

# “Narrative” Information Problems

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## INTRODUCTION

‘Narrative’ information concerns in general the account of some real-life or fictional story (a ‘narrative’) involving concrete or imaginary ‘personages’. In this article we deal with (*multimedia*) *nonfictional narratives of an economic interest*. This means, first, that we are not concerned with all sorts of *fictional* narratives that have mainly an entertainment value, and represent an imaginary narrator’s account of a story that happened in an imaginary world: a novel is a typical example of fictional narrative. Secondly, our ‘nonfictional narratives’ must have an *economic value*: they are then typically embodied into corporate memory documents, they concern news stories, normative and legal texts, medical records, intelligence messages, surveillance videos or visitor logs, actuality photos and video fragments for newspapers and magazines, eLearning and multimedia Cultural Heritage material, etc.

Because of the ubiquity of these ‘narrative’, ‘dynamic’ resources, it is particularly important to build up *computer-based applications* able to represent and to exploit in a general, accurate, and effective way the *semantic content* – i.e., the key ‘meaning’ – of these resources.

## BACKGROUND

‘Narratives’ represent presently a very ‘hot’ domain. From a *theoretical point of view*, they constitute the object of a full discipline, the ‘narratology’, whose aim can be defined as that of producing *an in-depth description of the ‘syntactic/semantic structures’ of the narratives*, i.e., the narratologist is in charge of dissecting narratives into their component parts in order to establish their functions, their purposes and the relationships among them. A good introduction to the full domain is (Jahn, 2005).

Even if narratology is particularly concerned with *literary analysis* (and, therefore, with ‘fictional’ narra-

tives), these last years some of its varieties have acquired a particular importance also from a strict Artificial Intelligence (AI) and Computer Science (CS) point of view. Leaving apart the old dream of generating fictions by computer, see (Mehan, 1977) and, more recently, (Callaway and Lester, 2002), we can mention here two new disciplines, ‘storytelling’ and ‘eChronicles’, that are of interest from both a nonfictional narratives and a AI/CS point of view.

*Storytelling* – see, e.g., (Soulier, 2006) – concerns in general the study of the different ways of *conveying ‘stories’ and events in words, images and sounds* in order to entertain, teach, explain etc. *Digital Storytelling* deals in particular with the ways of introducing characters and emotions in the *interactive entertainment domain*, and concerns then videogames, massively multiplayer online games, interactive TV, virtual reality etc., see (Handler Miller, 2004). Digital Storytelling is, therefore, related to another, computer-based variant of narratology called *Narrative Intelligence*, a sub-domain of AI that *explores topics at the intersection of Artificial Intelligence, media studies, and human computer interaction design* (narrative interfaces, history databases management systems, artificial agents with narrative structured behaviour, systems for the generation and/or understanding of histories/narratives etc.), see (Mateas and Sengers, 2003).

An *eChronicle system* can be defined in short as way of *recording, organizing and then accessing streams of multimedia events captured by individuals, groups, or organizations making use of video, audio and other sensors*. The ‘chronicles’ gathered in this way may concern any sort of ‘narratives’ from meeting minutes to football games, sales activities, ‘lifelogs’ obtained from wearable sensors, etc. The technical challenges concern mainly the ways of aggregating the events into coherent ‘episodes’ making use of domain models as ontologies, and providing then access to this sort of material to the users at the required level of granularity. Note that *exploration, and not ‘normal’ querying, is the predominant way of interaction with the chronicle*

*repositories*; more details can be found, e.g., in (Güven, Podlaseck and Pingali, 2005), (Westermann and Jain, 2006).

The solution (NKRL) proposed for the ‘intelligent’ management of nonfictional narratives in the companion article – ‘Narrative’ Information, the NKRL Solution – of the present one is considered as a fully-fledged eChronicle technique, see (Zarri, 2006). In NKRL, however, a fundamental aspect concerns the presence of powerful ‘reasoning’ techniques – an aspect that is not taken into consideration sufficiently in depth in eChronicles that are mainly interested in the accumulation of narrative materials more than in the ‘intelligent’ exploitation of their inner relationships.

## REPRESENTING THE ‘NONFICTIONAL’ NARRATIVES

All the different sorts of ‘nonfictional narratives’ evoked in the previous Sections concern, practically, the *description of spatially and temporally characterised ‘events’ that relate, at some level of abstraction, the behaviour or the state of some real-life ‘actors’* (characters, personages, etc.): these try to attain a specific result, experience particular situations, manipulate some (concrete or abstract) materials, send or receive messages, buy, sell, deliver etc. Note that:

- The term ‘event’ is taken here in its *most general meaning*, covering also strictly related notions like fact, action, state, situation, episode, activity etc.
- The ‘actors’ or ‘personages’ involved in the events *are not necessarily human beings*: we can have narratives concerning, e.g., the vicissitudes in the journey of a nuclear submarine (the ‘actor’, ‘subject’ or ‘personage’) or the various avatars in the life of a commercial product.
- Even if a large amount of nonfictional narratives are embodied within natural language (NL) texts, this is *not necessarily true*: narrative information is really ‘multimedia’. A photo representing a situation that, verbalized, could be expressed as “The US President is addressing the Congress” is not of course an NL document, yet it surely represents a narrative.

An in-depth analysis of the existing Knowledge Representation solutions that *could* be used to represent and manage nonfictional narratives endowed with the above characteristics is beyond the possibilities of this article – see in this context, e.g., (Zarri, 2005). We will limit ourselves, here, to some quick consideration.

We can note, first of all, that the now so popular Semantic Web (W3C) languages like RDF (Resource Description Framework), see (Manola and Miller, 2004), and OWL (Web Ontology Language), see (McGuinness and Harmelen, 2004) are unable to fit the bill because their core formalism consists in practice of the classical ‘attribute – value’ model. For these ‘binary’ languages then, a property can only be a *binary relationship*, linking two individuals or an individual and a value. When these languages must represent simple ‘narratives’ like “John has given a book to Mary”, several difficulties arise. In this extremely simple sentence, e.g., “give” is an *n-ary (ternary) relationship* that, to be represented in a complete way, asks for the presence of a specific ‘semantic predicate’ in the “give” or “transfer” style, where the ‘arguments’, “John”, “book” and “Mary”, of the predicate must be labelled with ‘conceptual roles’ such as, e.g., ‘agent of give’, ‘object of give’ and ‘beneficiary of give’ respectively.

Efforts for extending the W3C languages by introducing some *n-ary* feature have been not very successful until now: see, in this context, a recent working paper from the W3C Semantic Web Best Practices and Deployment Working Group (SWBPD WG) about “Defining N-ary Relations on the Semantic Web” (Noy and Rector, 2006). This paper proposes some extensions to the binary paradigm to allow the correct representation of ‘narratives’ like: “Steve has temperature, which is high, but failing” or “United Airlines flight 3177 visits the following airports: LAX, DFW, and JFK”. The technical solutions expounded in this paper are not very convincing and have aroused several criticisms. These have focused, mainly, on i) the fact that the majority of the solutions proposed *do not deal, in reality, with the n-ary problem*, but with (only loosely) related matters like the possibility of specifying a ‘standard’ *binary relationship* via the addition of properties, and ii) on the *arbitrary introduction, through reification processes, of fictitious (and inevitably ad hoc) ‘individuals’ to represent the n-ary relations* when these are actually dealt with. Moreover, the paper say nothing,

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