Informational Narratology and Automated Content Generation

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Abstract

Several studies have proposed a concept called "informational narratology" or "information narratology." In this paper, we integrate narratological studies, including narratology and various literary theories, into information technologies, such as artificial intelligence and cognitive science, in order to mainly design and develop systems that automatically generate, create, or produce digital narrative contents related to a variety of existing or future narrative genres. Under this framework, we design and develop narrative generation systems, advertise image processing systems, and develop narrative film operation systems. In this paper, we present an overview of the concept of informational narratology, and introduce the above three studies as concrete approaches to its development.

Keywords: Informational narratology, automated content generation, narrative generation, multiple narrative structures, integrated narrative generation system.

1. Introduction

"Narrative" is one of the most important words in the fields of literature and humanities. Furthermore, it is also an academic term that is related to wider areas such as clinical psychology, artificial intelligence (AI), and cognitive science. The concept of the narrative in AI and cognitive science is used particularly as a kind of schemata through which a variety of information in an environment is synthetically recognized and represented. Studies of narrative text analysis have also been attempted using various narrative-relating methods and techniques. Ogata & Kanai[1] and Ogata[2] reviewed narrative studies in diverse academic fields including narratology, literary theories, AI, and cognitive science.

We have performed narrative-related studies from various viewpoints. However, a common outstanding feature is the objective to integrate narratological themes and materials related to literary theories into information science and technologies such as AI and cognitive science. For narrative-related studies from the above perspective, we have proposed a new research framework and concept called "informational narratology" or "information narratology." Informational narratology focuses on the areas of narrative generation and creation, and is different from the previous or traditional narratology, which focuses on

the narrative aspects of reading and interpretation. Informational narratology also focuses on automated narrative content generation using computers and AI to utilize the formalized characteristics of narratology.

In this paper, we present an overview of three approaches to the informational narratology, which were developed by the respective authors of this paper, to show the potential and effectiveness of automated narrative generation. We mainly designed and developed systems that automatically generate, create, and produce digital narrative contents for several existing or future genres through narrative communication and simulation. In particular, we designed and developed narrative generation systems (Ogata), advertising image processing systems (Kawamura), and narrative film processing systems (Kanai). In this paper, we propose an overview of the above three systems as mutually related approaches to embody the informational narratology.

2. Theories and Systems of Narrative Generation by Ogata

Although narrative generation systems called Integrated Narrative Generation System (INGS)[2] and Geino Information System (GIS)[3], which are central parts in the current work by Ogata, have been designed and developed, they are based on the following theories for informational narratology.

2.1. *An Overview*

Ogata recognized that there are narratological phenomena through which diverse narratives always emerge and exist. Ogata[4] tentatively showed a hierarchical list that comprehends diverse narrative genres to indicate the large space of the narratological phenomena. Another reason for this attempt is to create new narrative works that absorb and re-construct a variety of elements and characteristics of previous or traditional narratives in the relationships with future digital narratives and narrative generation systems (INGS and GIS) developed by Ogata.

Ogata considered two types of narrative processes: the narrative generation-reception process at the personal narrative level, and the narrative production-consumption process at the social narrative level. As the models and systemization of these processes, INGS and GIS correspond to the former and latter, respectively. In other words, both the narrative generation-reception

model and narrative production-consumption model, which are integrated by the next multiple-narrative structure model, are implemented by the INGS corresponding to the narrative generation-reception model and the GIS corresponding to the narrative production-consumption model.

From the perspectives of the mutual relationship or inclusive relationship, as well as a larger narrative model, narrative production, i.e., the consumption process, includes the narrative generation-reception process. Therefore, from a broad perspective, a narrative as a generation-reception process is constructed by a production-consumption process. We use the term "multiplenarrative structure model" to show such multiple narrative phenomena. In addition, at other various levels, the multiple-narrative structures model is a very significant characteristic in narrative phenomena.

According to the above theoretical frameworks, Ogata aims to develop a practical method of narrative generation through the collaboration of narrative-generation systems and humans. At the same time, at a larger social level, he envisions a narrative generation society, where diverse narratives are created and received through the interaction between humans and machines, as mutually equivalent existences, although they have different characteristics and merits, respectively.

2.2. *Phenomenological Multiplicity of Narrative and Expanded Literary Theory*

Ogata's plan is based primarily on considering a narrative phenomenon that appears with very diverse forms as a single framework. We refer to a personal level's narrative model as a narrative generation-reception model and a social level's narrative model as a narrative production-consumption model. These models form an integrated and entire model including multiple narrative structures, where the former model is included in the latter model, and where the repetition of the former constructs the latter.

Further, we refer to previous or traditional narratology and literary theories in order to apply them to the expanded literary theory as a theoretical foundation. Although recent narratology and literary theories have focused on destroying the constructive ideas that rely on the terms of de-construction and others, they have gained an important and novel academic value by considering narratives as objects that

can be analyzed technologically depending on structuralism theories. The expanded literary theory[5] returns to this original idea of narratology in an effort to seek to newly create model-oriented narratology and literary theory.

2.3. Model of Multiple Narrative Structures

The narrative generation-reception model refers to the narrative generation level by single subjects, namely the level of narrative generation realized by each human as an individual. We refer to this level as a "human system of narratives." On the other hand, the narrative production-consumption model is a social and collective narrative generation level in which many narrative generation-reception systems are included, and this level is considered a "social system of narrative." In the relationship between narrative generation-reception and production-consumption levels, both levels interact with each other to create an entire narrative phenomenon.

The multiple narrative structures model[1] is an idea that focuses on a narrative phenomenon from the viewpoint of the multiplicity of the narrative. In another feature, a single narrative work is structured using such various types of narrative elements as a story or stories, characters, a world or worlds, and so on. These elements are not constructed as a hierarchical structure, and it is difficult to determine the most important element. The narrative elements in a narrative work are composed through appealing each existence and many types of mutual relations among narrative elements. Ogata has surveyed and analyzed kabuki as a narrative genre to show multiple narrative structures from various perspectives.[3]

2.4. Integrated Narrative Generation System: INGS

The narratological study by Ogata is not sociology. It does not remain within the range of the model development and the analysis of societies. The study aims to design and construct actual systems that are dependent on the above two levels of narrative generation and the interaction model. Although the analysis and modeling of a phenomenon are objective and static tasks, we insert a subjective and dynamic method into the objective and static model.

The INGS is a mechanism that systematizes the above narrative generation-reception model. The purpose of this mechanism is to simulate narrative generation in a single level. Ogata[1] provided a detailed description.

There are corresponding relationships between the INGS and humans. For example, the conceptual dictionaries in the INGS are equivalent to the conceptual memory of a personal human. The narrative content knowledge bases in the INGS are similar to human episodic memory. Further, narrative generation techniques such as the story-generation techniques in the INGS correspond to the knowledge for making and operating event sequences in the human brain.

2.5. Geino Information System: GIS

On the other hand, the GIS is a systematization of the model of the narrative production-consumption process. The GIS is a narrative generation model at the social level, which actualizes both narrative generation-reception and narrative production-consumption processes through collaboration with the INGS.[3] Fig. 1 shows an overview of the GIS architecture, which includes the INGS. Although this system is not actually executed in the current timing different from the INGS, in the near future, we plan to implement it as a system including several INGSs.

The GIS is a social level system considering the following points: First, a society is a space where diverse narratives are continuously generated and received in parallel. However, on the other hand, with respect to a specific narrative production system, it is a subject that continuously repeats narrative production cycles. A society refers to a situation where diverse narrative production-consumption subjects, including individuals, are produced in parallel (namely spatially) and sequentially (namely temporally). According to our theoretical framework, a society refers to a temporal and spatial field where there are many INGS as well as the GIS as a collection of INGSs. Therefore, although a single GIS does not indicate an entire society, the GIS is modeled as a geino production mechanism that is a kind of social-narrative production and a consumption system as a small-scaled social mechanism or system.

2.6. Vision of Human-Machine Symbiosis System of Narrative

From the above theories and systems, we seek to approach a situation that we refer to as a "human-society symbiosis system." Alternately, we consider that such a situation will need to be realized in the future
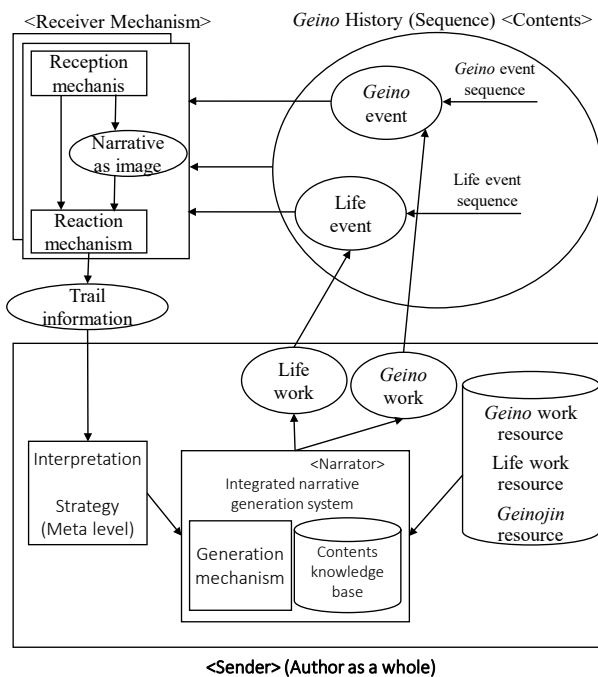
Fig. 1. GIS Architecture

society. This is a narrative situation where human authors and machine authors live together with no mutual discrimination in order to continue to collaboratively create narrative works in various genres. This is not necessarily just a wish, but an expectation that the historical progress will take such a route.

In such a social situation, we aim to determine the positioning of narrative-generation systems. There are several phenomenological forms shown below:

With respect to a narrative generation system as a single unit, first, we consider a form where a narrative generation system autonomously exists as itself. Next, there is a form where a human makes narratives using a narrative generation system or a narrative generation system makes narratives using humans. These are variations of a narrative generation case involving the collaboration of both humans and machines. There are many possibilities for collaboration methods. For example, we can consider various possibilities such as methods through which a human completes a narrative, where once a narrative generation system is made, it adds a new part to a narrative that a human made. As these are very practical problems, we will not be able to classify in advance all of the possibilities normatively.

On the other hand, in the case of the narrative generation at a social level, there is a situation where

both human-narrative generation and social-narrative generation coexist. If we consider each narrative generation mechanism, such as the GIS, it is related to the problem of the specific gravity of narrative generation.

The most extreme type is a narrative production-consumption mechanism that does not involve humans at all. Then, the most extreme type in the reverse sense is a previous type's narrative generation mechanism, which is formed by only humans or which at least does not include any machines as narrative generation systems. In addition, with respect to concrete usage forms of the GIS, we seek to undertake various narrative generation and representation forms where humans and machines coexist.

As stated above, based on the model of multiple narrative structures, we can envision the phenomenon where both narrative generation mechanisms as humans and narrative generation mechanisms as machines coexist at various levels, and this applies also in the concrete implementation level.

3. An Attempt of the Commercial Film Production Support System (CFPSS) Based on the Image Rhetoric of Commercial Film

There are case studies into effective commercial films with a focus on marketing and advertisement.[6] Some of these studies include elements of advertising expression that have been classified and extracted to enhance advertising effects. Alternatively, other studies classifying advertising expressions according to the nature of the information (comparative, unique selling proposition, preemptive, hyperbole, generic-informatic), and the nature of transformation (user image, brand image, use occasion, generic-transformatic) examine the ideas of advertising expressions.[7] However, these studies provide insight into advertising expressions from a particular vantage point, and are not conducive to developing specific rules for creating images at the microcosm level. Related to print advertisements (text, photo, poster etc.), studies examine an interpretation and analysis of the effect of advertising rhetoric on viewers.[8,9,10] However, these studies do not include analyses related to commercial films. Moreover, as these research approaches aim to interpret and analyze existing advertisements, these studies also exclude information systems to generate specific advertisements according to operating rhetoric. Under such

circumstances, Kawamura provided one of the few studies aiming to build an information system that analyzes the advertising image techniques (advertising story, editing). [11,12,13]

Fig. 2 shows the plan of CFPSS.[11] The concept of CFPSS is to generate the various commercial films adapted to the user's keywords and sentences (life scenario) input. CFPSS includes a database of 3643 image shots converted to a commercial film, that searches and classifies image shots based on keywords and sentences. The system includes a function to generate the storyboard based on the selection of advertising story, and playback in the order arranged in the storyboard. The menu of advertising story is as follows;[12]

- Provider story type: The primary structure expresses the provider's story (production and distribution, product function, effect on company). This is the "story of the product" and "story of the company."
- Consumer story type: This primary structure expresses consumers' stories (consumption situation, product acceptance, consumption effect). This is the "story of consumption."
- Overall type: This structure generally expresses both the provider's and consumer's stories. This is represented as provider story type + consumer story type.
- Image type: This structure expresses images related to the consumer situation, though does not express product acceptance and consumption effects in the film. Rather this structure represents a product function. This category also includes structures expressing an image that does not belong to the consumer, provider, or product function.
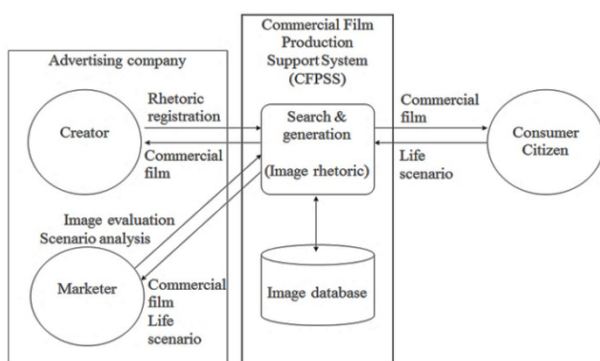

Fig. 2. CFPSS Plan.

Using an advertising story technique, a system was developed to generate commercial films through an interaction between the users and the system, which was tested with an observational experiment. Since the system easily generates commercial films that comply with a variety of requirements, it can be utilized for various experiments in the future. These types of experiments will clarify and enhance the creative know-how (image techniques and rhetoric) to produce individual advertisements.

4. Cutting Techniques and Non-Story Type Rhetoric

For computational and informational narrative film generation, many kinds of cognitive effects can be actualized using a strategy that employs story and non-story rhetorical aspects[17]. Many cognitive effects from narrative films are created through the interaction between cognitive process, story, discourse, and rhetoric. For example, irrational rhetoric cutting techniques for narrative space and time in the film can change the viewer's cognitive transition from story-driven to rhetoric-driven processing. Based on cognitive transition due to narrative processing from story-based to non-story based, cognitive effects such as intensive nostalgia effects can emerge.

The process of the viewer coming to understand the past story may lead to some cognitive effects. Conversely, many films have a primary purpose other than to tell a story. This happens when the purpose of the director is the film rhetoric itself, or the non-story rhetorical aspects rather than the story. When the above issues are considered, a system for computational and informational narrative film generation must include story and non-story rhetorical aspects.

Based on the cutting techniques used to make generate irrational relationships with time or characters in continuous shots, a viewer or a reader can feel less constrained with regard to story comprehension and reset the viewpoint to subtle elements, such as individual shots.

In addition, there are two different cognitive process types for the rhetoric of film. Cognitive effects from certain rhetoric, such as story type rhetoric, are primarily generated by the story or consistent narrative (cognitive process type-1). Conversely, the cognitive effects from the other rhetoric, such as non-story type rhetoric, are caused by the rhetoric of films, in particular

the cutting techniques (cognitive process type-2). Many films combine both type of rhetoric. Therefore, the viewers transfer cognitive processes from type-1 to type-2 while viewing the same film.

Cognitive process type-1, the process in which the viewers understand the story, has some cognitive effects. In this process, the "experience" of the film's goal-directed characters and consistent narrative may lead to some affective response. However, the cognitive effects such as nostalgia effects may arise from other sources, as well as cognitive process type-2.

When the constraint is relaxed, an irrational cut of non-story type rhetoric may cause a "resetting of viewpoint" and "affect, which does not arise through comprehending a story, but through the audiovisual situations." A resetting of viewpoint indicates that the viewer's viewpoint shifts from the need to be told a story to a grasp of the non-story narrative. This reflects the object associations within the moving image and the "mood" or the details of the moving image. "Affect, which does not arise through comprehending a story, but through the audiovisual situation" is caused by the audiovisual situation that emerges from the film's mood and object associations.

In non-story type rhetoric, the editing, recording, and photography are not always subordinate to the overall story. As stated above, the focus is on non-story narrative, the film's mood and object associations or the reality related to the unfamiliar situations rather than on the events in the story. Such associations and situations cause cognitive effects that do not arise in the process of comprehending a story. Kanai[14,15] indicated that when a viewer is able to relax his or her constraint with regard to the need to comprehend a story, this strengthens those cognitive effects including nostalgia effects, which do not arise in the process of comprehending the story. On the contrary, with story type rhetoric, the cognitive effects are those generated by the overall story.

The unfamiliar situations derived from non-story rhetorical elements create new realities. Unfamiliar situations can emerge through the sudden appearance of a section of non-story type rhetoric. In this case, a viewer sometimes cannot understand the consistent story. Therefore, attention to the situation itself is enhanced. The unfamiliar situations generate new cognitive effects related to unknown memories and affects that do not arise through story comprehension.

Non-story type rhetoric is created through cutting techniques used to make irrational relationships between 1) the rhetorical elements of two shots; 2) events and images; or 3) sounds and images[16]. The irrational relationships through the cutting techniques are used in many artistic films and music videos in order to generate situations unfamiliar to the viewers and to create new realities.

5. Conclusions

In this paper, we described the basic ideas of informational narratology as a fusion of narratology, including literary theories and informatics such as AI and cognitive science. In particular, an important direction of informational narratology is the point that it focuses on content generation or production through narrative communication and simulation. Previously, we performed research that focused on each narrative content generation, as discussed above in this paper.

Ogata stated the idea and concept of the model of multiple narrative structures, and presented an overview of two mutually related systems, the Integrated Narrative Generation System (INGS) and Geino Information System (GIS), to show the implementation of the model. Kawamura discussed the Commercial Film Production Support System (CFPSS) based on the Image Rhetoric of Commercial Film. Kawamura's study mainly focuses on the perspective of the reception in narrative communication. Kanai, who focuses on computational and informational narrative film generation, mainly analyzed the cognitive effects by receivers for movie films, and used a strategy that employs story and non-story rhetorical perspectives.

However, these studies were not integrated in the previous research. If these researches are synthesized, in particular by developing narrative content-generation systems, it will enable the expansion of the constructive feature, namely an academic approach through executing system development, of the informational narratology.

Therefore, one or our future plans is to integrate the above narrative content generation systems proposed by the three authors into a larger system. This will also help to bridge informational narratology studies to the social experimental stage for the distribution of generated or produced narratives.

Acknowledgements

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