The Generative Audiovisual Narrative System

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Abstract

This paper documents the results of a research project that deals with the application of an artificial life (AL) approach to creating a system of cinematographic narration. This project investigates the possibility of producing an autonomous cinematographic narration system, in which meaning results from a kind of hypermontage, conditioned by genetic algorithms. The theoretical thesis lead to the design and construction of a generative system for the synthesis of audiovisual narratives, in which a genetic algorithm manages the collection of video fragments, that have been parameterized and stored in a database. The genetic algorithm's fitness criteria are being defined by the viewer, via the system's interface. During the presentation of this paper, the system and its audiovisual results will be demonstrated.

This paper investigates whether individual video fragments belonging to a database may be linked into numerous different successions in order to satisfy fitness criteria defined by the user. The aim is to create optimum sequences in accordance to specific requirements, instead of coming up with a closed predetermined unique sequence, as it's traditionally done by directors.

Fragmented videos as micro-narrations are composed to a greater whole which is unique, since the system has never given the same result twice. Taking the phenomenon of semantic montage as an axiom, the viewer attributes causality relationships to the succession of these fragmented micro-narrations which are seamlessly integrated in the sequence.

A traditional work of art may be read in multiple ways, which depend on the subjectivity and arbitrariness of the spectator-reader. In the case of AL, the multiplicity of the artwork mainly depends on the manner in which the artifact is being written. Having the same structural elements as a starting point may result in different readings. Having the same data as a starting point, may lead to different versions of the same work of art.

1. Introduction

During the 20th century the work of art has been repeatedly questioned, overturning the dominant perceptions of "beautiful" and "good quality". The aesthetic object is often transformed into procedure, into a game between the author and the spectators, expressed as installation, performance or digital interactive application. The "degradation" of the artist's role in favour of the spectator's empowerment and the providing of dialogue between the author, the spectator and the art object, cannot be thought of without the active participation of all three of the above agents.

Digital interactive art projects in particular, are characterized by the potential of multiple choices during navigation, where the user is faced with hypertextual structures, called to act according to the interface and the system's rules, which have been designed and defined by its author. The actions of the spectator – user, based on intuition and having a ludic character, influence the formal and narrative evolution of the piece through the function of feedback.

In the case of Artificial Life art, the author lays down rules materialized by the system-artistic piece, without being able to predict the forms that the latter is going to take. Author and spectator watch the "materialization" (representation) of the rules set by the former.

This paper documents the results of a research project that deals with the application of an artificial life (AL) approach to creating a system of cinematographic narration. This project investigates the possibility of producing an autonomous cinematographic narration system, in which meaning results from a kind of hypermontage, conditioned by genetic algorithms. The theoretical thesis lead to the design and construction of a generative system for the synthesis of audiovisual narratives, in which a genetic algorithm manages the collection of video fragments, that have been parameterized and stored in a database. The genetic algorithm's fitness criteria are being defined by the viewer, via the system's interface.

2. The example of dada

In the beginning of the 20th century, art had already begun to question the up until then established ways of narration, as well as their methods of presentation. The example mentioned is that of dada, set against the institution of art exhibitions. When in 1919 the director of Kunstverein in Cologne saw the latest work of the Germans Max Ernst and Johannes Baargeld, he called them to exhibit separately. They then exhibited not only their work but also paintings of amateurs and children, as well as "art objects", like an umbrella, a piano key and African sculpture. Thus, the work of art became the exhibition's mise-en-scene and not the individual objects of which it was consisted [1].

The provocative confrontation of the art's establishment consists one of the first examples in combination of database and interactive art, given that the artistic value

is attributed to the sum of exhibited objects and not to the individual objects themselves, fact that introduces the concept of collection as a synthetic procedure. Combining elements of minor importance for the articulation of an interesting whole lies in the centre of databases' logic.

The co-existence of works by famous artists, amateurs and children, gives an interactive touch to the concept of collection, which, instead of being an individual's private property, consists a team effort. Traditionally, the concept of collection is identified with the particular interest of a person in a specific kind of object (stamps, coins, wine bottle labels, etc.). The passage from individuality to collectivity, as far as artistic activity goes, signifies an important shift in the goal and interpretation of the art object, which is transformed from personal expression into procedure and social critique. Formally the transition is accomplished, from the individual object to the sum of objects that consist space and define to the spectator a path inside the collection.

In 1920 Ernst and Baargeld, by withdrawing pieces from a supposedly open exhibition, rented the Brasserie Winder, a yard half-covered with glass, which one could access only by passing through the men's toilets, where the visitors had the right to destroy anything they didn't like. It was an inversion of the conventional exhibition, demanding from the spectator active involvement and not passive watching, while it was parodying the artist's authority. In 1919, the "relatives" Dadaists John Hartfield and Georg Grosz declared that "the word artist is insulting and the doctrine "art" cancels the equality between people". In 1959, Allan Kaprow created the term happening that set a way of escape of the artists from their up until then starring role, empowering the spectator, or rather the participant [1].

The "degradation" of the artist's role in favour of the spectator's empowerment and the providing of dialogue between the author, the spectator and the art object, is characteristic of interactive art, which cannot be thought of without the active participation of all three of the above agents.

Digital technology provided the dialogue between author and spectator through the work, whose final form is defined by both. Author and spectator are involved in a game of writing and reading, laying down rules and discovering / revealing them, with the art object as starting point. The digital work as a field of experimentation contains the concepts of exploration, game and intuitive response, on behalf of the composer as well as the user.

Digital technology suggests tools that are registered in the continuation of the traditional tried and tested practices, enriching them with new possibilities. The artistic practices seek new ways of application, following the rules of "writing and reading" introduced by games and game machines, promoting the spectator to a participant, since the interaction tends to confront him with semiotic objects enriched with autonomous behaviours.

Hypertext consists a mechanism par excellence of digital interactive art, which allows and amplifies the correlation between cultural texts favouring new forms of reading them. The constructed net of audiovisual information is explored by the spectator – user, in a way that defines the exported narrative product.

3. Hypermedia narratives

Narratives supported by hypermedia systems adhere to a series of conventions that render them readable. However, we cannot suggest that a particular writing system, entailing grammar and syntax, that could totally condition the creation of digital hypermedia systems, has so far been established. For the time being it would be quite hard to create an analytic and strict writing code in compliance with a linguistics model.

It is suggested that a language of narrative that stems from representation through moving images and is supported by computers can be formed via the combining existing theories of cinematic language with theories that propose reconsideration or even change-over of conventional forms of narrative [2]. Becoming familiar with the grammar and syntax of cinematic language constitutes the first stage of reading, which is essential for conceiving and further comprehending the message communicated through new media. A person may watch the input and output of information between her and the computer, through a monitor or a projector, which constitutes the visualization field of moving images, accompanied by sound. The projected image follows, to a great extent, the visual and semiotic conventions already known to us, originally from cinema and later from television.

With reference to interactive narratives and more specifically in the case of interactive cinema, there exists a "live" spectacle, the narrative and duration of which are activated, controlled and affected by the viewer. The latter does not remain a mere observer: she is simultaneously assigned the role of director, editor and often the lead actor. The computer provides the potential for an interaction process.

Apart from interaction itself, the source of other elements of an interactive artifact, namely the shots and the montage, relate to a certain extent to conventional cinema. Interactive artifacts are hybrid systems constructed by directors as far as their contents and mechanisms are concerned.

New media are still using the cinematic language that recognizes the séquence as the structuring element of the audiovisual transmission system. Cinema differs from other narrative methods in that linear narrative evolves within time and space. The introduction of the time parameter in narrative has imposed a new writing method, able to establish a correlation amongst the protagonists, their surroundings, the story plot and time, via their representation through images and text.

The various potential forms of an interactive play are finite. The creator of the system is in position to forecast in advance the potential forms that the play may exhibit, as a result of interaction with the user. Even in cases when the system has been programmed to pick up an element over a group of elements at random, through the "random" command, it is easy to find all possible combinations that may be applied by the computing system, by means of probability theory. The number of options for interaction and navigation, as well as the consequent results are predetermined by the system creator.

The computation system that is adequate for exploring evolution as a creative process, entailing any random and indefinite elements of nature and culture, shall be

more effective if it operates upon a mechanism simulating natural evolution stages. The discipline that attempts to simulate nature and living organisms in order to study and comprehend their mechanisms is Artificial Life (AL). Artificial Life is often depicted as an attempt to comprehend complex behaviors through simple rules [3]. The term AL was coined in 1989 by Christopher Langton, who defined it as "the study of man made systems exhibiting behaviors typical of natural living systems" [4]. Genetic algorithms, which are based on Darwin's theory of evolution, constitute the core method applied to simulate biological genetics through digital computation.

4. Emergence

An important concept of artificial life is the procedure known as emergence, through which simple ingredients interact to produce complex, lifelike results. Claiming that complex behaviours of a living organism emerge from its non living parts, artificial life attempts the recreation of this procedure into artificial systems, so that the sum of simple computational parts interacts to spontaneously produce lifelike dynamic structures [5].

Emergence is the idea on which is based the crucial distinction between life and non life. According to a bottom-up approach that distinguishes artificial life, the complex, lifelike behaviours are not totally controlled and determined, but they are born of small scale interactions. Emergence is the term and the idea used for the evaluation of these effects.

Emergence refers to something new or unexpected, something more that impresses in systems of artificial life, since, even though they are made of commonplace ingredients, they show complex, subtle and unpredictable behaviours. In brief, they seem to contribute more properties than the mere sum of their computational parts, manifesting them in the form of motif or space, specific behaviour or general tendency of the system. All the (artistic) systems of artificial life are based on a determined sum of computational rules and procedures, of limited interest compared to the rich, multiple, complex, emerging results that they support. The something more of emergence is central in the interest and charm of artificial life. Regarding the generative narrative system, every time it's being activated it composes different outputs. It has never given the same result twice.

The concept of emergence gives to the work / computational system itself a ludic character, since it takes unpredictable, by the author, but also the user, forms. It exists and evolves based on specific and inviolable rules that have been set during programming, causing its author to explore the power of the rules he has laid down. In the same time, awareness narratives enrich the emergence's obvious results.

5. The concept of collection

The effect of creation of a complex and basically unpredictable product through the combination and interaction of individual elements, which do not show particular interest by themselves, gives new perspectives to the concept of collection. Collection as a sum of similar elements can be of interest that surpasses the personal and emotional value attributed by its creator and owner.

The concept of collection as an artistic work dates from the middle of 20th century. When in 1960 Iris Klert asked from 41 artists her portrait for an exhibition, Arman gathered her personal belongings: a shoe, underwear and cosmetics, referring to the fetishism of Froyd and Marx (the shoe with its high heel), presenting the property of the artist as a collector and a pathological one [6]. In the case of Arman, the objects of the collection illustrate a conceptual portrait of Iris Klert, where the signified of the sum is completely different to the signifiers of the individual objects.

With the arrival of digital technology, where the collection is translated into database, the creation of complex works using the data of the base is feasible. The complexity of the works does not only lie on conceptual reductions, but also on formal, spatial, temporal and other transformations of the individual elements' sum, referring to an emerging behaviour, central concept of artificial life, which, applicated into artistic systems, can give new perspectives to the procedure as well as the result of artistic creation.

6. Generative narrative system

The creator organizes the database including the audiovisual materials that are to be used for the construction of the final product and also builds up the software mechanism, which will process the composition of the database constituent parts. In a "cinematic" work produced through genetic algorithms, the director's role is restricted to the shooting and organization of the footage as well as the creation and/or adaptation of the software mechanism of production. Editing is automatically conducted by the system. The role of the director is limited to the "organization" of material so that the computation system can begin and complete the process of narrative composition, without the need of any further assistance by the creator. More precisely, the role of the "director" should be appointed to the system, for the creator/organizer provides it with the resources required for the execution of this task.

Beginning from fragments of a specific narrative genre, the soapopera, we attempted to compose new narratives via the use of Artificial Life rules. As a scenario basis for the fragmented shots, we used the original scenario of the first five episodes of the Greek TV show "Filodoxies", written by Ada Gourbali, for Mega Channel. The phrases of the scenario were altered in a way that the various characters were reduced to 4, a man (Agis) and a woman (Niovi) who we see conducting a dialogue and a man (Frixos) and a woman (Rita), that we never see, but we come to know them because of Agis' and Niovi's references to them.

The aim of the system was the experimentation and the observation of its behavior, during the management of the above audiovisual data. The treatment of the initial scenario and the restriction of the characters into four persons, resulted to a destruction, a disorganization and a deconstruction of the story, since the alteration of the subjects paramorphized every sentence of reference. The initial dialogues had turned into independent and autonomous phrases articulated by two characters, Agis and Niovi, which can refer to themselves, to each other or to Rita and Frixos. The initial flow of the text was definitely gone.

The phrases of the scenario were recorded with the help of two actors, Jasmine Kilaidonis who in the role of Niovi and George Chrysostomou in the role of Agis. The shots were recorded by four cameras, two for each actor, capturing gros plans and très gros plans.
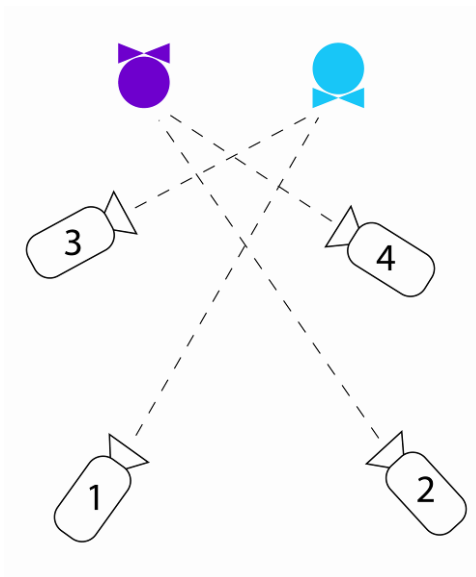

Figure 1

Figure 2

6.1 Tabbing of the shots – narrative audiovisual units

The tabbing system for the sum of the audiovisual narrative units should express their special characteristics on one hand and be readable by the computer on the other hand. The content suggests a methodology adapted to it, with syntactic and semantic parameters that respond to all of the units and can constitute the basis of the synthesis programming rules of the reproductive narrative procedure. For that purpose a special interface was designed, that comprises all the contents categories with their possible values for each unit, in order to introduce them into the database. Via the use of that interface, the designer gives metadata to fragmented shots and makes them part of the generative system's database.
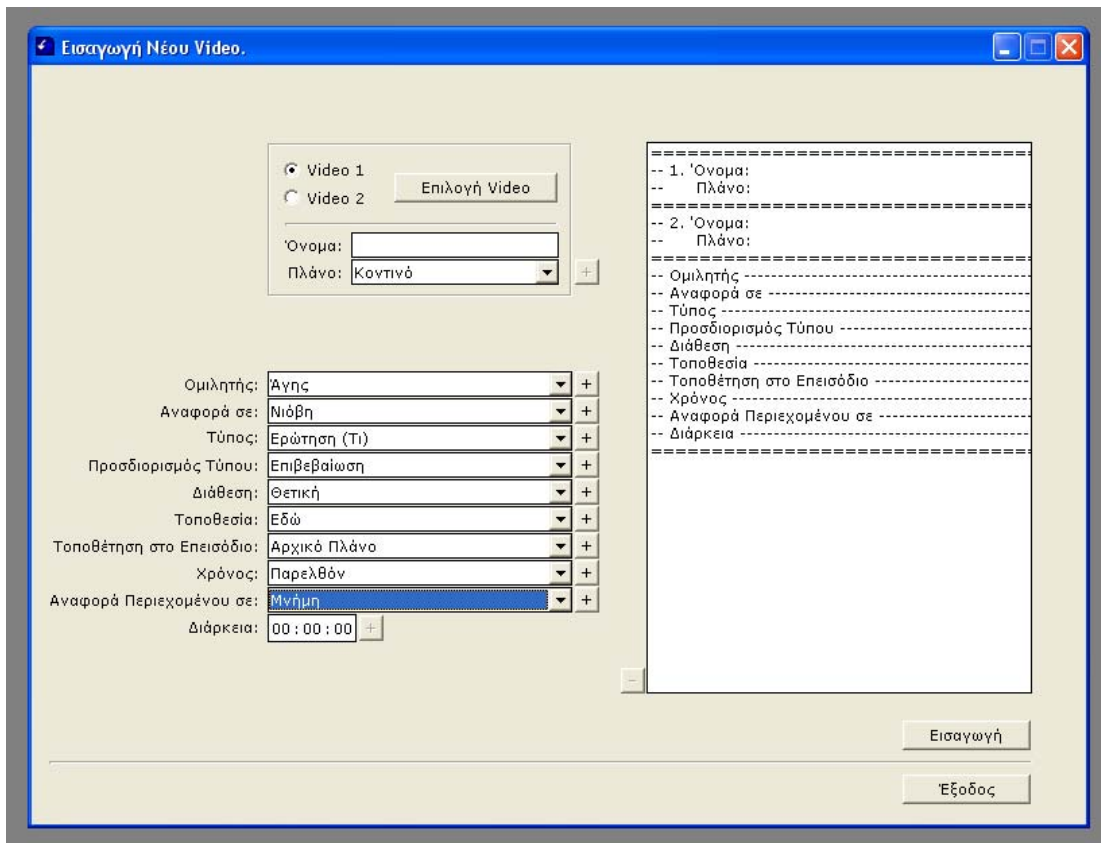
Figure 3

6.2 Basic programming principles

During the programming of the generative narrative system, basic principles of genetic algorithms are being followed, where the initial population, constituted by generative narratives (séquences), remains stable in every generation. The individual séquences mutate, crossover and survive selectively according to fitness criteria, parameterized by the viewer. The reproductive loop stops at the point where an individual fulfills the fitness criteria, which constitute the measure of evaluation for each individual, rendering it suitable for survival or extinction in the next generation. This second interface is designed in a way that every value can be parameterized by the user, so during the programming they are characterized as variables. All the menus appearing on the left side of the interface are the final narrative's properties which take values as decided by the user. In the field appearing on the right of the interface appears the raw of the shots in the fittest generative narrative, in the form of its découpage. Below we can see in which generation it belongs.
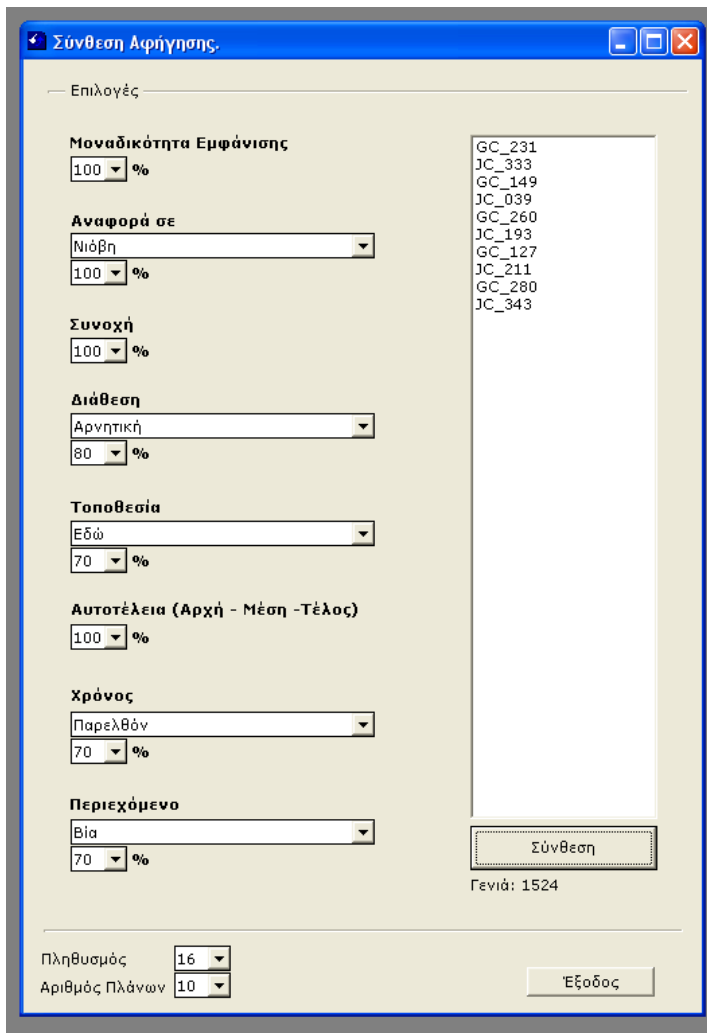
Figure 4

Fitness criteria are global and local, defined by the user. Global criteria include the basic structural rules of the system, that relate to the syntax of the narrative, such as the way that Niovi's shots and Agis' shots should succeed each other in order to conduct a dialogue, or which answer should follow a specific kind of question. Some shots that are considered as introductive should be placed at the beginning of the sequence and so on. Local and personalized criteria are those defined by the user, who selects them upon a list of possible values, offered by the user's interface (*Figure 4*). He can ask the system to create a narrative referring mostly to Rita, where love in the basic issue facts are being unfold in a past tense. He can also define the precise number of the shots of the final audiovisual narrative.

By the time where a séquence accomplishes all above criteria, global and local, the reproductive loop stops and the generative procedure is over. The system creates plot as a meaning administrator, since it juxtaposes narrative units according to their metadata. The sequences' succession defines the signified, leading the viewer's reading to specific conclusions, due to the phenomenon of semantic montage.

7. Reading of the generative system's results

As Bordwell [7] mentions, during the interpretation of a film, the signifier of every one of its parts corresponds to many different signifieds. The same thing stands for the generative narratives produced by the presented system, given that their reading follows the same conventions as for traditional film reading. Besides, the particularity of cinema as a language according to Collet [8] is due to the fact that it is being formed by the succession of elements. Combining the above statements, we conclude that the particularity of the narratives synthesized by the system is due to the fact that they are created by the succession of elements (fragmented narratives), whose signifier corresponds to various signifieds.

Since the shots of a system's narrative are fragmented recordings of a reality viewed by a particular point of view, their composition and decomposition forms different versions of a reality that might have existed once upon a time or never. Every shot's signified is translated into a different signifier according to the shot that precedes it and to the one that follows.

The most important difference between a narrative created by the generative system and one created by a human director is that, even though they both make use of cinematic language, the first one is only a possibility among several that can be created by the same mechanism, and the second one is considered as unique.

8. Conclusion

The presented system creates narratives starting by the juxtaposition of video fragments. Based on the phenomenon of semantic montage, the viewer attributes causality relationships to the succession of these fragmented micro-narrations which are seamlessly integrated in the sequence.

The process of a cinematic film production, usually results in the creation of a single product. No matter how many times it is screened, the film remains the same. In the system under study, the narrative products that could be built, as a result of the same work functioning, may be countless. Every time the viewer commands the system to start screening, it starts editing the database elements anew. Given the fact that the process is being conducted by genetic algorithms, which constantly alter the produced outcome, the composition of shot is unforeseeable and so is the number of the potential results. Due to the high complexity of the whole process, there is practically no chance of two outputs being the same.

Systems that "imitate" natural selection processes for the evolution of an entity, set strict rules for the control of the evolutionary process. The results after each stage of evolution may be unpredictable for the constructor but the rules remain unaltered. Computations applied to the management of the genome by transforming it, altering the genotype or handling user interaction remain unaffected by the evolutionary processes [9].

In an evolutionary cinematic system, the creator functions as a driving force, a stimulus of a process that goes beyond the scope of the creator's imagination and may acquire unpredictable forms, in compliance with strict and specific rules. The designer of such a system examines the potential, the limitations and the power of the rules she establishes. She also monitors the formation of the rules she has set.

9. References

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