

# Semiotic Structuring in Movie Narrative Generation

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**Abstract.** In this paper we apply, in a novel way, our ongoing research work on the interactive composition of narratives based on *semiotic relations*. To the two basic components of interactive systems, namely, a software tool and a user interface, we add a third component – *AI agents*, understood as an upgraded rendition of software agents. Our semiotic relations approach considers four ways of composing new narratives from existing narratives. Along the horizontal syntagmatic axis one can form the new narrative by *combining* two or more previous narratives. Along the vertical paradigmatic axis, the new narrative may emerge as a similar version, which *imitates* the previous one in a different context. Along the depth meronymic axis, the hierarchic narrative levels, such as event and scene, are explored, allowing to *zoom in and out* in the composition process. Lastly, the antithetic consideration, rather than adding a dimension, aims at some form of *reversal*, through the adoption of opposite values. A fully operational prototype is described, with ChatGPT operating as the main AI agent component. To run the experiments, we concentrated on movie narratives.

**Keywords:** Interactive Story Composition, Semiotic Relations, Artificial Intelligence, Movie Narratives, Storyboards, Chatbots, ChatGPT.

## 1 Introduction

In this work, we address the processes of analyzing and generating movie narratives, with the support of our proposed *semiotic relations*, previously introduced in the course of our Logtell<sup>1</sup> interactive storytelling project [13, 23, 30].

Our early work in the project, as formally described in [8], dealt mainly with interactive plan-based plot generation [8, 27, 28, 29] and dramatization [9, 25, 31, 32], wherein plots consisted of partially-ordered sequences of events. Our prototype tools, developed in logic programming notation, basically remained at what Mieke Bal [2] calls the *fabula layer*, where a simple abstract account of *what* happens is presented, to be followed by the *story layer* indicating *how* what happens is told – i.e. how the

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<sup>1</sup> <http://www.icad.puc-rio.br/~logtell/>

author structures the narrative – and, lastly, by the *text layer* which materializes the narrative in some chosen medium (which could be animation, video, film, etc.).

On the one hand, our tools were generally well evaluated by the non-professional users who interacted with them, and were happy to see their decisions at branching points being taken into account so as to produce plots conforming to their taste [24], and noticed the curious unexpected solutions that the plan generator managed to find when given apparently impossible goals. On the other hand, by not trying to contemplate Mieke Bal’s story layer, the plots invariably looked rather shallow, lacking the creative touch of talented professional authors.

We accordingly decided, while keeping user interaction, to extend our approach to the story layer, by composing the plots, still under the form of partially ordered sequences of events, by extracting them from narratives told by professionals. In an early attempt in this direction, we applied our previous work on semiotic relations to the analysis of folktale narratives, investigating how the innumerable *variants* of a folktale type might have emerged, and then proceeding to show how to automatically create new variants by the interactive application of the semiotic relations. One of our papers [30], based on the *Index* compiled by Aarne and Thompson [1], dealt in particular with the folktale type AT 333, to which pertains the *Little Red Riding Hood* story, reported in [40] to have appeared in no less than 56 variants in different regional and temporal contexts.

In the present paper, we propose to advance one fundamental step further in the application of semiotic relations to the process of interactive narrative analysis and generation by focusing on their natural language representation. We concentrate on movie narratives as the object of research, realizing that they are generally attractive to contemporary taste, inasmuch as their producers are compelled to strive for both critical acclaim and box office revenue.

*Related works* with stimulating results include a growing number of publications pertaining to the active research topic of *film semiotics*, a particularly influential contribution being Umberto Eco’s characterization of what he calls ‘cinematic code’ [11]. Another important reference on the semiology of the cinema is the work by Christian Metz [33]. The relevance of scenes that function as leading *motifs* is confirmed by Folgert Karsdorp [21], who sees them as “the primary building blocks of stories”. Our approach to achieve support to narrative generation is akin to *case-based reasoning* [22], in our case by looking at some ‘virtual library’ of popular movies to *search* for movies whose structure has certain characteristics and could then be *adapted* in order to compose new narrative structures. Previous attempts to employ case-based reasoning to narrative generation include, among others, the work reported by Pablo Gervás [16]. *Searching* through a library is a pattern-matching activity that, in principle, should not be too hard to implement if the library items are conveniently indexed. The subsequent *adaptation phase*, on the contrary, poses widely different sorts of unpredictable *blending* problems [12, 26] calling for human interaction, ideally combined with the development of heuristics that may promise some chance of success.

More importantly, what makes our proposal look viable is the fact that current efforts to cope with the difficulties of natural language understanding and generation are obtaining increasing success, thanks to technical novelties that allow to handle

very large text repositories, such as *transformers* [20]. The GPT (Generative Pre-trained Transformer) model [34] has guided the production of the ChatGPT tool<sup>2</sup>, which is now being tried for a variety of purposes. However, there are no in-depth references on ChatGPT for interactive plot generation for movie narratives, but simple examples in blogs and guidelines dealing with screenwriting exist. Among these applications, we find attractive the experiments by Gonsalves [17] to write screenplays, the practical guidelines for screenwriting by Carter [6], and the simple course materials of the University of New Hampshire [41]. None of those applications, nevertheless, have a robust foundation of movie semiotics that allows a more controlled use of the ChatGPT tool as we propose in the present paper.

The paper is organized as follows. Section 2 explains how our proposed semiotic relations support the structured analysis and generation of narratives. Section 3 applies the relations to the analysis of four popular movies, in an attempt to gain experience for the interactive generation process, which is the object of Section 4. Section 5 contains concluding remarks.

## 2 Semiotic Structuring

One major guideline of our Logtell interactive storytelling project is the *semiotic treatment* of both factual and narrative information, on the basis of four *semiotic relations* [13, 30].

The four relations – *syntagmatic*, *paradigmatic*, *meronymic*, *antithetic* – have been drawn from the so-called *four master tropes*, a topic of high interest in the area of *semiotic research* [7]. The word ‘trope’ comes from the Greek ‘τροπος’ from ‘τρεπειν’, ‘to turn’, with the intended meaning that such rhetorical figures ‘turn’, i.e., alter the meaning of a word. Table 1 shows our four semiotic relations, together with their intuitive meaning, associated logical connectives, and corresponding tropes.

**Table 1.** Semiotic relations.

<b>relation</b>	<b>meaning</b>	<b>operator</b>	<b>trope</b>
<b>syntagmatic</b>	connectivity	and	metonymy
<b>paradigmatic</b>	similarity	or	metaphor
<b>meronymic</b>	hierarchy	part-of	synecdoche
<b>antithetic</b>	negation	not	irony

Present among the numerous rhetorical tropes compiled in Greco-Roman antiquity by Quintilian (c. 35-c. 100), these four tropes were later characterized as fundamental, first by Ramus (1515-72) and again by Vico (1668-1744) [7]. In modern times they were revived in Kenneth Burke’s seminal study [5]. Their universality and completeness have been repeatedly emphasized, with the indication that they do constitute, according to Jonathan Culler, “a system, indeed *the* system, by which the mind comes to grasp the world conceptually in language” [10]. Applications to several topics have

<sup>2</sup> <https://openai.com/blog/chatgpt>

been reported, for instance, to worldviews and ideologies by the historian Hayden White [42] and, in our own work, to mathematical proof methods [15], to database conceptual modelling [13], and, more relevant to the present discussion, to digital interactive composition of story-plots [30].

With respect to the names we assigned to the proposed semiotic relations, the terms ‘syntagmatic’ and ‘paradigmatic’<sup>3</sup> correspond to the two linguistic axes postulated by Saussure [37], who originally called the second axis ‘associative’. His *horizontal* syntagmatic axis modelled sentences as aligned sequences of words connected in obedience to language syntax, whilst the *vertical* associative dimension offered alternative choices to be placed below some of the sentence components.

The now universally adopted renaming of ‘associative’ to ‘paradigmatic’ was promoted by Jakobson [19], who argued convincingly, while discussing aphasia disorders, that “the development of a discourse may take place along two different semantic lines: one topic may lead to another either through their *similarity* or through their *contiguity*. The metaphoric way would be the most appropriate term for the first case and the metonymic way for the second”, in clear reference, respectively, to the paradigmatic and syntagmatic terminology.

In [43], wherein six types of *part-of* links are distinguished, one reads: “We will refer to relationships that can be expressed with the term ‘part’ in the above frames as ‘meronymic’ relations after the Greek ‘meros’ for part”. About its associated trope, Burke affirms that “for synecdoche, we could substitute *representation*.” [5]. In fact, breaking some signifying term into detail is an effective way to achieve its representation, whereas its identification should be possible by summarizing a detailed view. This zooming in / zooming out variation of granularity level suggests that meronymic relations introduce *depth* as a third dimension.

Lastly, the term ‘antithetic’ reflects the attribution of a *value scale* [7], either simply binary or graduated. No additional dimension is implied. According to Burke [5], the perspective induced by the associated irony trope refers to *dialectic*, which includes *antithesis* as a critical phase, expressing *negation*.

Section 3 contains examples of structured movie narrative analysis based on the four semiotic relations. The informally conducted analysis of four representative examples (which led us to examine long series of related narratives, not mentioned here to save space) furnished clues to formulate the verbal definitions of the semiotic relations, shown in Table 2 of Section 4.2, which guide the prototype in the generation of new movie narratives. At the close of the analysis, we verified the adequacy of each definition over the corresponding example in separate ChatGPT sessions.

As we proceed with analysis as a preliminary step to generation, we should have in mind Barthes’s assertion that reusing other authors’ work, in honest and imaginative fashion, is a culturally consecrated artistic practice, and that *intertextuality* can be detected everywhere [3, p. 39]: “Any text is a new tissue of past citations ... the intertext is a general field of anonymous formulae whose origin can scarcely ever be located; of unconscious or automatic quotations, given without quotation marks”.

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<sup>3</sup> Eco [11] and Metz [33] treat the syntagmatic and paradigmatic elements within a more general approach to the semiology of cinema, which lies beyond the scope of the present paper.

### 3 Examples of Structured Movie Narrative Analysis

#### 3.1 Syntagmatic Relation – *Batman v Superman: Dawn of Justice*

The narrative of *Batman v Superman: Dawn of Justice* (Warner Bros., 2016) operates the confluence of the life stories of the characters in the title, who premiered separately in the films *Batman* (Warner Bros., 1989) and *Superman* (Warner Bros., 1978), indicating a syntagmatic relation between the films. The two protagonists are *comics superheroes*, and their quest is to protect all citizens of the fictional town where they live, respectively named Gotham City and Metropolis, apparently modelled after New York. They are committed to fighting highly resourceful criminals, while often suffering opposition from the regular police and from conservative newspapers, given that they act in a vigilante extra-legal capacity.

The question is then why they behave as enemies, since they are engaged in the same kind of quest. It has been suggested [4] that the film could be interpreted thematically as an *allegory* about America’s response to the 9/11 terrorist attack, in which case the opposition to Superman would be motivated by the fear that “an all-powerful alien” – referring not to the villain Zod but to Superman himself – “could destroy his adopted planet with ease”. And yet Superman would be revived later in the interest of a common cause. Reconciled with Batman, he would join his repentant adversary, together with Wonder Woman, Aquaman, Cyborg and The Flash to form the *Justice League* (Warner Bros., 2017) to save the planet from an assault of catastrophic proportions. The Marvel Studios later embarked on the active production of superhero films<sup>4</sup> featuring, in particular, the *Avengers League*.

#### 3.2 Paradigmatic Relation – *The Magnificent Seven*

The opening scene of *The Magnificent Seven* (United Artists, 1960) overtly announces that it is based on Akira Kurosawa’s film *Seven Samurai* (Toho, 1954). First of all, the similarity between the American and the original Japanese narratives stems from their casting of solitary heroes – *gunmen* in the former, *ronin* in the latter – in both cases brought together for a minimally rewarded quest: to protect a poor defenseless farmer community against the repeated assaults of an army of bandits.

A ronin was a type of samurai who had no lord or master and, in some cases, had also severed all links with his family or clan [36]. Being unemployed, they were customarily poor, and thus not unwilling to accept the farmers’ appeal simply in exchange of regular daily meals. On the other hand, as all types of samurai [38], they were hereditary members of noble families. Gunmen, too, moved independently most of the time, admired as folkloric figures by some, but execrated for their often-unlawful conduct by those who made efforts to raise the primitive farming settlements in the old American west to the status of official political units. As opposed to the samurai, they were common people, with no pretense of nobility. The farmers begging for the help of the samurai are equally Japanese, whereas in the American retelling they come from a neighboring Mexican locality.

<sup>4</sup> <https://editorial.rottentomatoes.com/guide/marvel-movies-in-order/>

The intended narrative similarity is confirmed by a close correspondence, in terms of a number of *mappings*, between the characters and between the plot events. Each group of heroes has a leader, Kambei in the Japanese film, Chris in the American film, who accepts the calling and recruits his companions, one of which proves his superior fighting ability in a Japanese sword duel, mapped into a typical Old West gun showdown. A radical twist in the American version is the conflation of Katshu-shiro, the young apprentice of the leader, with the turbulent falsely pretending but brave and resourceful samurai, Kikuchiyo. The conflated character, the hot-blooded Chico, like Kikuchiyo, has a lot to do before overcoming the initial rejection of the group and, meanwhile, like Katshushiro, has a paternally opposed – but most touching – love case with a farmer girl.

### 3.3 Meronymic Relation – *The Sixth Sense*

The narrative of *The Sixth Sense* (Buena Vista Pictures, 1999) reconfigures the *type* of supernatural fantasy films, by applying an *Arthurian motif* inspired in Disney's *The Sword in the Stone* (Buena Vista Pictures, 1963).

One protagonist of *The Sixth Sense* is Cole Sear, a *psychic child*. The boy sees and hears dead people begging for his help to achieve some mission left unfinished. Another protagonist is the (dead) psychologist Malcolm Crowe, who, after a number of therapy sessions, counsels the boy to try to communicate with dead people and help them as they pleaded – and this counsel determines from then on Cole's heroic quest.

A symbol of his commitment to the quest is the scene the boy plays at a school theatrical performance, wherein the legendary Arthur's royal status is revealed by freeing the sword Excalibur from the rock that imprisoned it. The scene clearly reenacts the culminating event in Disney's *The Sword in the Stone*, creating a meronymic relation between both movies. An Arthurian scholar stressed how the boy then effectively assumed the figure of Arthur, who was reputed to generously attend the appeals of whoever came to his court, while Malcom the psychiatrist assumed a sort of sage Merlin figure: "a supernatural guide, it turns out, who helps Cole to understand the unique role he is called upon to play." [18].

### 3.4 Antithetic Relation – *The Shape of Water*

The narrative of *The Shape of Water* (Fox Searchlight Pictures, 2017) has been classified as a romantic fantasy, deliberately based but in radical opposition to the 1954 horror movie *Creature from the Black Lagoon* (Universal-International, 1954). The Mexican director of the former, Guillermo del Toro, who was also the producer and main author of the screenplay, provided, in an interview<sup>5</sup>, an eloquent account of how the project developed. Watching, when he was 6 years old, *Creature from the Black Lagoon*, he thought "I hope they end up together."

The villain in the horror movie was definitely the creature, an amphibious humanoid found in the Amazon jungle, predestined to be killed by the hero, the scientist Dr.

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<sup>5</sup> <https://www.latimes.com/entertainment/movies/la-et-mn-guillermo-del-toro-telluride-20170905-htmllstory.html>

David Reed to save his girlfriend Kay Lawrence from the monster’s clutches. In *The Shape of Water* romantic fantasy, the creature becomes the victim, and the villain would be the man who captured, kept for military purposes, and continuously tortured him: a coronel, called Richard Strickland. Most remarkably, the early victim, promoted to become the *hero* in the transgressive new movie (situated in the United States environment of 1962), was Elisa Esposito, a custodian at the secret government laboratory where the creature was kept. Found abandoned by the side of a river with wounds on her neck, she was mute, limited to communicate through signs. Her *quest* was to save the life and restore the freedom of the creature.

The quest seems to terminate in failure as she dies, but the creature’s magic healing power not only revives her but also, when he touches the scars on her neck, they open to reveal gills like his. So, while the creature is introduced as a survival from the Devonian period, Elisa turns out to be a mutation with compatible traits. On a first sight, such narratives would seem affiliated to the *Beauty and the Beast* folktale, but there is a snag: the monster does not change into a prince, which would make him acceptable as a consort. In fact, a more closely related folktale might be evoked, *The Ugly Duckling*, since Elisa’s birthmarks – the scars on her neck and her muteness – were a sign of her future felicitous metamorphoses, rather than marks of inferiority.

## 4 Semiotic Support for Movie Narrative Generation

The previous section analyzed the occurrence of semiotic relations in popular movies, which provided useful insights on how story writers can reuse ideas from existing movies. The possibility of using ChatGPT to identify semiotic relations in existing movies, combined with its writing capabilities, lead to the development of a novel system to support narrative generation, presented in the next subsections.

### 4.1 System Architecture

Figure 1 illustrates the architecture of the proposed movie narrative generation system, which comprises four main components: (1) the *Storywriter AI Agent*, which is responsible for writing story plots; (2) the *Illustrator AI Agent*, which is in charge of creating visual representations for the narrative scenes; (3) the *Plot Manager*, which controls the plot generation process by requesting story events and illustrations to the *Storywriter AI Agent* and *Illustrator AI Agent*, respectively; and (4) the *User Interface*, which provides a visual interface that allows users to compose and visualize new narratives in a storyboard format. In addition, a database (*Stories Database*) is used to store and retrieve all the narratives generated by the system.

The system is implemented in Python, PHP, and JavaScript, and relies on the knowledge of the AI agents to generate new stories using semiotic relations. The AI agents are integrated into the system through a plugin approach, which simplifies their replacement when new and more powerful models become available. In our current implementation, the *Storywriter AI Agent* is based on the ChatGPT model (GPT-3.5-

turbo), which is accessed through the OpenAI API;<sup>6</sup> and the *Illustrator AI Agent* is based on the Stable Diffusion 2.1 model,<sup>7</sup> which is accessed through a REST API.

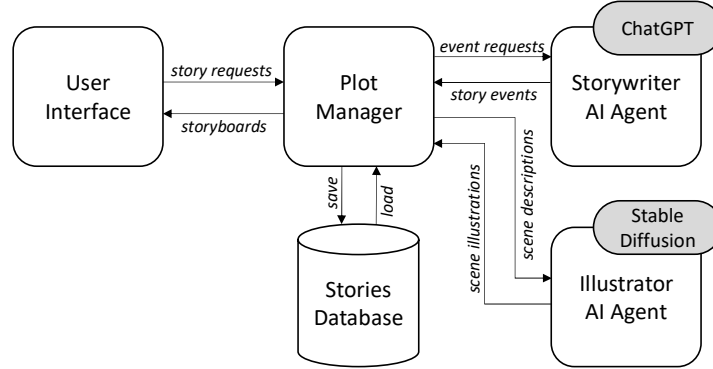


Fig. 1. Architecture of the movie narrative generation system.

## 4.2 Story Generation

The story generation process relies on the extensive movie knowledge of ChatGPT to create new stories using existing movie plots. Stories are generated according to a set of parameters that vary for each type of semiotic relation: the syntagmatic relation requires two *related movies*, M1 and M2 (creating a new story that combines both movies); the meronymic relation operates over a *related movie* M1 and a *scene description* S1 (creating a new story that details (zoom-in) the scene S1), and both paradigmatic and antithetic relations require only one *related movie* M1 (while the paradigmatic relation creates a story that is similar to M1, the antithetic relation generates a story that is the opposite of M1). Additionally, a *description of the protagonist* (PD) can be provided to guide the generated narrative.

Based on initial experiments conducted with ChatGPT to test its capacity to identify semiotic relations in existing movies, we designed a set of parameterized prompts that our system uses to instruct ChatGPT in the process of generating new stories using semiotic relations. Each prompt has three parts: (1) the definition of a semiotic relation; (2) a task description; and (3) a description of the output format. Table 2 presents the definitions and task descriptions created for each semiotic relation.

The description of the output format was designed to instruct ChatGPT to write the story in a format that can be interpreted by our system, which contains a description of the story event, a description of an image that illustrates the scene, and the title of the new story. The exact instructions provided to ChatGPT for the output format are: “Always write just one line for the story, starting with ‘EVENT:’, followed by a second line starting with ‘IMAGE:’ containing a short description of an image that illustrates the narrative event. Also generate a new creative title for movie B and add it at the beginning of the response starting with ‘TITLE:’”.

<sup>6</sup> <https://platform.openai.com/docs/api-reference>

<sup>7</sup> <https://github.com/Stability-AI/stablediffusion>

**Table 2.** Parameterized prompts designed to instruct ChatGPT on how to write new stories using semiotic relations and existing movie plots. The parameters are: <M1> - related movie 1; <M2> - related movie 2; <S1> - scene description; and <PD> - protagonist.

<b>Relation</b>	<b>Prompt</b>
Syntagmatic	Definition The fictional protagonist in the plot of movie A is X. The fictional protagonist in the plot of movie C is Y. Movie A has a syntagmatic relation with movie C if X does not appear in C, Y does not appear in A, and there exists a movie B that features both X and Y.
	Task Considering this definition, write the first event for a new movie B considering that movie A is "<M1>" and movie C is "<M2>". The protagonist of movie B must be <PD>.
Paradigmatic	Definition Movie A has a paradigmatic relation with movie B if there is some similarity between their plots and their protagonists have similar objectives.
	Task Considering this definition, write the first event for a new movie B considering that movie A is "<M1>" (movie B must have a paradigmatic relation with movie A). The protagonist of movie B must be <PD>.
Meronymic	Definition There is a meronymic relation between two movies A and B if the plot of B is equivalent to a detailed narrative of a scene S taken from the plot of A.
	Task Letting A be the movie "<M1>", S be a scene taken from the plot of A where <S1>, and letting B be an imaginary new movie, please write the first event for the plot of B, so that there is a meronymic relation between A and B. The protagonist of movie B must be <PD>.
Antithetic	Definition Movie A has an antithetic relation with movie B if there is some similarity between their plots but the objective of the protagonist of movie A is the complete opposite of the objective of the protagonist of movie B.
	Task Considering this definition, write the first event for a new movie B considering that movie A is "<M1>" (movie B must have an antithetic relation with movie A). The protagonist of movie B must be <PD>.

An important characteristic of the initial prompts is the fact that they instruct ChatGPT to write only the first event of the story, which allows the system to generate narratives in a stepwise manner. This approach allows users to compose stories in an interactive manner, allowing them to decide when to regenerate certain events,

continue, or finish the narrative. Whenever the user decides to continue the story, the system uses a specific prompt to instruct ChatGPT to generate the next event: “*Continue the story by generating another pair of lines (only 'EVENT' and 'IMAGE:').*”.

The general structure of the conversation between our system and ChatGPT is:

- (1) **System:** SEMIOTIC RELATION DEFINITION + SEMIOTIC RELATION TASK + OUTPUT FORMAT
- (2) **ChatGPT:** TITLE: *story title*. EVENT: *story event*. IMAGE: *scene description*.
- (3) **System:** CONTINUE PROMPT
- (4) **ChatGPT:** EVENT: *story event*. IMAGE: *scene description*.

where messages (3) and (4) are repeated until the user decides to end the story. An essential feature of ChatGPT used here and in all systems assisting screenwriters is that ChatGPT recognizes the context of the previous messages. Indeed, an exciting aspect of ChatGPT is its capacity to remember and work on earlier dialogs.

### 4.3 Image Generation

The process of generating images for the narrative events relies on the recent advancements on text-to-image machine learning models, such as DALL-E, Midjourney, and Stable Diffusion, which are capable of producing detailed images based on natural language descriptions. In our implementation, we use the Stable Diffusion 2.1 model [35].

The scene descriptions generated by ChatGPT play a fundamental role in the image generation process of our system. Providing them directly as input to the Stable Diffusion model would be enough to produce interesting results. However, to provide users with more control over the generated images, we included a parameter in our system that allows users to define the *style of the illustrations* (IS). This parameter is directly combined with the scene descriptions generated by ChatGPT to establish the prompt that is provided to the Stable Diffusion model: SCENE DESCRIPTION + IS.

In addition to the prompt, the system also ensures that the same *seed* is used for all images generated for the same narrative. The seed is used to initialize the model and can be used to produce similar images (the same seed and the same prompt always produce the same output image), which improves the coherence between the images generated for the same narrative.

### 4.4 User Interface

Users can access and interact with the system through our public webpage (<http://www.icad.puc-rio.br/~logtell/semiotic-relations/>). The user composes new stories by selecting a semiotic relation (action 1, Figure 2) and provides the required parameters (action 2, Figure 2). The field "Protagonist" is optional. The story generation process starts when the user presses the button “Generate Story” (action 3, Figure 2), which leads to the story composition screen, where the user can see the title and the events of the story with a scene description and a visual illustration. In the exam-

ple of Figure 2, the user selected the antithetic relation, entered the movie “Guardians of the Galaxy”, and generated a story called “The Annihilation of the Galaxy”. After visualizing the first event, the user has two options: (1) regenerate the event by pressing the reload button on the right side of scene illustration, which will cause the system to produce another version of the event; or (2) continue the story by pressing the button “Continue”, which will lead the system to generate the next event for the story. When the user decides to conclude the story, the button “Finish and Add to User Library” must be pressed, which will save the generated narrative in the current user’s Library, wherein a few representative examples created by us are also kept. Such stories are available at the webpage, which can also be accessed by clicking in the link “View User Library”.

**Semiotic Movie Narrative Generation**

This system uses semiotic relations between existing movies to generate stories for new movies.

In order to create a new story, select a **semiotic relation** (syntagmatic, paradigmatic, meronymic or antithetic), inform the **title of existing movies**, and describe the desired **protagonist** for the story (optional). It's also possible to change the **style of the illustrations** used to portray the scenes (use stable diffusion prompts).

1 Semiotic Relation Syntagmatic (Connectivity)

Syntagmatic (Connectivity)

Syntagmatic (Connectivity)

Paradigmatic (Similarity)

Meronymic (Hierarchy)

Antithetic (Negation)

2

Semiotic Relation Antithetic (Negation)

Movie Guardians of the Galaxy

Protagonist Description of the protagonist

Style of the Illustration digital painting, hyperrealistic

3

Generate Story

view saved stories → View User Library

**The Annihilation of the Galaxy**

*event description*

*visual illustration*

**Event:**

The Guardians of the Galaxy steal a powerful weapon from a high-security planet, with the intention to use it to destroy the entire galaxy.

**Scene:**

The Guardians sneaking into the planet's facility and disabling the security systems, as they walk towards the weapon room with determined expressions on their faces.

*scene description*

**Event:**

The Guardians of the Galaxy find out that the weapon they stole has been sabotaged, and it will explode as soon as they use it, killing them all.

**Scene:**

The Guardians gathered around the damaged weapon, looking at each other in stunned silence, realizing that their plan to destroy the galaxy has just backfired.

Reload

continue story

Continue Finish and Add to User Library finish story

**Fig. 2.** User interface of the movie narrative generation system.

The complete description of the events generated for the story “The Annihilation of the Galaxy” is: “*The Guardians of the Galaxy steal a powerful weapon from a high-security planet, with the intention to use it to destroy the entire galaxy. / The Guardians of the Galaxy find out that the weapon they stole has been sabotaged, and it will explode as soon as they use it, killing them all. / The Guardians of the Galaxy, knowing that they have very little time before the weapon explodes, decide to fly directly towards the center of the galaxy to sacrifice themselves and destroy everything along with them. / The Guardians of the Galaxy finally reach the center of the galaxy, and the weapon explodes, destroying everything in a colossal explosion of light*”. The complete storyboard version of this story available at: <http://www.icad.puc-rio.br/~logtell/semiotic-relations/view.html?id=333>. More examples of stories generated by our system are available at: <http://www.icad.puc-rio.br/~logtell/semiotic-relations/list.html>

## 5 Concluding Remarks

What we consider to be the main contribution of the present paper is the proposal and demonstration of a novel strategy for assisting different types of users, not necessarily professional writers, in the process of interactive story composition. As explained in the preceding sections, the strategy, based on our semiotic relations theory, comprises three components: a software tool, a user interface, and two AI-agents.

This third component, currently driven by ChatGPT, played from the start a fundamental role. The verbal definitions determining how semiotic relations instruct the prototype to react creatively to the user's prompts were first analyzed through guiding experiments conducted in consultation with ChatGPT. To users, an AI agent ought to be regarded as a welcome collaborator, like the traditional anonymous ghostwriter, invited to enhance literary writings. Collaboration, incidentally, is a normal practice in the movie industry, recalling in particular that specialized screenwriters are usually called to supplement the work of novelists when adapted screenplays are concerned. To ourselves, while specifying our definitions in English sentences, the AI agent gave the unique opportunity to start learning how to program in natural language, given that until recently we were exclusively used to reason in terms of logic programming. It is noteworthy that ChatGPT can also handle basic logic reasoning, which is leading our research towards a composite logic strategy that we are referring to as "metaverse logic" [14].

The results thus far obtained are encouraging. Our previous tools, using plan generation to compose the plots, sometimes surprised us by finding unexpected ways to reach goals that we believed to be impossible. But the multiplicity of unpredicted variants, obtained with the autonomous thinking of the AI agents, goes much beyond what we had before. Moreover, the user interface is quite informal, and the generated texts are exhibited to the user in idiomatically correct natural language. Since each resulting story is framed in storyboard format, the way is paved for approaching screenplay status in future versions.

Until now the prototype served mainly as a proof of concept and for gaining experience on how to more effectively explore the potentials of AI agents. Further research is needed to increase the degree of user interaction, as well as for measuring user satisfaction and using the responses to extend the functionality and improve the interface of the prototype. The set of definitions that, so to speak, parameterize the behavior of the prototype, may be extended and/or generalized to cover an increasing number of cases.

Future research may also be directed toward the different possible use of systems assisted by AI agents, along lines similar to those adopted in our project. One simple application is as a teaching resource to train language proficiency and also to develop literary skills. We chose to concentrate on movie narratives – which are known as habitual sources of games. Besides helping to create underlying stories for games and, in general, to serve as aides to screenwriters, an AI agent could play a part, perhaps as adversary to be defeated, but also as a Merlin-like mentor, offering wise advice to the human players.

**Acknowledgements.** We want to thank CNPq (National Council for Scientific and Technological Development) and FINEP (Funding Agency for Studies and Projects), which belong to the Ministry of Science, Technology, and Innovation of Brazil, for the financial support.

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