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Photogrammetry as a tool for linking Traditional and Digital Sculpture

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***Abstract*— In this paper we explain the experience of using 3D digitization through the photogrammetry technique, incorporating it into the subject of Sculpture as a link between traditional sculpture and digital sculpture, to achieve greater fluidity in the interaction between traditional and digital areas. The correlation between traditional and digital skills improves the global comprehension of the sculptural volume and in this process photogrammetry becomes a good tool for this transition from the real to the digital**

Keywords—photogrammetry, sculpture, digital sculpture, digital arts

I. Introduction

Within the context of the Digital Arts Degree, we are characterized by having a first course closely linked to traditional arts, with subjects such as Drawing, Painting, Sculpture or Anatomy. We consider that this training in classical techniques related to Fine Arts creates an improvement in the technical and conceptual training of our students. However, since the final objective of the training is the skill in digital art techniques, we incorporate innovations from traditional subjects that, usually originated by the teachers' own research activity, help to connect traditional with digital art.

II. Modeling and Digitalize

In the first undergraduate year, the subject of Sculpture ends with a final project of 10 sessions that consists of the modeling of a realistic and anatomically correct human figure. It is modeled at one-third life size, resulting in a piece between 55 and 60 centimeters high. This work clearly exposes all the skills that students have developed throughout the course in the different exercises, as well as the learning about the human body acquired in the subject of Anatomy.

Aware that the main objective of the training is digital art, we decided to incorporate the photogrammetry technique as a final element in the training of traditional sculpture (1). The possibility of digitizing three-dimensional volumes through photometric imaging helps them understand that a clear relationship between traditional and digital arts is increasingly necessary. Currently, even the research of traditional artists in Sculptures should require the incorporation of digital technologies.

The rapid advance of photogrammetry has led us towards different software such as Metashape, Meshroom or Reality Capture (2). Regardless of the choice of one software or another, the great advantage for students is to see that with elements as accessible as photographs taken with their own mobile phone we can obtain increasingly precise results.

The capture of these images must be carried out at 360 degrees, creating a kind of dome of images that encompasses the object in the various positions, accessing all the nooks and crannies of the shape.

Thus, they end their first sculptural experience not only with a hand-modeled figure, but also with an obj file that contains the digital mesh of their sculpture.

Fig. 1. Screenshot. Photogrammetry process of the sculpture carried out with Meshroom.

III. Implementation in Digital Scultpure

The interest of having the digital file consists of determining that the sculptural work does not necessarily end at a material point, but can have a second part in the digital world.

Incorporating this action, we are creating for the students a connection with the subject of Digital Sculpture I, which is carried out during the following semester (corresponding to the second year of the degree).

To do this, it is essential to start by knowing specific software. For organic modeling we use Zbrush (3). The learning curve of this software begins with a high complexity because its interface is not intuitive, although after the first 3-4 classes, students begin to acquire fluency and understand the logic and workflow of digital sculpture.

From this moment we recover the result of the photogrammetry to begin to intervene digitally. The confrontation between the real three-dimensional model (traditional sculpture), its photographic image and the virtual three-dimensional model (obj) allows an apprehension of three-dimensionality in a deeper and more precise way.

Fig. 2. Screenshot. Digitized sculpture prepared for modeling in Zbrush, with background reference of the traditional sculpture

With organic computer modeling (digital sculpture) we can apply improvements and continue advancing in the direction of realistic representation of the body. But it also opens the door to a new imaginary that allows the creation of new works that are not necessarily close to the initial reference.

IV. Research and Art Project

The application of the knowledge obtained by adding the skills acquired by traditional modeling and by the three-dimensional vision of the model that photogrammetry offers us is evident when facing the personal artistic project. In this case, we took advantage of a visit to an exhibition at the European Museum of Modern Art in Barcelona (MEAM). We will use as a starting point the paintings exhibited, made in oil by the artists Kike Meana and Jaime Valero. The goal is to convert these two-dimensional images into three-dimensional works.

To achieve this goal, we propose an individual project where students have to make a digital sculpture directly. At this point we can realize the greater importance of experiencing traditional sculpture and photogrammetric practice in advance, since now is the moment when the acquired qualities have to emerge while the artistic project is being carried out.

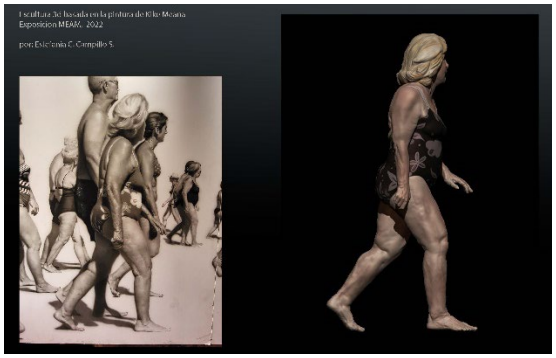

Fig. 3. Render from digital sculpture made by Estefanía Campillo based on an oil painting by artist Kike Meana.

It is interesting to observe how in the results made individually not only for the level or quality of details or surfaces, but for the global understanding of the sculptural concept of the representation of the body. We consider that carrying out this conceptual process in learning, incorporating photogrammetric experiences, helps students to make a better transition between traditional and digital sculpture, between real and virtual.

Conclusions

Although we mostly use photogrammetry as a tool in the area of research than in the field of teaching, we consider that training digital arts students in this technique for creating three-dimensional models helps to relate the sculptural concept in the transition from the traditional field to the digital. Although it is not among our objectives to test by what percentage these results improve, it is obvious that being able to digitally manipulate the same "object" that was initially manipulated manually helps to better understand, not only the volume, but also the digital sculpture in general terms, regardless of the starting point.

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