# Representing Dramatic Features of Stories through an Ontological Model

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**Abstract.** In this paper we present a novel ontology-based model for the representation of the dramatic features of narrative media (video, text, audio, etc.), focused on the notions of the character's motivated actions. We describe the theoretical background, composed of narratological theories and rational agent theories, that support the proposed ontological formalization. We sketch the ontology and an encoding example.

## 1   Introduction

In this paper, we describe an ontology of the dramatic narration, called *Drammar*, designed and implemented for the CADMOS Project (Character-based Annotation of Dramatic Media ObjectS). The goal of the CADMOS project is to establish a formal framework and a software platform for the creation of annotated corpora of narrative media objects. The working hypothesis is that the construction of reliable resources of annotated media objects can contribute to the research in storytelling by prompting the empirical studies and triggering the automatic acquisition of rules for generation and analysis purposes. In this sense, the use of the ontological encoding, as a shared formal representation, limits the arbitrariness of the annotation and improves the interoperability of annotated resources.

In CADMOS, ontologies are employed to encode both the entities and the events featured in a story (characters, objects, places, actions, natural phenomena, etc.), and the basic principles of the dramatic narration.

For encoding such principles, the ontology Drammar pivots on the notion of *motivated actions*, that is, the actions carried out by the characters in trying to achieve their goals. Actions are central in drama (from classical Greek "dran", to act), and their motivations, in terms of goals, moral values, and emotions, provide the basis for the characters' coherence on behalf of the audience.

The next section provides the theoretical background of Drammar, together with a description of the related work. The Section 3 sketches the structure of the ontology and illustrates an example. Conclusions end the paper.

## 2    Theoretical Background and Related Work

The Drammar model builds upon three major knowledge backgrounds concerning, respectively, story models, rational agents and computational ontologies.

The notion of story is usually summarized as two orthogonal axes: *characters* and *plot* [19]. A story contains a series of incidents, made of characters' actions and unintentional, naturally occurring, events. *Drama*, as a "cultural object" developed along two millennia, is based upon the notion of action (drama as "imitation of praxis") [1], where *emotional characters* [7] engage in *conflicts* that necessarily arise from their deliberative processes [12]. So, actions are motivated by characters that are pursuing their goals. The most general and commonly acknowledged dramatic rule requires the actions to be deployed in such a way to put at stake values of increasing importance, until a climax of characters' struggling, after which conflicts tend towards a resolution [10]. For example, in *Romeo and Juliet*, the two lovers first must foul the parents to get secretly married; then, as the plot unrolls, they have to face homicide, exile and death.

In our ontology, in order to keep the annotation schema as much as possible of a descriptive nature and independent on specific accounts of the narrative structure, we did not include the knowledge about story models, such as Propp's functional roles [20], Egri's premises [8], or Polti's dramatic situations [18]. On the same line of research, there are the recent collections concerning genres and tropes (such as TV tropes[1]). The adoption of such approaches would bias the annotation toward empirical aspects; this will be possible on top of the core ontology we propose.

Character is a powerful instrument of identification, contributing to the emotional engagement of the audience [4] "in sympathy with the narrative character" [11]. The mechanism of identification [3] requires characters to exhibit both stability of behavior and dynamic changes (character as a general psychological and moral trait and as an individual person occupying a place in a narrative) [15]. So, while the plot forces the character to react to the events by adapting her/his behavior to the context, she/he must as well stick to her/his established long-term goals. For example, Romeo is confronted by his archenemy Tibaldo in one scene, but tends to avoid conflict because he does not forget the long term goal of being with Juliet. The mediation between the high–level stability of characters' behavior and the deployment of drama is achieved through organization of drama into a hierarchy of units. In Drammar, the annotation of characters' goals, values at stake, emotions and actions, are formally interconnected in a structural unit (*Unit* class).

The formal model employed in Drammar for the annotation of character's actions and motivations is the BDI (Belief, Desire, Intentions) model of rational agent [2, 9]. In Drammar, the BDI model is augmented with emotions, and moral values: characters' feel emotions, associated with the achievement of their own goals and the appraisal of the actions of other characters and unintentional

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[1] http://tvtropes.org

events (following [6, 16]); characters' values are put at stake by others' actions or events, prompting the formation of new goals (see the model in [5]).

Finally, beside the inner consistency of characters' behavior, the notion of verisimilitude also requires the overall interplay of characters' actions to form a logical, believable sequential flow of facts. For the story to be consistent, the state of the world that holds after a certain unit must be consistent with the logical preconditions of what follows it in the narration, in order to account for the narratologists' claim that plot incidents must be causally connected to each other as a necessary condition for story construction [21]. The notion of horizontal development of the story is the *Dynamics* of the unit.

Given the background of narratology and AI studies sketched above, the instrument through which this knowledge is represented in CADMOS is given by the computational ontologies. This assumption is in line with other initiatives in multimedia annotation, especially in story–oriented media.

The EU-funded ANSWER project[2], aims at defining a formal language for script and scene annotation, with the goal of automatic pre-visualization. ANSWER does not address the narrative aspects, but rather the filmic language by which the narrative will be conveyed, and relies on the semantic layer provided by a Film Production ontology. This ontology constitutes the reference model for the Director notation, the input language for the pre-visualization services.

A media independent project is provided by the OntoMedia ontology [13], exploited across different projects (such as the Contextus Project [14]) to annotate the narrative content of different media objects, ranging from written literature to comics and tv fiction. The OntoMedia ontology mainly focuses on the representation of events and their organization into a timeline. In this sense, it lends itself to the comparison of cross-media versions of the same story, for example, a novel and its filmic adaptation, while it does not cover in a detailed way the role of the individual characters and the description of their behavior.

KIIDSOnto [17] is an ontology developed for the KIIDS (Knowledge-Intensive Interactive Digital Storytelling) system, that generates interactive stories with a case-based reasoning approach. KIIDSOnto incorporates Propp's model of tale [20] to deal with a repository of 49 Russian folk tales. KIIDSOnto is used to measure the semantic distance between different folk tales, considering the concept hierarchy and the heuristics of the system. Though it includes the notion of character, KIIDSOnto is limited to the mapping of the Proppian functions onto the story events and does not address the motivations that lead characters to perform certain actions.

The CADMOS project shares with these approaches the basic assumption that a media object can be segmented into meaningful units and, given some kind of formal description, the units can be accessed and navigated. However, it replaces the previous definition of units, respectively based on production (Answer), structuralist concepts (OntoMedia), or events (KIIDSOnto) with a character–based perspective.

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[2] http://www.answer-project.org/

## 3  Drammar

The Drammar ontology has been designed for the annotation of the narratological features of units, i.e. segments of a dramatic narration, with the goal of building annotated corpora of audiovisual media objects. This resource can be used in many applicative scenarios such the retrieval, on a narrative base, of archive material, for the production of new videos and the acquisition of knowledge, in terms of dramatic rules, for use in analysis and generation of stories.

The top level of the presented ontology consists of four classes: `Entity`, `Dynamics`, `Unit` and `Relation`. `Entity` models the agents and objects of the dramatic narration. In particular, the agents' propositional attitudes, namely beliefs and deliberated goals, account for the participation of the character in the dramatic media objects.

The `Dynamics` of drama encompasses both the occurrence of incidents (actions and events) and their effects on the mental states of the characters. The `Incident` class models both the intentional actions performed by the characters and the naturally occurring events. Characters' motivations and emotional states are modeled by the `MentalState` class, further subdivided in `Belief`, `Goal`, `Emotion` and `Value`. Since all these properties are dynamic (i.e., Unit-dependent), they are not directly connected with the `Agent` class. Indeed, the connection between `Agent` and its properties is mediated by the `Relation` class.

`Unit` is the core of the annotation, since it models the partition of the story into logical segments. A unit is a chunk of the story that is motivated by (at least) one character's goal. Unit boundaries are defined by the achievement or failure of agents' goals. In the story progression, some units exhibit dramatic qualities: when a goal is in conflict with some other goal (either of the same character or of another agent) or with an event, it is defined a `DramaGoal`. If the unit encompasses a sequence of actions that show the dramatic qualities (such as the conflicting goals), it is defined as `DramaUnit` class.

The major subclass of `Relation` is `DramaRelationType`, that defines the relationships among agents and mental states in a specific Unit. This is needed because the relation between characters and mental states can vary from Unit to Unit. For example, in Romeo and Juliet (Act III, Scene 1), Romeo is fond of Tibaldo and later on he hates him because Tibaldo has killed Mercuzio. This information is modeled through the subclass `AgentInUnit` that permits to associate an instance of an `Agent` to a `Goal` and the unit in which the agent pursues the goal (`featuresGoal` property). Since goals are assumed to be achieved by action plans, the property `obtainedThrough` connects the `GoalOfAgentInUnit` class with the actions the agent performs.

As an example, consider the famous nunnery scene, in Hamlet, where Hamlet is confronted by Ophelia, while Claudius and Polonius observe them behind the curtains (already studied in [6]). Here, we describe only the first unit of the characters of the scene, where Hamlet and Ophelia meet, DU1. This `Unit` contains all the scene characters, through the `enactedBy` property.

```
<NamedIndividual rdf:about="&drammar;nunnery-DU1">
  <drammar:enactedBy rdf:resource="&drammar;nunnery-agentInUnit1Ophelia"/>
```

```
<drammar:enactedBy rdf:resource="&drammar;nunnery-agentInUnit1Hamlet"/>
```

The `Action` performed by Ophelia is to greet Hamlet (`&drammar;greetingProcessSchema`):

```
<NamedIndividual rdf:about="&drammar;nunnery-actionOpheliaDU.1">
  <rdf:type rdf:resource="&drammar;Action"/>
  <drammar:predicateIncident rdf:resource="&drammar;greetingProcessSchema"/>
```

Ophelia's goal is to meet Hamlet. This is a drama goal, since it is in conflict with Hamlet's goal, and it holds in Unit DU1 (it is an instance of `GoalOfAgentInUnit`). The predicate describing it (`predicatePropositionalAttitude`) is &drammar;nunnery-meetingProcessSchema.

```
<NamedIndividual rdf:about="&drammar;goalOfAgentInUnitOpheliaDU1">
  <rdf:type rdf:resource="&drammar;goalOfAgentInUnit"/>
  <drammar:predicatePropositionalAttitude rdf:resource="&drammar;nunnery-meetingProcessSchema"/>
```

This goal is linked to the agent by the featuresGoal property and conflicts with the goal that Hamlet holds in the same unit.

```
<drammar:featuresGoal rdf:resource="&drammar;dramaGoalOpheliaDU1"/>
<drammar:inConflictWith rdf:resource="&drammar;goalOfAgentInUnitHamletDU1"/>
```

Hamlet's goal in that scene is described by the predicate `&drammar;nunnery-avoidingProcessSchema`. The status of this goal is false, since it is not achieved in the unit: by the end of the unit, Hamlet fails to leave after Ophelia greets him.

Ophelia's goal originates from Ophelia's `belief` (`&drammar;beliefOpheliaDU1`) that Polonius wants her to meet Hamlet (`&drammar:goalPoloniusDU1`):

```
<NamedIndividual rdf:about="&drammar;beliefOpheliaDU1">
  <rdf:type rdf:resource="&drammar;Belief"/>
  <drammar:predicatePropositionalAttitude rdf:resource="&drammar:goalPoloniusDU1"/>
```

Since she owns the value of paternal authority, this belief puts such a value at stake, forcing her to assume the goal.

```
<NamedIndividual rdf:about="&drammar;OpheliaCharacterValue">
 <rdf:type rdf:resource="&drammar;CharacterValue"/>
 <drammar:valueContent rdf:resource="&drammar;valuePaternalAuthority"/>
```

Ophelia's emotional state is "hope" for the achievement of her goal:

```
<NamedIndividual rdf:about="&drammar;emotionOpheliaDU1">
  <rdf:type rdf:resource="&drammar;Emotion"/>
  <rdfs:label>nunnery-emotionOpheliaDU1</rdfs:label>
  <drammar:emotionType>hope</drammar:emotionType>
  <drammar:cognitiveAppraisal rdf:resource="&dramamr;goalOpheliaDU1"/>
</NamedIndividual>
```

## 4  Conclusion

In this paper we presented a novel ontological model for representing dramatic features of a narrated story. This model relies on the dramatic concepts of "character" and "goal", and uses them to logically segment the story into narratively coherent units. The presented ontology can therefore be used for guiding a dramatic based annotation process or also supporting advanced retrieval and reasoning operations on the annotated data. We reported the motivations and the general assumptions that guided our work, providing also examples that highlight the functionalities of the ontological model for annotation purposes.

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