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Computer art: software art design

Arte por computadora: diseño de arte por software

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KEY WORDS
computational art; software art; digital design; art software; developer artist

ABSTRACT
The article presents artistic works developed at the Computational Art Research Laboratory Media Lab / UnB, carried out as a team, under my coordination. The artistic and theoretical production sought to defend the idea that computational art is a new form of appreciated art, based on the assumption that it contains many of the components of a complete philosophy of an art form, which can be summarized in four basic references: one definition, an ontology, aesthetic characteristics, and the recognition of its status as art. What is currently called computational art is based on the observation that experiments in this domain involve more general common issues, *in statu nascendi*, to the artistic and technoscientific domains, which provide the structuring modes, the methodology and the programming techniques, introduced in the process. Computational art does not always use the computer, sometimes it is based on logical-mathematical operations only. However, computers had a profound impact on the arts, and in order to carry out a partial synthesis, based on a global theory of aesthetics today, a set of artistic works was selected that encompass the following subjects: the computer as an amplifier complexity (computational methods of creation); computational language; the developer artist; computational art as art of

the crowd and not of the individual; laboratory work; software art (presentation and analysis of historical algorithms such as permutation, random, etc.); the appreciation of the human-computer interface (highlighting the importance of the game), which enabled greater public interactivity with the artistic work; the appropriation of the media for artistic purposes; the artistic engagement with social and ecological issues originated by technoscientific advances and the society's computerization policy and propositions related to the future, formulated philosophically in the post-biological era. We sought to develop poetics that resulted from the collaboration between living beings and machines.

PALABRAS CLAVE
arte computacional; arte de software; Diseño digital; software de arte; artista desarrollador

RESUMEN
El artículo presenta trabajos artísticos desarrollados en el Computational Art Research Laboratorio Media Lab / UnB, realizado en equipo, bajo mi coordinación. La producción artística y teórica buscaba defender la idea de que el arte computacional es una nueva forma de arte apreciado, basado en el supuesto de que contiene muchos de los componentes de una filosofía completa de una forma de arte, que se puede resumir en cuatro referencias básicas: una definición, una ontología, características estéticas y el reconocimiento de su condición de arte. Lo que actualmente se llama arte computacional se basa en la observación de que los experimentos en este dominio implican problemas comunes más generales, *in statu nascendi*, a los dominios artísticos y tecnocientíficos, que proporcionan los modos de estructuración, la metodología y las técnicas de programación, introducidas en el proceso. El arte computacional no siempre usa la computadora, a veces es basado únicamente en operaciones lógico-matemáticas. Sin embargo, las computadoras tenían un profundo impacto en las artes, y con el fin de realizar una síntesis parcial, basada en un teoría de la estética en la actualidad, se seleccionó un conjunto de obras artísticas que engloban los temas siguientes: la computadora como un amplificador de complejidad (métodos computacionales de la creación); lenguaje computacional; el artista desarrollador; arte computacional como arte de la multitud y no del individuo; trabajo de laboratorio; software art (presentación y análisis de algoritmos históricos como permutación, aleatorio, etc.); la apreciación de la interfaz hombre-computadora (destacando la importancia del juego), que posibilitó una mayor interactividad pública con la obra artística; la apropiación de los medios con fines artísticos; el compromiso artístico con los problemas sociales y ecológicos originados por los avances tecnocientíficos y la política de informatización de la sociedad y proposiciones relacionadas con el futuro, formuladas filosóficamente en la era posbiológica. Buscamos desarrollar poéticas que resultaron de la colaboración entre seres vivos y máquinas.

INTRODUCTION

The laboratory has the participation of Scientific Initiation fellows, interns and undergraduate and graduate students, in art and technology, who work on different proposals, involving the creation of animation, videos, computer art, unconventional interaction devices, urban cyberinterventions, urban augmented reality (RUA), human-computer interface, among others. The projects involve socio-artistic and political issues in the context of art, science and technology carried out in close collaboration (partnership, consortium or service provision) with other areas of research such as computer science, communication, mechatronics, biology and music, to propose projects innovative, artistic and technologically interesting ways to think about society today.

In this way, we seek to realize the synergies between artistic creativity, higher education and research carried out at the University of Brasília, providing a context of advanced training and promoting the creation of economically sustainable projects. MídiaLab's activities explore Aesthetics, Information and Communication Technologies in the following areas: Design, development, integration and operation of artistic, educational and technoscientific solutions; National and international partnerships in computational art projects; Promotion of entrepreneurship and support for techno-scientific-based cultural production; Specialized training (projects, internships and seminars for artistic and technoscientific dissemination); Support for proposals under national and community programs; Artistic, technological and innovation prospecting and Consulting and advisory.

The production of research in computational art (2017) is inserted in the complexity of computational artistic and technological production. They integrate collaborative work with other areas of knowledge, such as technology and computer science, as well as health and sport. Undergraduate and postgraduate students participate in the productions made annually, as well as those interested in the community in general, through classroom and distance creation courses and workshops. The projects have already received national and international awards, such as Rumos Arte Cibernética-2009: Tijolo Esperto and IdAnce: interactive dance floor, Funarte: visual arts connection, CNPq Universal Notice, Latin American and African Festival of Art and Culture and XPTA .LAB of the Ministry of Culture: Wikinarua collaborative social network project.

1. Art software design

The proposals are interactive in the relationship established between the audience and the work, as they aim at intuitive and quickly understandable forms of interactivity. They exclude, for example, all forms of interactivity where the interactant often does not notice the result of his gestures and does not understand how the device works. Interactivity occurs in the naturalness of gestures. In other words, interactivity is established in a spontaneous and natural relationship between the interactant and the machine, so it uses the concept of the body as an interface. Interactivity provokes the

sensation of dominating the gesture, and transmits the action on the work, and can involve elements such as moving image, text and sound.

The intuitive relationship does not mean, however, that the interactant should not strive to understand the result of his gesture, on the contrary, the proposals are expected to instigate his intelligence, sensitivity and ability. The works present unconventional interfaces of interaction, allowing the interactor to feel freedom and desire to explore the potential of the works to understand their meaning. The works also present the pedagogical and playful dimensions.

Accordingly, the artistic proposal entitled Geopartitura, carried out from 2011 to 2013, comes close to the modus operandi described. The word Geopartitura comes from the combination of the words geography and score. Geography is the science that studies space, that is, it seeks the meaning of places, thus contributing significantly to society, in the reorganization of its spaces and its forms of interaction with the environment. The proposal also relates to the idea of urban intervention, as it can only occur in an open and public space, due to the need to detect the signals emitted by cell phones. The concert is projected on the outer surface of the architecture in real time. This is the same interface that can be seen on the cell phone. The sound of Geopartitura appears as a sound image in motion and is simultaneously played in real time on cell phones.

The interventions, accompanied by workshops, were carried out in five states of Brazil: Amazonas, Alagoas, Paraíba, Santa Catarina, Rio de Janeiro and in the Federal District. The proposal considered, first, that score means a written representation of universally standardized music. Like any other language, it has specific symbols such as musical notes that are associated with sounds. In the context of computational music, the image resulting from the composition, unlike tablatures, plays a crucial role. Through technologies such as MIDI, it is possible to translate a score in its entirety into a code, algorithm, readable by the computer or electronic instruments, such as synthesizers, for later reproduction. The Geopartitura project, involves musical writing, having as reference the computational art and electroacoustic music, as well as the interactivity that uses locative and mobile media for the georeferenced collective creation of a computational concert, including also the visualization of the musical space_temporal, and of individual sounds, being edited in real time, in the form of sound strings that vibrate when detecting the approach of mobile devices, such as cell phones. Interactivity and creative participation took place in public spaces, such as urban cyberintervention and technoperformance.

The project pointed to emerging issues involving music, geography, and mobile devices such as cell phones to enable the collective georeferenced creation of a multimedia concert, in real time. The system formed by software and mobile devices allowed the presentation of a multimedia concert whose composition was performed live in real time, by people connected to the system by their cell phones.

The work had as reference the ideas of sound markings, coming from electroacoustic music and computational music that historically broke the boundaries of traditional music to seek interactivity through public participation. Therefore, free to expand more and more in his articulations and interventions, he considered the freedom of creation

and presented a new form of interaction from cell phones as a performance in the context of urban intervention.

The geopartitura system (figure 1) used locative media which, for André Lemos (2006), is defined as a set of technologies and info-communicational processes whose informational content is linked to a specific place. Locative is a grammatical category that expresses place, such as "in", "next to", indicating the final location or the moment of an action. Locative media are digital informational devices whose information content is directly linked to a location. These are processes for sending and receiving information from a specific location. Mobile media is media that is always transported, always connected and always present at the point of creative impulse.

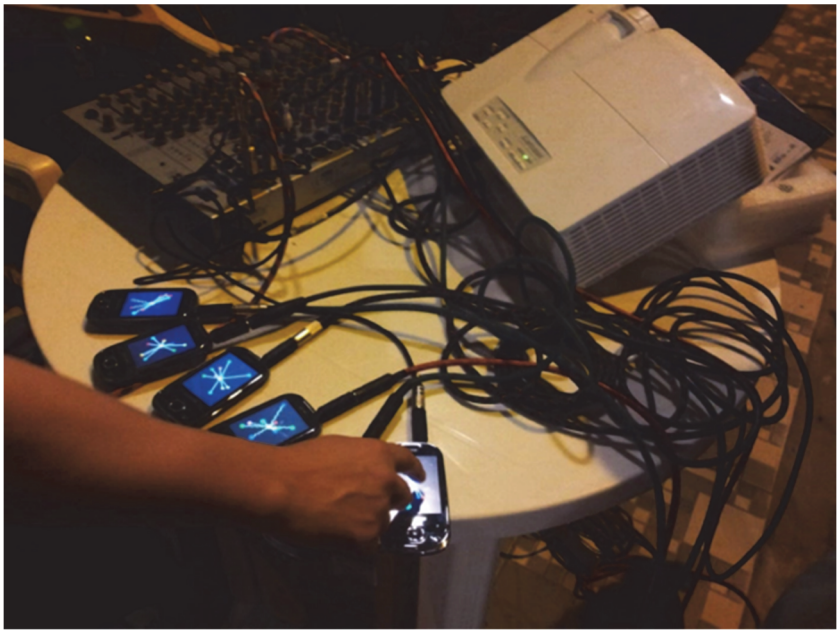

Figure 1. Geopartitura system composed of cell phones connected to the software, Brasília, 2011

Murray Schafer (1997) states that, with society, we learn how man behaves with sounds and how they affect and modify his behavior. With the arts, and particularly with music, we will learn how man creates ideal soundscapes for that other path which is that of imagination and psychic reflection. For the author, with the accelerated industrialization process, the world suffers an overpopulation of sounds, we live daily and passively with an immense amount of sound information, which has attracted the attention of scientists in various parts of the world.

The soundscapes generated, as a concert, are the basis for the composition of a subjective cartography that maps through physical, cultural, economic and social human

nomadism through sounds, art and technology. The key points of the sound cartography of each individual or passerby are detected, that is, forces of interference in the sound mesh projected in the urban context, the result of a drift through the city, leaving chance to work. The integration between different systems such as social networks, software, images and texts form a new, changeable and interactive holistic system where changes in any one of the factors change the way the others will be viewed.

2. Gamearte: Invaders project

The Invaders project was designed to be carried out as an activist interactive urban cyberintervention, aiming at current issues in Brazil in relation to ethics and discrimination. Since 2013 the proposal has been presented in the following cities: São Paulo - SP, Brasília - DF and Santa Maria - RS.

The first presentation was at Avenida Paulista, in São Paulo, as part of the Play exhibition, which occupied the facade of the building of the Federation of Industries of São Paulo (figures 2). The proposal contains characteristics of a political manifesto, part of an activist and playful artistic action. Human-computer interaction was carried out with a tablet on the street and the Fiesp building itself interacted with the gamearte.

Figure 2. Paulista Invaders, 2013

The proposal took as reference the well-known game Space Invaders, developed by Tomohiro Nishikado launched in 1978. Paulista Invaders is a shooting game in two dimensions, in which the player controls a bicycle by moving it at the bottom of the screen in a horizontal direction. The cars move towards the bike, from the top of the screen, while the bike throws flowers to defend itself. The cars, when hit, fall apart and purify the air by changing the background color. The objective of the game is to prevent cars from reaching the bottom of the screen, invading the space reserved for bicycles.

The goal, in this gamearte, was the humanization of Avenida Paulista. For this, we approach the use of bicycles as a means of transport, to the detriment of cars, contributing to the discussion on quality of life, health and air clean-up. In addition, we seek to raise the discussion about the relevance of using the bicycle as a traffic agent, as its use helps to relieve urban roads. We also emphasize the fragility of the cyclist when trying to occupy his space on the street.

The main elements of the Paulista Invaders game are:

.Bike (controlled by the architecture / building or by a player);

.Flower (randomly launched by the bicycle);

. Cars (change color randomly);

.Bus (valued as public transport);

.Pedestrian crossing (pedestrian safety metaphor);

.Score (result of the interaction between objects);

.Background color (undergoes the modification process symbolizing air clean-up).

Figure 3. https://www.youtube.com/watch?v=Sy7Ub6p3Ytk

Through the gamearte, current social issues are discussed and, through play, one can find a space for humanization through art and digital technology.

3. Brasília Invaders

The second cyberintervention was held in Brasília during the Cena Contemporânea event, participating in the first edition of the International Media Festival. Gamearte raised political issues related to local society. In this proposal, the invaders are corrupt politicians and the player's avatar is a Painted Face. In this cyberintervention, we continue with the idea of taking over the classic game of the 1970s Space Invaders to occupy the facade of the Pantheon of Heroes and Heroines of the Republic, opening the first International Festival of Multimedia Innovation (FIIM) that took place in 2013, in the capital. "It was a bit of a pirate action; we exchanged the original spaceships for the faces of politicians, who were the target of those who passed through the Praça dos Três Poderes and decided to vent with the iPad ", says Rodrigo Barata, director of the producer Pylha, director of the festival with Criolina and Media Lab / UnB (figure 4).

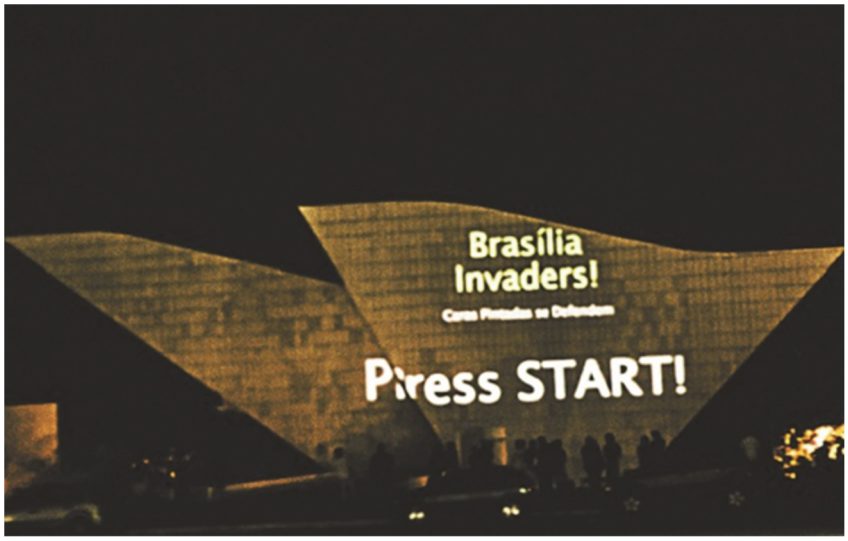

Figure 4. Projection on the facade of the Pantheon - Esplanada dos Ministérios, Brasília, DF, 2013

As a system, it comprises software, a database and mobile devices, which allows long-distance interaction via Wifi. The project was designed to be carried out in a specific location, aiming at the interaction with passers-by in the city, in a bias of social inclusion, transforming the urban landscape into a place of occupation through the game. Gamearte also aimed at the development of global skills of the interactant, such as, for example, logical reasoning, memorization, notions of direction and sense, spatial location, among other aspects of motor sensoriality.

4. Santa Maria Invaders

The third Santa Maria Invaders Urban Cyberintervention, was held at the invitation of the curator of the interactive exhibition FACTORS, organized by the National Association of Plastic Artists of Brazil (Anpap) in 2015 and held at the Museum of Contemporary Art. In this work, the main concepts of the proposals were continued, in which, through poetics, one can discuss current local social issues and, through the playful aspect, one can find a space for awareness and humanization through digital art and technology. The main aesthetic characteristics are mainly the graphic, playful and interactive elements. In the broader context of its bio-functions, the work aims at the development of global skills of the interactant, such as logical reasoning, memorization, notions of direction and sense, spatial location, among other aspects of visual, auditory and motor sensoriality. The project also addresses issues of art and activism related to society (figure 6).

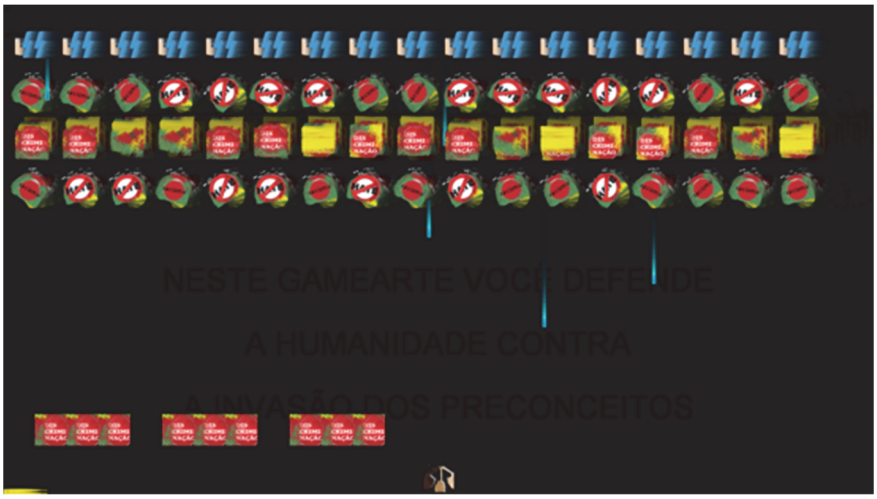

Figure 6. Santa Maria Invaders, Museu de Arte Contemporânea, Santa Maria/RGS, 2015

Santa Maria Invaders is a 2D game, in which the player, who is the avatar himself, controls an anti-prejudice symbol, moving it at the bottom of the screen horizontally. Starting from the top of the screen, symbols of racism and prejudice move towards the avatar, while he throws flowers to defend himself. Prejudices, when hit, dissolve and disappear from the gamearte. The objective of the game is to prevent prejudiced symbols from reaching the bottom of the screen, dominating the Brazilian scene, symbolically invading the space reserved for diversity.

5. EXTINÇÃO![2]

The EXTINCTION! Curated by Priscila Arantes was held in 2014 at the Paço das Artes museum in São Paulo. Machine for picking up stuffed animals, as amusement park cranes are popularly known, are the machines (Toy Machines) proposed here in the EXTINCTION installation! to compose a gamearte computer system, considering the hybridization between art, activism, design, ubiquitous / pervasive computing and augmented reality. The visitor was invited to play at the Animal Picking Machine, where he could, at a certain time, pick up balls or boxes with markers that only showed the Mico-Leão animal in a virtual way, through the system known as Augmented Reality. The visitor could take the ball he could get, like a fetish. To play it was necessary to buy little files that were inserted into the machine, thus starting the system. The proceeds were donated to Greenpeace, whose mission is to preserve forests. The poetics relates the virtual image with the situation of the living species on our planet that are threatened by deforestation and other factors that are currently impairing their survival.

Figure 7. Exposition Paço das Artes, São Paulo/SP, 2014.

In the same context, when seeking to relate art and nature, to support demonstrations in its defense, the proposal DesflorestamentoZero and the work Jardim emerged, both exhibited at the National Museum of the Republic in 2014 and 2015.

[2] http://pacodasartes.org.br/eventos-e-acoes-de-formacao/extincao_suzete_venturelli.aspx

DeforestationZer0 was presented as an interactive installation with augmented reality technology. The poetics of the work addresses the launch of the ZERO DEFORESTATION campaign, led by Greenpeace, to bring a law of popular initiative to Congress, seeking to combat rampant deforestation in Brazil. And for this to happen, popular participation was necessary to obtain 1.4 million signatures from Brazilian voters, in addition to generating a large national movement in defense of forests to guarantee their approval.

Figure 8. DesflorestamentoZer0, Museu Nacional da República, 2014/2015

The work was presented as an installation, with the design of computational trees printed in large format (5x3m), sticked on the gallery wall, an avatar (zombie) appeared inside the forest, when the public looked at the print through a camera. tablet. Two realities (computational and local) merged in real time.

6. Jardim: computer vision research

The work Jardim, proposes computer vision, which perceives its movements when composing the garden and immediately modifies the image projected on it, creating colorful spaces depending on its new typography. The proposal is based on the Japanese Garden, as it is also an invitation to contemplation. It seeks to transmit peace through colors and composition. Likewise, visual aspects such as texture and colors are

important aesthetic, philosophical, and symbolic elements. Interactivity is its main aesthetic characteristic. When interacting the public of the exhibition changes its appearance and integrates metaphorically with nature.

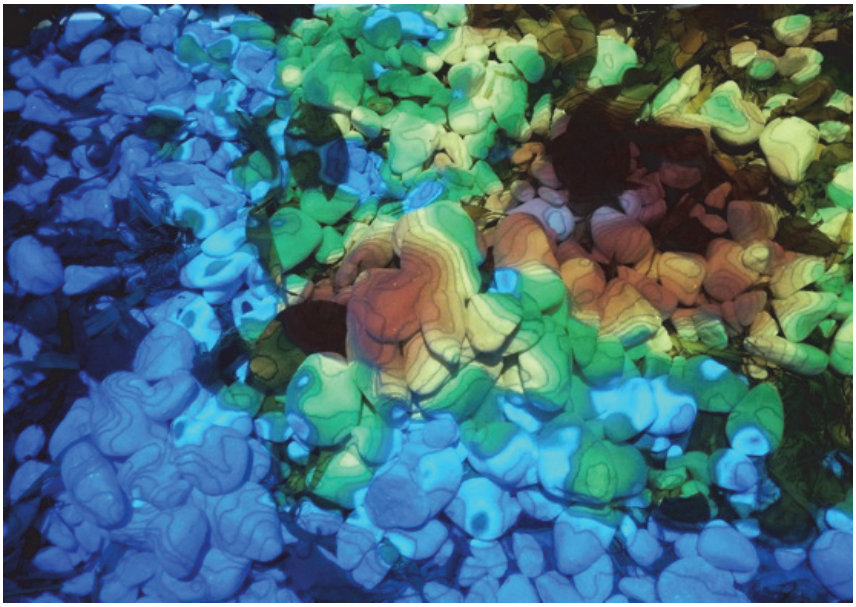

Figure 9. Jardim , Museu Nacional da República, Brasília, DF, 2015

The artists' interest in creating interfaces and interactions between machines, without the presence of other stimuli for interactivity to occur, has been more experienced due to open source technologies, for the development of hardware in addition to software. These two elements are components of computer systems, which support the way objects can communicate, in addition to the interaction between living beings and computers. This type of interaction also considers studies in the field of ubiquitous and pervasive computing, which means that the machine and software can be everywhere without being noticed. For this, the computer system has to leave the black boxes, which are industrial computers, to enter the computer art system, with its own objects appropriate for the current art scene.

CONCLUSION

Computational art research and aesthetic experiments carried out as a team at the Media Lab / UnB covered the following subjects: relationship between the traditional notion of art and the aesthetic emergence of new forms of artistic practice; relationship between technology and art, with an emphasis on computational technology; relevance of an aesthetic conscious of the diversification of artistic

practice; conflict with established art; the artist's tiredness of being in the background, only reacting to what already exists; I support the recombinant strategies of media, reuse, appropriation, free and free, do-it-yourself, cyberculture, critical media, re-presentation, cut-up, which was central to our aesthetic arguments.

The object of computational art is software art, just as the artist-programmer is the author of the program. There is no computational art without technoscience, but it can exist without the computer. Computational art is not a mirror of the power of technology, on the contrary, it analyzes how this power serves what the artist needs, making it visible, as it will thus be inserted in the proposed poetics. Technology also determines its shape. The power of computational interactivity is presented as fundamental for human development, contributing to the elaboration of databases, to structure participatory information, as well as, it resorted to the capacity of networks to bring people from different cultures, to approach them through connection systems online, in real time, collaborative.

It was highlighted eight basic elements that are related in order to produce poetics, in the artistic works analyzed: 1. randomness; 2. variable points of view; 3. modeling and simulation of the real world, the behavior of living beings and nature, which are not always representative, but pure changing imagination; 4. interactivity; 5. Invention; 6. Infographic elements and, in some cases, Artificial Intelligence.

Computational art finds itself in a historic position in computer applications, because using computers, the artist became involved in an activity that had been the central domain of living beings: the act of creation. Emerging aesthetics appear spontaneously, with artificial beings and interactivity of a high level of complexity, between living beings and machines. This means establishing a level of dialogue between the machines as well, including the self-organization of their emerging structures, as well as the adaptive and evolutionary networks, in the Darwinian sense.

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