Digital Material and Creative Practice
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Abstract

Digital Material explores fluctuant dynamics between artistic creation and digital systems by projecting a theoretical model to analyze variable methodologies implemented in creative processes. The proposed model is articulated through levels and layers of information representing abstraction barriers where the information changes and assumes particular identities. Through these strata creative thought is filtered informing the material, manipulating its information and becoming art.

Keywords

Digital Material, Theoretical Model, Creation, Code, Information, Art Practice.

Digital Material and Creative Practice

This essay projects the model for a *digital material* used by creators when they implemen digital systems in their creative processes. The model is structured by a series of information layers and establishes the possible relations within the material and with the rest of the creative system. The configuration and relations between these layers can be used to analyze the creative strategies exercised on digital information as well as the resulting outcomes. Likewise, the strata are constituted as abstraction barriers that: on one hand signal changes in the identity of the information, and on the other may indicate the depth of manipulation on data the artist seeks. These indicators can be of great help and interest for the analysis of artistic methodologies and the particularities of specific practices.

The work with digital systems is usually performed on several levels of depth simultaneously or involves multiple strategies in parallel that define divergent identities for a singular digital entity. That is to say, within the same project the creator can adopt strategies that use a given block of material as a predefined element or use it as a dynamic process, in which case the informational dynamics changes at any given time. Therefore, it is presumed that the structure of digital material explored in the case study does not represent a fix entity but rather a particular example for implementing the model and can be multiplied by analyzing new sets of creative processes.

The basic framework for the concept defines four points of approach and a specific context. Thus, the problematic system is the artistic practice within digital production and is defined by the following guidelines:

A) The *digital material* only exists within digital systems. Once the information acquires body outside of the system it losses some of the features inherent to the concept. Such is the case of a printed image from a digital archive. When printed it loses its update variability and closes all the paths of communication with the system.

B) An artist works with compounds or blocks of *digital material*. A block can be a digital entity or can be composed by several nested or interconnected entities. An entity includes any digital file that contains in itself all the strata necessary for its own predefined actualization, for example a digital image. A second option is to use a database, in this case the compound includes the database as structure and its elements. Another possible format of compound can include an algorithm that meets a specific task required by a database or its elements. In short, a compound is defined by all digital elements to which the artist has access at a given time.

C) The artist works within a digital system. This system can have different levels of complexity and therefore the concept of *digital material* acts as an accordion that expands and contracts with the configuration of the system and the extension of the manipulation carried out by the creator. For example, if an artist works on a small scale system, such as an *Arduino*[1], in which he programs all the control software, creative substance comprises the totality of that system.

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[1] Arduino is a platform of open hardware designed to facilitate the use of electronic means in multidisciplinary projects.

On the contrary, when the work is done on a complex system there is usually a computing framework which the creator does not transform, e.g. the operating system of a computer. It acts as the environment in which the manipulation of the material is performed, but it will not be considered part of the *digital material* because there is no creative force exercised on it.

D) The user interfaces are configured by the creative work and constitute communication channels that feed new data into the compound. Therefore, interfaces are constituting its outer layer.

These basic parameters define *digital material* as: the compound of entities on which a creator exerts a creative force within a digital system. In this general framework different methodologies may appear and the implementation of diverse strategies for separate instances of digital production are common. Even so, it is possible to identify the raw material in a given state of the process and establishing both: the layers of information in action and its internal and external relationships with the system. The strata configuration and the relationships may vary through the process given the dynamic nature of digitality, but in general the model is proposed over the most recognizable abstraction barriers.

Model [digital material]

The proposed model is formed by five layers of information and four separate levels. Each stratum represents a particular type of information or a specific manifestation of the identity of the information. Each level represents an access path and an observation scale in relation to information.

Level 1	|----------|	Data block
Stratum 1	|----------------|	Binary Information
Stratum 2	|----------------|	Structural information
Stratum 3	|----------------|	Metadata
↓↓↓↓↓↓↓↓↓		
Level 2	|----------|	Programs: opaque/transparent
Stratum 4	|----------------|	Programmatic Information
↓↓↓↓↓↓↓↓↓		
Level 3	|----------|	System Software
↓↓↓↓↓↓↓↓↓		
Level 4	|----------|	Human Interfaces
Stratum 5	|----------------|	Sensual information. Updates to the *digital material*

Table 1. Digital Material layers

First Level (Sratum [1, 2, 3]) // Data

The first stratum of *digital material* is the binary code. Namely, the moment in which information is binary, encoded in a numeric string of zeros and ones that can be transmitted quickly and effectively by means of an electrical signal. Given that a binary string of characters is not in itself structured it needs a second layer of information that defines the organizational parameters. This second layer defines the structure that organizes the binary information and projects the reading system for the binary data, consequently it is the first step towards information actualization. The third stratum defines a set of data useful to manage this information. That is to say, it consists of
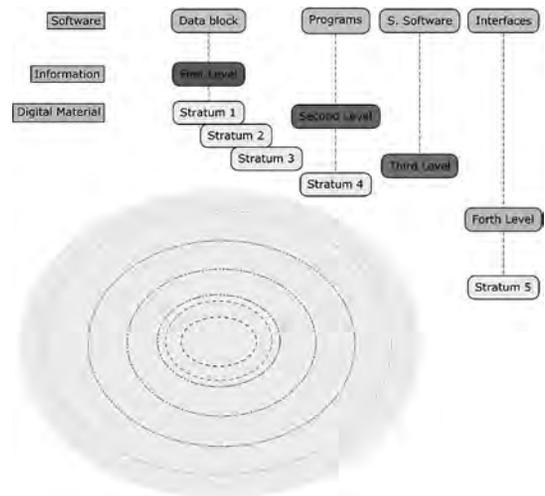

Figure 1. Digital Material Model. Metadata associated with the package or data flow that informs the exterior layers. These three layers form the first level and can be treated as a unit. This level forms a packet referring to a set of data with intrinsic structure which the creator can access.

Data packets may have at least two states: predefined stored information or variable streams of data. The first one defines information stored in a specific location that can be accessed at any time (e.g. an image, a text or a sound stored on a hard disk). This packages are relatively stable and its actualization is replicable since the data does not change. The second state of information packages flow through a digital system without being stored and therefore are ephemeral (e.g. the information current from a microphone, data retrieved in real time

from the Internet, the video stream of a webcam, etc.). They are elastic, do not have dimensions nor default parameters since these will depend on the volume of data flowing. Finally, their sensual actualization is not replicable because of its variability.

Second Level (Stratum [4]) // Programming

The fourth layer of *digital material* is constituted by computer programs which determine when and how the information on the first level is used. They allow access to independent strata of the data package and set the mapping scales for information. Here are defined the algorithms used for handling the underlying strata and the processes used to format the resulting updates. This stratum also determines the interaction between masses, including the ways of human interaction. This programmatic text is structured in computer programs limited to the parameters of a particular programming language, which defines its structural information and metadata that allows communication with the system. The fourth layer of data provides the second level of access to information.

It is characterized by an attribute of opacity that determines the level of control for the artist. This opacity is proportionally direct to the degree of programmability that it possesses, i.e. the possibility of defining the program processes and the data identities. Opacity defines the manipulation potential over the digital mass, the higher the opacity less control, the greater the transparency more control. However, in general it is presumed that a higher opacity faster and stronger data processing. A common example of opacity is the difference between image manipulation with a graphic editor or by means of graphical programming. A graphical editor is opaque because the actions exercised over the image are preset and cannot be changed outside the programmed parameters. The creator usually does not understand the underlying processes because they are hidden under a graphic abstraction which aims to simplify use[2]. In compensation for the concealment of their processes these programs have a wide range of specialized procedures to be performed quickly and easily. On the other hand, through graphical

programming this layer acquires transparency. This is, the programmer defines and controls processes; determines and maps parameters; and establishes the paths of formalization for the information. In this way the creator gains greater control over the material.

In conclusion, this fourth layer structures the *digital material* by defining the general shape of its actualization. The programmatic text found in this stratum details the update path by which the information becomes sensitive to humans. In other words, the fourth layer generates the information that will be used and filtered by the software system and the hardware infrastructure to complete the visualization process.

Third Level ( ) // System

The computational system is the third level of information acting as the environment for the *digital material*. It includes the operating system, the device drivers and other predefined software. It is in direct contact with the hardware and it defines the possibilities and limitations of the system. Therefore, although theoretically digital data has an undefined potential for actualization, this potential is confined to the bounds of its computational system. It is through this environment that the basic structure molded with the material acquires details, resolution and other specific attributes.

Fourth Level (Stratum [5]) // User Interfaces and Sensual Actualizations

Finally, the data packets handled through the processes and filtered by the system is updated in sensitive forms for humans in the so-called user interfaces. This is the outermost layer of the system where the *digital material* is projected and accordingly its peripheral layer. Through the user interfaces the information enters the human sensory spectrum and simultaneously, through them, external information enters and nourishes the material. That being the case, the user interfaces are the last level of informational mutation where, for a moment, the dynamic exchange of forces update on the interfaces.

The proposed model is articulated through levels and layers of information representing abstraction barriers where the information changes and assumes particular identities. Each level is a point of access to digital materiality which favors certain methodologies and practices. The implementation of the model has shown that the creative work with digital systems changes according to the stratum manipulated. Through these

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2 The graphic menu of these applications is composed by symbols representing actions to be performed: a brush, a pencil, a draft, etc. These symbols are used to represent the expected outcome of their use but not the algorithmic process performed on the digital data.

strata creative thought is filtered informing the material, manipulating its information and becoming art. This dynamic information flow is key in the constitution of the work of art and the aesthetic experience, as it is here where the informational entities absorb thought. Each stratum of information, which operates as an open variable in the model, receives new data generated in the creative process. Therefore, after *digital material* accumulates information in its multiple levels it acquires shape, volume and image. Digital information ceases to be a structured collection of data assuming the role of a specific creation entity. It becomes artistic material.

Actualization [Paisaje desmembrado]

The particular artistic practice of an artist and the way in which the digital systems are inserted in a project constitute the framework within which different configurations of *digital material* are projected. These formations are variations of the model, derived from the work of the artists, that express their qualities, characteristics, powers and possible appropriations.

The project *Dismembered Landscape* (*Paisaje desmembrado*, Vergara, 2009) allows to explore the way in which video as a practice and as a medium, acquires a very particular expressive potential when it leaves the traditional limits of audiovisual language and explores its digital characteristics. This case study is interesting because of Nelson Vergara's practice and ideas have profound roots in traditional painting which emerge in his interest of using code to remodel and stretch the boundaries of videographic representation.

In this work the video emerges as a record, it has symbolic and discursive value as a trace of the human action over nature. However, the digital identity of this videos allows Vergara to extend the documentary nature of the register and reshape the information, redefine its structure and thus investigate the relationship between time and space in videographic representation. As digital files, the videos are just part of the configuration of a *digital material* through which the artist acquires data. Specifically packages of data in the first level of information containing the video's own data: its metadata, the digital structure and the actual audiovisual data. They constitute the third, second and first data stratum adding the first level the proposed model.
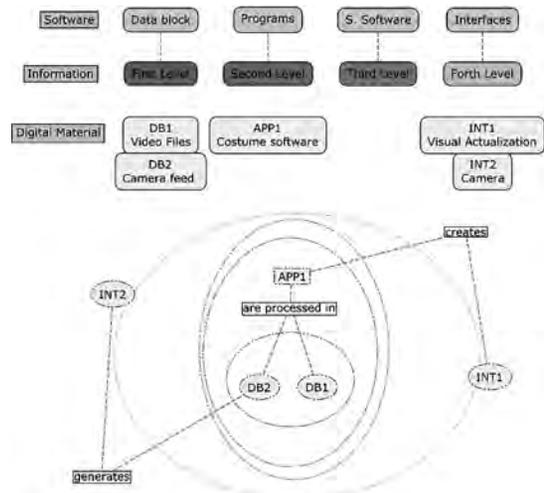

Figure 2. Digital Material projected on Vergara's Dismembered Landscape

However, in *Dismembered Landscape* there are other first-level data packets with their respective strata. The data flow coming from the video camera that registers in real time the exhibition space, the projection and public interaction. This information package is dynamic, since its data is not stored in the system and is constantly emerging from the camera feed. The images from this video stream are analyzed in the fourth layer of information in order to detect motion in the space and define openings and modifications for the figurative planes in the screen. In this way a dynamic relationship between the data packets, the documental image and the motion feed, is defined and the visual update of the work arise.

On the one hand, the video file provides graphical information and spatiotemporal sequentially storing its representational potential. On the other hand, the video feed defines the location, duration and dimension of the dynamic plane apertures in these spatiotemporal sequentially updating and modifying that discursive power. It can be concluded from this interactive relation that the projected visual update on screen cannot be considered a conventional video, since it is constructed dynamically from multiple sources of asynchronous and delocalized information. On screen, local and global times collide, external data is nested on videographical information, and the formal elements of the image cannot be attributed exclusively to any of these sources, since their structure is defined by a programmatic

module outside the first information level, the video and camera files.

This programmatic module controlling the described relationship is a costume made program specifically designed for the piece. It occupies the fourth stratum - second level - of the material on which the data packets converge. It is also concerned with collecting, transforming and reshaping these packages into a new stream of dynamic visual information that is injected into the system for display.

Specifically, the program performs a series of transformations on the data to build the visual dynamic object on screen. The process can be described as follows: First, it abstracts the video frame information into vertical lines organized from left to right as a function of the video temporal space. This converts the time vector into a spatial vector - the horizontal - in the visual object. Second, the program analyzes the changes on the camera flow to identify the presence of bodies in the exhibition space. This is achieved by comparing a reference image with the image flow such that the difference is interpreted as values defining a transformational behavior related with the presence of people in the space. Behavior that defines apertures of the symbolic accordion constructed by the continuous lines. Third, it draws a visual construct made up of color lines and rectangular apertures, moving from right to left of the screen as the video file runs again and again inside each one. As a whole, the programmatic behaviors reintroduce the video-image into the dynamic visual object. Allowing the viewer to discover that the on-screen abstraction represents a visualization of the internal structure of the digital video file, which register the action of the artist's gaze on the natural territory. Simultaneously, it activates the audience own look over the installation territory.

Figure 3. Dismembered Landscape. Up: Installation view. Down: Image processing interface

Following the information transmutation, the program generated data circulates through the computer system. On this third level it is updated according to the particular characteristics of the informational system. Finally, it is updated on screen, the communication interface and fifth layer of this artistic material. Both the screen and the camera act as a communication interfaces, giving access to external information thus allowing the interaction between public and work. *Dismembered Landscape* exemplifies a syncretic balance between data packets (first level), the designed application (second level) and the human communication interfaces (fourth level), instances of the creative material character of digital information.

To conclude, the particular configuration for the *digital material* on Vergara's practice produces a highly variable work which expresses differently to each observer. Although it uses video files as resource it is much more because the visual construct does not follow a video logic, rather it expresses the informational

structure and the variability of data.

While its medial content is virtualized, its digital structure is visualized, remixed and reconstructed into an experience (Manovich, 2005, p. 203). The experiential and performative character of this work is a direct reflection of the artist 's actions over territory. The piece becomes a metaphor for the action of transforming the territory into landscape through the view. For the audience, when traversing the territory of the digital archive, their actions modify the installation territory thus becoming landscape and aesthetic experience.

The implementation of the model in the study of *Dismembered Landscape* shows that the creative work with the digital systems changes according to the stratum from which it is accessed. Even so, regardless of the methodology of work, through these strata the creative thought is filtered, the material is transformed, the information within is manipulated and it becomes art. This dynamic flow of information is decisive in the constitution of the work of art and in its experience, since it is in this stream of information that the *digital material* is formed and informed.

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