Metadata annotation for dramatic texts

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Abstract

English. This paper addresses the problem of the metadata annotation for dramatic texts. Metadata for drama describe the dramatic qualities of a text, connecting them with the linguistic expressions. Relying on an ontological representation of the dramatic qualities, the paper presents a proposal for the creation of a corpus of annotated dramatic texts.

Italiano. *Questo articolo affronta il problema dell'annotazione di metadati per i testi drammatici. I metadati per il dramma descrivono le qualità drammatiche di un testo, connettendole alle espressioni linguistiche. Basandosi su una rappresentazione ontologica delle qualità drammatiche, l'articolo presenta una proposta per la creazione di un corpus di testi drammatici annotati.*

1 Introduction

Drama annotation is the process of annotating the metadata of a drama. Given a drama expressed in some medium (text for screenplays, audiovisual for cinema, interactive multimedia for videogames, etc., termed by Esslin "dramatic media", i.e. media that display characters performing actions): the process of metadata annotation identifies what are the elements that characterize the drama and annotates such elements in some metadata format. For example, in the sentence "Laertes and Polonius warn Ophelia to stay away from Hamlet.", the word "Laertes", which refers to a drama element, namely a character, will be annotated as "Character", taken from some set of metadata. Drama annotation projects, with the sets of metadata and annotations proposed in the scientific literature, rely upon markup languages and semantic encoding.

Recently, there have been many approaches to the annotation of stories (a larger set than drama, including general narrative, not exclusively conveyed by characters performing actions). Annotations are going to enrich drama documents with appropriate metadata. Most of the approaches, e.g., the Story Workbench tool (Finlayson, 2011) and the DramaBank project (Elson, 2012), build upon the linguistic expression of the story, typically some natural language, and annotate story elements, such as characters and conflicts, over the linguistic layer of part-of-speech tagging and verbal frames. Other approaches are more detached from the linguistic expression: they consider the cultural object of the story and rely on conceptual models encoded in logic frameworks, e.g., the Contextus Project[1], the StorySpace ontology (Wolff et al., 2012).

However, most projects work in an isolated fashion: each approach provides its own annotation schema, without connection with the general knowledge, and do not provide the annotated documents with a clear status. This paper presents an overview of the Drammar approach for the metadata annotation of dramatic texts: the gathering of such corpus is relevant for teaching drama through schematic charts (Lombardo et al., 2016b), informing models of automatic storytelling (Lombardo et al., 2015), preserving drama as an intangible form of cultural heritage (Lombardo et al., 2016a). We shortly review the current approaches, before introducing the Drammar ontology under-

[1] http://www.contextus.net, visited on 7 July 2017.

lying the annotation schema. Then we describe the crowdsourcing initiative POP-ODE and the current development of the annotated corpus. Finally, we briefly discuss the status of the annotated document, before the conclusion.

2 Drama and annotation

A drama is a story conveyed through characters who perform live actions: for example, theatrical plays (Shakespeare's *Hamlet*), TV series (HBO's *Sopranos*[2]), but even reality shows (CBS's *Survivor*[3]), and games (Ubisoft's *Assassin's Creed* [4]). Metadata annotation for dramatic texts must encode the major concepts and relations of the drama domain, which have been shared by a majority of scholars in the drama literature. Here, we refer to the so–called *dramatic qualities*, that is those elements that are necessary for the existence of a drama, which can be found in several drama analyses, e.g. (Lavandier, 1994; Ryngaert, 2008; Hatcher, 1996; Spencer, 2002). All the initiatives on this topic have shared similar sets of elements, namely story units, characters or agents, actions, intentions or plans, goals, conflicts, values at stake, emotions. These elements are annotated in connection with media chunks (e.g., text paragraphs), often with the goal of constructing corpora of annotated narratives and the study of the relationships between the linguistic expression of the story in the narrative and its content.

Project DramaBank, which has proposed a template based language for describing the narrative content of text documents, is a standalone downloadable application relying on an internal, non-standardized representation format (Elson, 2012). A media-independent model of story is provided by the OntoMedia ontology, exploited across different projects (such as the Contextus Project[5]) to annotate the narrative content of different media objects, ranging from written literature to comics and TV fiction. In the field of cultural heritage dissemination, the StorySpace ontology supports museum curators in linking the content of artworks through stories (Wolff et al., 2012), with the ultimate goal of enabling the generation of user tailored content retrieval. Some initiatives also rely on automatic annotation approaches, which can overcome the difficulties of recruiting annotators, especially when minimal schemata targeted at grasping the regularities of written and oral narratives at the discourse level can be worked out (Rahimtoroghi et al., 2014).

Here, we provide an overview of the Drammar approach[6], an ontology of drama, specifically conceived to annotate dramatic media (Lombardo and Pizzo, 2014), that makes the knowledge about drama available as a vocabulary for the linked interchange of annotations and readily usable by automatic reasoners for implementing many tasks (such as, e.g., the calculation of characters' emotions (Lombardo et al., 2015)).

However, though convenient for its formal account amenable to automatic reasoning, the use of ontology editors and reasoning tools is challenging for drama experts (Varela, 2016). For the accomplishment of the annotation task, it is crucial to provide a friendly environment with metaphors and interfaces that directly descend from the drama scholarship, which abstracts the annotator from the details of the ontology representation. Here we describe a pipeline and system for the metadata annotation of dramatic texts.

3 The Drammar ontology

In order to build a formal encoding of the dramatic elements, Drammar resorts to a set of theories and models that are well established in Artificial Intelligence and Computer Science. Fig. 1 provides an overview of the major classes and properties of the ontology: on the left side, the timeline of incidents grouped into units (upper part, left), connected with the agents' intentions (or plans, lower part, left) through the concept of Action (middle part, left); on the right side, the hierarchical scene structure (upper part, right), connected to the patterns for describing actions (lower part, right), which assign roles to agents; the middle of the figure describes the agent, with its conflicts (lower part, middle), and mental states (middle). Elements in grey levels are referred on external references: *List* and *Treenode*, on top, from abstract data structures; *SituationSchema*, *FramenetSchemata*, and *DescriptionTemplate*, on the left, from linguistic resources; *Agent* and *Object* from general upper

[2] `http://www.hbo.com/the-sopranos`, visited on 21 July 2017

[3] `http://www.cbs.com/shows/survivor/`, visited on 21 July 2017

[4] `https://www.ubisoft.com/en-US/game/assassins-creed/`, visited on 21 July 2017

[5] `http://www.contextus.net`, visited on 21 July 2017

[6] `https://www.di.unito.it/wikidrammar`, visited on 15 October 2017

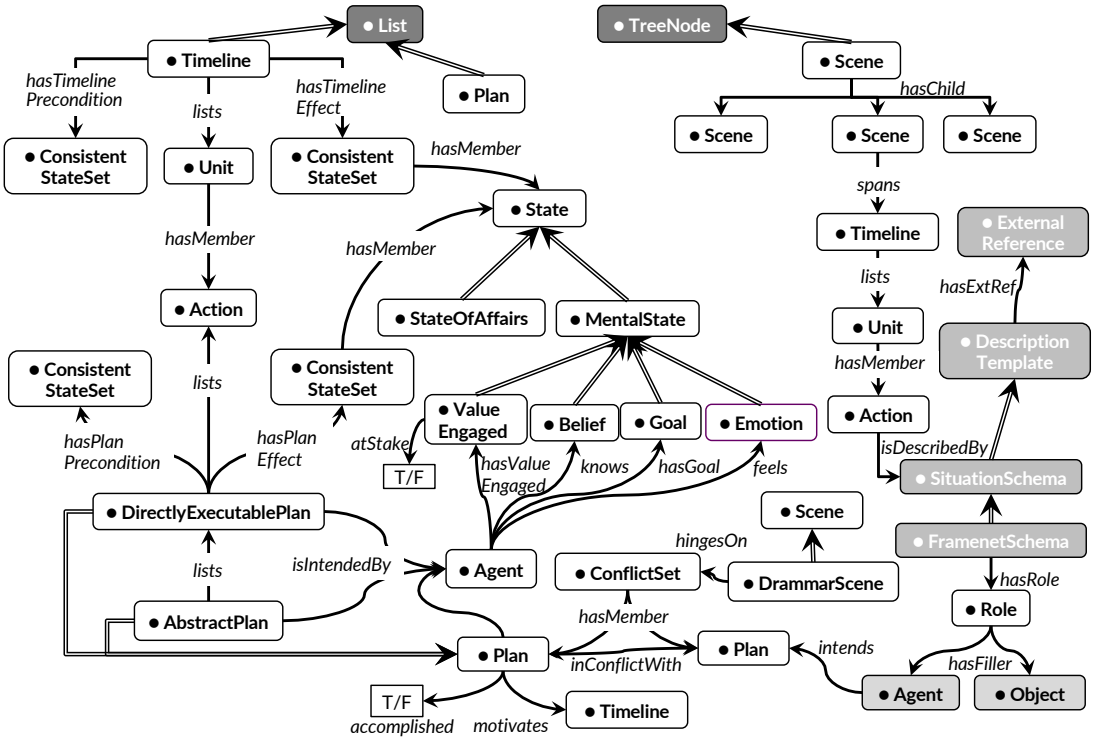

Figure 1: Major classes and properties of ontology Drammar

ontology.

The *Timeline* is the closest element to the drama document (a literary text or an audio-visual medium), a succession of the incidents (or *Actions*) that happen in the drama. Incidents are assembled into discrete structures, called *Units*. Each succession of incidents forms a sub-timeline of the whole timeline of the drama. This level is formalized through the Situation Calculus paradigm (McCarthy, 1986): with sub-timelines that function as operators advancing the story world from one state to another (states aggregated in *ConsistentStateSets*), that work as preconditions and effects of some sub-timeline of incidents.

The actions result from the deliberation process of the characters, named *Agents*, which centers upon the notion of the character's intention in achieving (or trying to achieve) a *Goal*. The intention, or the commitment of the character, is represented by a *Plan*, which consists of the actions that are to be carried out in order to achieve some goal; plans are organized hierarchically, with high-level behaviors (*AbstractPlans*) formulated as lists of lower-level plans, or subplans, until the *DirectlyExecutablePlans*, which directly contain actions. Goals originate from the values of the characters that are put at stake and need to be restored (*ValueEngaged*), given the *Beliefs* (i.e. the knowledge) of the agents. This level is formalized through the rational agent paradigm, or BDI (Belief, Desire, Intention) paradigm (Bratman, 1987) (which is also applied in the computational storytelling community (Norling and Sonenberg, 2004) (Peinado et al., 2008). So, an agent is characterized by goals, beliefs, values engaged, emotions, and plans; values can be *atStake* (true) or in balance (*atStake* false); plans can be in conflict with other plans, possibly of other agents; a conflict set aggregates all the plans, agents, and goals that determine a dramatic scene (*DrammarScene*), through the game of alternate accomplishments. A plan *motivates* the existence of a (sub)timeline, has preconditions and effects, which are consistent sets of states, and can be *accomplished* or not. Finally, scenes, defined by the author or perceived by the audience, to appropriately segment the timeline, are recursively composed of daughter scenes. A scene *spans* a timeline, that is a sequence of

units. Some scenes are *DrammarScenes*, meaning that they are motivated by some conflict over the characters' intentions, which is the characterization of scenes according to the Drammar ontology.

The concepts and relations of the ontology Drammar are written in the Semantic Web language OWL (Ontology Web Language), in particular, OWL2 RL (Rule Language), a syntactic and semantic restriction of OWL 2. This allows to address the problem of connecting drama knowledge with the general knowledge. In fact, since Drammar includes classes that are intended as an interface between the drama domain concepts and the linguistic and common sense types of knowledge (see the grey boxes in Fig. 1), it is compliant with the paradigm of linked data (Heath and Bizer, 2011).

4 Crowdsourcing annotation of drama texts: the POP-ODE initiative

POP-ODE consists of a pipeline and a number of tools for the accomplishment of the annotation task of metadata for dramatic texts. A web-based interface supports the feeding of the tables of a data base, built according to the tenets of ontology Drammar: story units, characters, actions, intentions or plans, goals, conflicts, values at stake (emotions are calculated automatically from these data). The ontology axioms have been encoded by the drama scholar (supported by the ontology engineers), through the well-known Protègè editor[7]. A module converts the data base tables into an OWL file, actual a Drammar Instantiated Ontology file (OWL DIO file).

Figure 2 shows the web interface for the annotation. The top of the figure shows the text selector: on the left, the Hamlet text from an authoritative source (Shakespeare's navigators), on the right, the text chunk that pertains to the unit selected below. The middle of the figure shows the unit annotation, that is the actions that have been identified by the annotator in the selected segment of the text, recognized as a bounded unit. On the left and the right of the unit annotation are the previous and the following unit in the story timeline, with the values that are at stake or at balance before and after the current unit. So, in this example, the unit concerns Polonius that asks Ophelia about her feelings; it occurs after Polonius blesses Laertes on his departure and before Ophelia promises to avoid Hamlet. The bottom of the figure concerns the plans that motivate such a unit. In particular, going from left to right, we see that, Ophelia (the agent or character shown at the left), who has the goal of meeting Hamlet, has the plan of convincing her father Polonius that Hamlet is reliable, and this plan is in conflict with Polonius' plan who wants to convince Ophelia that she is too candid for Hamlet. As we know from the following unit, Polonius will succeed in convincing Ophelia, and actually Ophelia's plan fail (see "accomplished? NO" at the far right).

The corpus of annotated drama documents currently consists of a small number of video and textual drama documents, respectively (see table 1). Though we have not carried a thorough evaluation of the annotation, we have employed the annotated documents in two applicative tasks: the first is the calculation of the emotions felt by the characters through automatic reasoning, on the basis of the events and the intentions manually annotated (Lombardo et al., 2015); the second is the realization of printed charts of the characters' intentions, aligned with the timeline of incidents (Lombardo et al., 2016b), currently employed in the didactics of drama writing at the University of Torino. We are going to evaluate the appropriateness of Drammar on the adequacy of description from the point of view of research on the humanities.

The current corpus has been employed in the realization of printed charts of the characters' intentions aligned with the timeline of incidents (Lombardo et al., 2016b), the application of automatic reasoning techniques to compute the emotions felt by the characters on the basis of the events and the intentions manually annotated (Lombardo et al., 2015); the proposal of a model for the preservation of drama as an intangible form of cultural heritage (Lombardo et al., 2016a), the encoding of Stanislavsky's Action Analysis, useful in perspective for supporting actor rehearsals and drama staging (Albert et al., 2016).

Finally, we report a few considerations on the status of a Drammar instantiated file, which contains an annotated drama text, by connecting the Drammar format with the widespread FRBR conceptual model. The FRBR model (Functional Requirements for Bibliographical Entities) (O' Neill, E. T., 2002), designed for capturing the seman-

[7] `http://protege.stanford.edu`, visited on 15 October 2017.

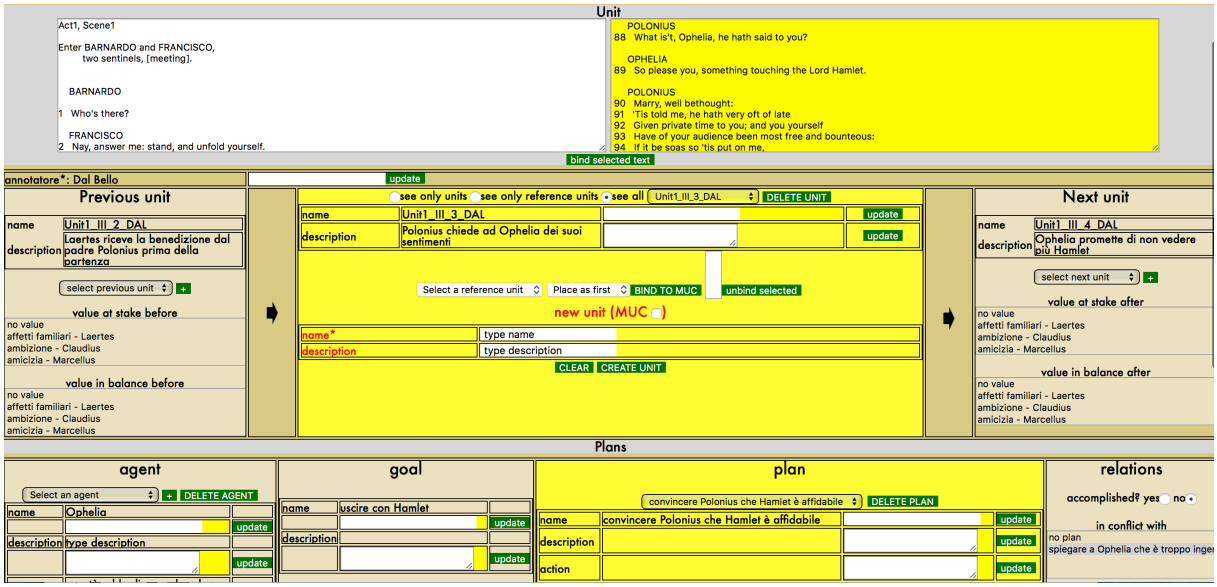

Figure 2: The web interface of the POP-ODE annotation: top) text selection; middle) unit annotation; bottom) intentions-goals-conflicts annotation.

Medium	Work	Fragment
Text	Hamlet (Shakespeare)	whole text (Arden book)
Text	Mutter Courage und Ihre Kinder (Brecht)	whole text (in Italian - Einaudi)
Text	L'Arialda (Testori's Italian neorealism)	whole text (in Italian - Feltrinelli)
Movie	Apocalypse now	helicopter attack scene (ride of valkyries)
Movie	Taxi driver	"Are you talkin' me?" scene
Movie	Matrix	bullet time scene
Movie	La Dolce Vita	Trevi fountain scene
Movie	The Clockwork Orange	Flat Block Marina scene
Movie	Blade Runner	"I've seen thinks ..." scene
Movie	The deer hunter	Russian roulette scene
Movie	The Godfather	Sollozzo omicide scene
Movie	The Snatch	dog VS. rabbit scene
Movie	Kill Bill - Vol. 2	"losing the other eye" scene
Musical video clip	Taylor Swift's "You belong with me'	3-min video
Advertisement clip	"Zippo" lighter commercial	30-sec video
Animation short	Oktapodi	2:30-min video

Table 1: Corpus of annotated drama documents.

tics of bibliographic information, addresses the abstract ideation (called Work, e.g., Beethoven's idea of the Ninth Symphony), the encoding in a specific language such as the text (called Expression, e.g., Berliner Philarmoniker's interpretation of the Ninth), the concrete representation (called Manifestation, e.g., some Berliner Philarmoniker's recording of the Ninth), and a single instance (called Item, e.g., some published CD of some Berliner Philarmoniker's recording of the Ninth). In our case, the instantiated OWL file is a particular Expression of the underlying drama abstraction (called Work, in FRBR terms), encoded in the ontological format. So, the original textual document is an actual Manifestation of the ontological linguistic Expression that is perfectly compliant with the FRBR model. We can have many manifestations of such a single expression, which however constrains units and timelines to remain unaltered.

5 Conclusion

In this paper, we have described the Drammar approach for the metadata annotation of dramatic texts. We have described the Drammar ontology and the POP-ODE initiative for the annotation pipeline for drama documents, together with the web-based annotation tool. We are going to make a vast and effective test of the annotation tool over several student classes, together with questionnaires and ethnographic observations, to eval-

uate the functioning of the tool and to create a vast corpus for studies in the digital humanities.

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