Towards the Narrative Annotation of Personal Information and Gaming Environments

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ABSTRACT
This paper presents an analogy between Semantic Web technologies and an existing narrative theory. Narrative generation is presented as an alternative method of human computer interaction, in the form of context based search. The discussions are grounded in domains of Memories for Life, and Massively Multiplayer Online Role Playing Games.

Categories and Subject Descriptors
H.5.1 [**Information Interfaces and Presentation**]: Multimedia Information Systems; I.2.4 [**Artificial Intelligence**]: Knowledge Representation Formalisms and Methods—*Relation systems, Semantics.*

General Terms
Narrative Generation, Semantic Web

Keywords
Computer Games, Memories for Life, Narrative Ontologies, Multimedia, Ontologies, Semantic Web

1. INTRODUCTION
The World Wide Web facilitates searching through search engines; one normally "googles" a given subject, and subsequently traverses a list of related documents, looking for the best match. There is no method of presenting the Web with a topic in order to generate a narrative on a given topic, something that approaches the rich and engaging overviews that a human expert may deliver.

Semantic Web (SW) [4] technologies are challenging the manner in which authors publish information; from the classic method of developing a document that is intended to convey a message to a human reader, to the publishing of "nuggets" of raw knowledge in the form of annotated multimedia items[1] that are linked together in a structured and meaningful manner for machine communication.

This position paper discusses how this new paradigm of publishing may be utilised to allow for narratives to be generated dynamically from available knowledges bases. This discussion starts by highlighting of some key sematic technologies that we believe will aid narrative generation. Then we present an overview of work currently undertaken under the scope of the Memories for Life (M4L) initiative (see section 3.1), namely that of autobiographical narrative assembly from one's photograph collection. Finally, in section 3.2 we present how the techniques applied the to the M4L scenario may be easily adapted to instill narratives into Massively Multiplayer Online Role Playing Games, in what we believe is a novel manner.

2. MOTIVATION
2.1 Semantic Technologies
A key problem faced by the information management community is that of information overload. The ever growing, evolving nature of the World Wide World is not making information retrieval any easier. The web is populated with an unmanageable amount of heterogeneous data, in forms as diverse as photos, sound, video, and text.

The Semantic Web defines the necessary relational models for describing web resources with context independent standards, such as the Resource Description Framework (RDF) [20]. Artifacts are enriched by semantics through the process of annotation with respect to a shared vocabulary, namely an ontology [13]. This resultant metadata can exist in varying levels of granuality as the detail and nature of an annotation depends on the intended use of the media item.

One ontology that aims to capture the narrative content of heterogeneous media is the OntoMedia[2] ontology [16]. One of the motivations behind making such knowledge explicit, as opposed to simple keyword labeling common to the current Web, is to capture and describe knowledge that is implicit in the context of the given media unit [17]. The metadata produced by annotating with respect to a shared ontological vocabulary will allow searching and navigation by concepts. OntoMedia defines the narrative context, by making explicit the entities and events with respect to a timeline(s) portrayed in the media item. The uptake of such an ontology would allow knowledge to be shared between software agents (machine-to-machine knowledge transfer), and

[1]The term multimedia items is used to refer to text documents, videos, audio, images, etc, ...

[2]Project homepage: www.ontomedia.ecs.soton.ac.uk

narratives to be generated for human consumption (machine-to-human knowledge transfer). This will be elaborated in the context of autobiographical narrative generation in section 3.1.1.

2.2 Narrative

Throughout human history narratives, in one form or another, have been used as a mechanism of transferring and propagating knowledge through society, and its subsequent generations. Insight into the evidence of narrative use, in its many forms, and the evolution of narratives across different mediums can be found in Joseph Campbell's book 'A Hero with a Thousand Faces' [7].

From a very young age, people are exposed to narratives. They tell stories, whether real or made-up, to teach children about the intricacies of life. The traditions of oral storytelling that have evolved into our contemporary modes of narrative have been recognised as core to the transfer of knowledge within society [7]. Work has been undertaken to illustrate the transfer of knowledge within societies through the use of narrative mediums and the similarities between these differing modes [7][26][3]. Research into the ways that we make sense of our world have resulted in the term *Narrative Intelligence* (NI) being coined, describing how humans organise events into more-or-less familiar narratives [5].

NI has been identified as one of the main synergies around which Artificial Intelligence (AI) research into narrative has been brought together [21]. At the time when this work was done Semantic Web technologies were still in their infancy, the remainder of this paper presents how advances in knowledge representation and the enrichment of information through explicit semantics can be utilised to develop meaningful narratives.

2.2.1 Narrative Theory for the Semantic Web

Narratives and the study of narratology, have been a central theme of the social sciences for a long time and have recently become increasingly popular in the field of knowledge technologies [2][12][18][30][11]. Narratology has focused on representing and defining one of the core modes of human communication. As a result of these efforts, there exists a growing set of different narrative paradigms, or ways of conceptualising narrative spaces, such as formalism, structuralism, post-structuralism, and post-modernity [29]. The aim of this research is not to try and develop a new paradigm or even to create a taxonomy of narrative approaches, this is best left to narrative theorists, but to learn from and harness existing methods to aid narrative generation.

There are a growing number of areas where strategies and viewpoints put forward from narratology have been adopted and utilised within computer science research, such as dynamic multimedia presentations [12][18], summarisation [2], and storytelling and interactive drama [26]. One example of an adopted theory is Bal's [3] view of narrative [18]. In abstract terms this states that narrative can be viewed to consist of 3 layers, the lowest being the *Fabula*, which represents the raw chronological events; the *Story*, where given a fabula one could derive a number of different stories, and at the third and highest level the *Narrative*. The narrative is said to be the final form of the rendered material.

2.3 The Analogy: SW meets Narratology

SW enabling technologies allow for the annotation of multimedia items, resulting in a corpus of available "knowledge nuggets".

This collection of meaningful knowledge is presented as the *fabula* (section 2.2.1); story grammars, that are most commonly implemented in the form of templates [2], present the structural design used to portray the desired *story*, and the resulting output, whether the form be textual or a composition of a variety of multimedia is presented as the *narrative*.

Given the above analogy, the major shortfall of existing narrative generation, for dynamic presentations, are the use of story-grammars. These static structures have to be defined by developers before the deployment of a system. This method of pre-empting the *story* of the narratives will limit a system's ability to discover any new, and possibly previously unknown, relationships to render a narrative. The next section will propose one method of enhancing the current template-based methods for two differing, but not disjoint domains.

3. APPLICATION DOMAINS

The form of narrative generation discussed in this paper takes the form of searching through a structured collection of meaningful data in order to discover useful, targeted narratives. This assembly of available *fabula* into narratives is being investigated in the domains of personal information stores, namely M4L (3.1), and computer games, namely Massively Multilayer Online Role Playing Games (MMORPGs) (3.2.1).

A single technique for identifying related narrative elements and assemblying them to tell a story is proposed for both of the presented scenarios. In the context of M4L, the discovered and assembled narratives are proposed as a method of dynamically assembling photocollections to tell autobiographical stories, were as in the domain of MMORPGs the narratives discovered will be used help guide players actions to make them feel involved in the game world.

3.1 Memories for Life

Memories for Life is being discussed as a grand challenge for UK computing[3]. It aims to address the challenges of storing autobiographical knowledge in the form of multimodal electronic media, and to identify any issues that may arise from such a situation. We believe that SW technologies could be adopted to help realise the potential of such a vision. Given a system that could store a comprehensive collection of a lifetime's worth of acquired electronic media a unified method of marking up this inheritantly heterogeneous data-set is needed. A vocabulary of terms and their relationships are presented as a means to annotate these "memory nuggets", to encapsulate the semantics of these autobiographical memories. The OntoMedia ontology is a possible candidate. This ontology has been designed to allow the mark-up of literature, film, and other forms of narrative at the *fabula* level.

[3]Memories for Life website: www.memoriesforlife.org, describes the ambitions and directions of the network

The Advanced Knowledge Technologies (AKT)[4] project has produced tools to automate the annotation of textual media, (e.g. Armadillo [8]), and are currently looking at methods of semiautomating photographs [14]. These tools and techniques are being applied to as many of the readily available sources of metadata as possible to create as rich a memory bank as possible while keeping the cognitive overhead to a bare minimum.

3.1.1 Narratives in the form of Dynamic Presentations

Photographs are an important physical addition to the store of human memory, much of our private archiving revolves around repositories of photographs (even if only in shoeboxes!). Furthermore, as the uptake of digital technologies and the mass manufacture of digital-cameras increases, the numbers of photographs taken rises. There are obvious problems with this uptake, understanding the context of individual photographs, retrieving photographs from storage, and developing narratives to contextualise series of photos for management purposes. The motivation behind annotating this continuously growing set of digital data is to help users make sense and manage their digital memories.

Research is being undertaken to identify what readily available metadata can be used to organise a collection of photos in a meaningful and useful manner. Narrative generation from one's digital memories is being explored as an alternative to the current methods of human computer interaction with semantic data-sets. Two of the most influential methods of interacting with SW enabled data-sets are facetted browsers, like mSpace [19], and knowledge data navigation techniques presented by systems like Haystack [15]. Both of these methods require an understanding of the underlying data-structure and a grasp of categorisation by concept that can not be expected from all end-users.

A desired narrative could be a collection of photos taken when on holiday of landscapes in foreign countries, or a collection of conference photos taken in the last academic year. Assuming a story is the presentation of a succession of events based around a given topic, this research aims to generate such narratives based on the resources available to it, namely the photos and any relevant information extracted from available sources like emails, and iCal files [14].

In M4L a two layered approach is being taken in order to allow maximum automation and full flexibility. The first layer will be an automatically generated time line, which will depend entirely on the date stamping of the images and the media available. Human intervention at this level is limited to altering the granularity of the time segments should the user feel this necessary. Automatically integrated at this level are the location annotations, derived from the absolute positioning via GPS, or coarse positions through GSM phone information [14], and any clues to the user's location presented from their iCal file. The combination of location and chronology provide useful contextual cues for generating stories to help refresh the users memory [10].

The second layer will aim to organise photos into a "narrative" structure based on automatically generated "educated" guesses derived from the metadata extracted from any of the freely available information sources. It is a core research issue to determine the appropriate balance between user intervention and automatically generated narrative structures. In essence, the annotated images will function as the instances in the underlying the *fabula*, which will allow for sequential organisation of the instance events into a cognitively coherent narrative structure.

A number of major projects are working towards similar visions, MyLifeBits [11], and SemanticLIFE [1] are the two most noteworthy. The aim of this research differs from that of the M4L due to the novel manner in which the M4L system will strive to accumulate as much low-cost metadata as possible. The methods that the SemanticLIFE project uses to extract metadata from the personal communications, i.e. emails and the surreptious analysis of web browsing, and the related issues surrounding trust are presented in Weippl *et al* [32], there system does not attempt to generate a narrative from the harvested knowledge. The story telling mechanisms in MyLifeBits [10] presents valuable insight on how stories can be generated based on leverages such as location and time, but they fail to generate narratives based on any further concepts, like the examples above (3.1.1).

The cultural heritage domain has also produced systems that generate narratives in given domains. The ArtEquAKT system [2] and Geurts *et al*'s system [12] both generate biographical narratives about artists, and Story Fountain [25] does so from the historical records of Bletchley Park. Research in being undertaken into ways of extending the typical static template-based approach of narrative generation through adopting techniques used by comics book writers to tell stories through a succession of images [24], and the use of natural language to strengthen the *story* presented by the rendered *narrative*.

3.2 Narrative and Computer Games

Over the course of the last few decades we have seen an abundance of academic work in computer game worlds that have attempted to combine narratives with interactivity [26]-[22][23]. Research in this task has produced valuable insight into the need for identifying the middle ground between interactive freedom, and coherent dramatic narratives. Systems have taken a number of different approaches with the aim of finding this elusive middle ground. Some have taken agent-based approaches, where complex autonomous believable agents [22] are deployed in simulated environments, such as the Oz project [27], limitations of which include the lack of focus on the user's actions and the systems inability to scale. Others have taken a more global approach, inspired by AI planning techniques.

These approaches tend to focus more on the users actions, their shortfalls come from to the need for the stories to be carefully planned, to the point that the game must ensure the chances of interrupting these plans are kept to a bare minimum. Façade [23] like the Oz project aims to find the middle-ground between interactivity and a coherent story, by incorporating more explicit knowledge in terms of the overall narrative structure and keeping track of the human-players juxtaposition in the narrative arc. One of the origi-

[4]Project website: www.aktors.org

nal aims of Façade was to empower the player to have complete control over the story. However, the final result still only allowed for players to be "interactive observers" rather than protagonists [23]. For more background on interactive drama see [26].

3.2.1 Massively Multiplayer Online Role Playing - Games

This section aims to present how similar methods of narrative generation, as described for M4L, could be extended to MMORPGs to "stimulate" dramatic narratives. As of July 2005, the game World of Warcraft[5] has sold more than 3.5 million copies world wide, 1.5 million of these being sold since the Chinese launch on 7th July 05. The publishing house, Blizzard[6] states that there are over half a million subscribers on online at any given time.

This uptake of MMORPGs, were humans take up the *personna* of an imaginary character depicted by an avatar in a massive online virtual world, has been tremendous. Game play in MMORPGs are not dissimilar in form to that of computer based role playing games commonly associated with narrative research. A player takes on a character and subsequently "role plays", in order to gain experience that in turn makes their characters more powerful, hence achieve status in the online community. Players are not following any narratives in so far as wanting to achieve their local goal of completing a given dungeon or finding a certain artifact, as opposed to traditional adventure games, were a player undertakes tasks in order to progress through a predefined story.

Given that MMORPGs are closed worlds, every entity, whether human player, item, or location, can be accounted for, and their relationship could be made explicit given the rules of games. These worlds are presented as knowledge rich domains, containing information about characters, their activities, and their belongings; all of which can be described with an ontology like OntoMedia. An ontological description of all of the character classes and races, items could also be developed. Given the server based nature of these games, a snap-shot of the state of the world could be taken at any given time, presenting the environment as an *accessible* one.

The method envisaged to stimulate dramatic narratives in MMORPG, is by generating a narrative based on a snapshot of the online world every time a user logs in to the game. The proposed form of the narrative would work on the following three levels. Firstly, a high level narrative is proposed, describing what the most powerful characters are doing, what relics they have accumulated, what lands they have conquered, etc. This is intended to promote a desire to play more, for all avid gamers want to be recognised as elite. The second level, consists of a narrative describing the major events that have taken place within a players vicinity, promoting local actions that may result in immediate reward. And finally another narrative based on the characters vicinity, describing characters that oppose the player, that need to be eliminated, and possible accomplices. This "newsletter" is proposed as a method of instigating actions that would result in dramatic events occurring in a MMORPG, effectively emergent narratives.

Unfortunately stories about real life seldom fit into the grand narratives of myth or fairytale and simple heuristics working on these semantics, such as chronology or human relationships, would not produce satisfying narratives. Work is currently being undertaken to adapt Bremond's [6] extension of Propp's functions [28] into a manner that could be used to generate suitable narratives in MMORPGs. Other descriptions of story structures are also being considered [9][31].

4. CONCLUSIONS & FUTURE WORK

This paper motivates how narratives could be used as a method of transfering knowledge from semantically rich information pools, to a human user. Memories for Life and MMORPGs are presented as candidate domains for such an activity, and are currently being investigated. In order to help evaluate the applicability of the M4L system described above and in [14], a system will be demoed at a small-scale event (such as an AKT workshop), where pictures taken can be mapped onto a standard calender of events, to see if any useful narratives can be extracted. With regards to the MMORPGs scenario, discussion is underway with the developers of WorldForge[7], an Open-Source MMORPG. The research aims to develop a methodology of dynamic narrative generation from semantically annotated items, whatever the domain, in order to find and present a narrative to the end user.

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