques based on Web ontologies. As formal and web-wide shared conceptualizations, ontologies facilitate the automated integration and meaningful retrieval of multimedia –both content and metadata– from different sources.

One limitation is that metadata is still limited and expensive to produce. MPEG-7 standard (Multimedia Content Description Interface), constitutes the greatest effort for multimedia description. MPEG-7 goal is to create a standard for the description of the multimedia content that supports some degree of interpretation of the information's meaning. Although MPEG-7 constitutes a valuable starting point for more specific developments, it lacks of explicit semantics that make MPEG-7 very difficult to extend in an independent way.

3.   **Framework for Artistic Production**

Ontologies are vital in order to enable the sharing of knowledge and reuse in various fields. Good domain ontology must retain all the crucial elements that conceptualize a domain, and the domain expert should be easily able to cross-examine the ontology.

An example of this tool in art is the ANSWER (Artistic-Notation-based Software Engineering for Film, Animation and Computer Games) ontology that model the semantics necessary "to interpret the process of film production consistently for all users (directors, producers, DOP's (Director of Photography), grips, post-production, lighting, etc)".

The ANSWER project has a dual goal: producing an artistic language for the recording of film-directing design and developing a semantic model of the film directing domain. The notation should allow the artist to record their ideas and also to formalize their own creative thought-process (designing the artistic notation will allow to serve as a guide in order to design an effective semantic model). A major part of the knowledge is the "tactic knowledge", that is, the artist inner skills that he uses when analyzing the ideas he has expressed in notation.

Although this is production knowledge, not film content knowledge, it still gives access to the technical awareness of how the process of filming takes place. Thus one may translate the notation, the description of content-design into the "tacit knowledge" level of understanding. Additionally, it is also necessary to formalize the semantics of the artistic notation itself with the risk incorrect expression due to ambiguities. This quest of orient research to automatically compute traditional artistic notations, such as music or dance, also has resulted in very difficult problems as notation allows subjective interpretation of its meaning. In the end, the entire model is based on this knowledge to explicitly model the artist's "tacit knowledge".

iMP (intelligent Metadata-driven Processing and distribution of audiovisual) aims to enable a 'Virtual Film Factory' in which creative professionals can work together to create and customise programmes from large digital repositories, using semantic technologies to organise data and drive its processing. The creative aim of the virtual film factory is to assist and encourage the interactive creation of itera-

tions and versions which enable a superior creative outcome. For the purpose of this research iMP project created Movie Post-processing Ontology (MPO), which is a set of modular ontologies providing a list of hundreds of relationships and concepts related to movie post-processing.

European project, FOCUS K3D, aims to exchange and disseminate novel ideas and techniques in the emerging research field of semantic 3D media. One of the application fields is Gaming and Simulation where frequently not only single objects have to be modeled, but as well whole virtual worlds including mutual relations between objects and this virtual world as well as among 3D characters. Nevertheless, knowledge technologies impact is rather limited. Only recently semantic issues like ontology development have been incorporated (for example, the AIM@SHAPE Ontology and Metadata Repository, MagnetarXSG or CORG- Collaboration Ontology Roles Game). Projects such as I3DPOST (intelligent 3D content extraction and manipulation for film and games) have started to research ways to integrate 3D information extracted from the visual scene into all stages of the postproduction pipeline, supported by semantic metadata, by the development of methods for recovering intelligent, structured content from on-set filming, and incorporating them in capture environments and software tools to enable the simple manipulation and reuse within post-production and the retargeting of content to interactive platforms. The impact of these efforts can be rather important if these efforts converge to a unify game ontology development effort occurs, and common procedures for managing 3D content for efficient re-use.

4.   **Remarks**

Recent technology advances and future scenarios that promises new tools and frameworks so that the role of an artist using digital technology as a tool for creating traditional art objects or as the medium itself will change. If the digital artist role maybe more passive in the first case (supporting the development of new tools that incorporates its process) there is an open new field in the case of the second scenario for the artist to explore, specifically the semantic gap issue (the difference between two descriptions of an object by different linguistic representations, for instance languages or symbols). Semantic gap expresses the difference between ambiguous formulation of contextual knowledge in a language and their sound, reproducible, and the computational representation in a formal language.

References and Notes:

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