



Digital Humanities and Physics Applied to the Study of Cultural Heritage Objects: The Case of Ex-votos

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Abstract. Several humanities research increasingly assumed the usage of computational technologies in different stages of their work. In this sense, these types of tools could generate theoretical, methodological and institutional issues that should be discussed. The aim of this paper is to present some initial reflections on the use of computer technologies in research in the field of Philology, more precisely with ex-votos (Latin ex-voto suscepto ‘the vow/promise made’) from the 18th and 19th centuries. Using certain technologies, it is possible to access the deepest layers – those that are not visible to the naked eye – of documentary sources and thus produce a more complete edition that is more faithful to the original. The work of Paixão de Souza [1, 2] is used as a theoretical point of view.

Keywords: Ex-votos · Philology · Digital Humanities

1 Introduction

Digital Humanities is increasingly gaining strength in the panorama of studies in the Human Sciences. This is no surprise, given that with the development of new technologies, researchers in this major scientific area are looking to apply innovations, especially in the methodological aspects of their research. This is because, as Marquilhas and Hendrickx [3] point out, Digital Humanities has two great virtues: openness (in the senses of accessibility and collaboration) and speed. Thus, there are currently several works that deal in some way with Digital Humanities. In this respect, it’s important to realise that the impact of computer technologies is far-reaching. As Fiormonte, Numerico and Tomasi [4, p. 15] point out,

“[...] the Digital Humanities movement is part of a wider phenomenon, a cataclysm that is changing not only the sciences and their transmission of knowledge, but also [...] the worlds of finance, media, politics, law, commerce and human resources”.

About the use of Digital Humanities in the fields of Linguistics (especially historical linguistics) and Philology, we should highlight the work of Paixão de Sousa, who is

one of the pioneers in this field in Brazil. As a theoretical basis for this work, we will therefore look at some of her texts, such as: Paixão de Sousa [1 e 2].

That said, the main aim of this short text is to reflect, albeit not in depth, on the possible contributions of Digital Humanities in working with the ex-votos that form part of the corpus of our doctoral research. In our (ongoing) research, we have been investigating a rather interesting heritage object. Interesting because, on the one hand, we have an object of religious devotion that constitutes both material and immaterial cultural heritage and, on the other hand, we have a multimodal text created by combining verbal text (the caption) with non-verbal text (the painting) (see Figs. 1 and 2). In addition to their socio-historical background, it is precisely these two major aspects – heritage value and multi-modality – that give ex-votos their unique character.



Fig. 1. Ex-voto of Manoel Miguel (1751). [5]

Milagre q̃. Ffes N.o S.o Da Piadade A Manoel
Miguel Laurador Da Erdade Das Cladejras.
Em oLiurar De Hum Prioris E Carttarral De que
Premitta omesmo S.r Seja p.a Sue S.to Seruiço Se
ndo Noanno de 1751



Fig. 2. Ex-voto of Ignacio Berrina and Maria Roza (1844). [5]

MILAGRE qVE FES N. S.^{ra} DO CARMO DE EVORA MOMTE
 A IGNACIO BERRINA E MARIA ROZA SVA MVLHER
 qVE TENDO TRES FILHOS POR DEFERENTES MVLESTAS EM
 PERIGO de VIDA PRISIPAL HVM qVE DEITAVA BIXO PELA
 BOCA IPEGANDOSE COMFE AMAI DOSDITOS DOENTES N. S.^{ra}
 LHE OBRO o MILAGRE EVORA MONTE ANO DE 1844

For now, to define *ex voto*, we rely on the work of Scarano [6]. According to this author, “[the] Latin locution *ex votos* means for the grace received in its broad sense. Thus, the intention of the *ex-voto* (using the scholastic sense of the term) is to pay for something that has been received” [6, p. 36]. It is therefore in the context of a request or a promise that *ex-votos* arise. There are all kinds of *ex-votos* – objects, paintings, replicas of body parts in wax, wood or metal. The fact is that any object given as payment for a promise effectively becomes an *ex-voto*. In this universe of *ex-voto* possibilities, however, our research will only focus on votive tablets, also known as Brazilian and Portuguese votive paintings from the 18th and 19th centuries. These are small pictures – of varying sizes and shapes – painted with technique, which are offered for a grace that has been obtained.

2 Development

In Digital text: a material perspective, Paixão de Sousa takes a new look at the materiality of text in the digital environment: a “disembodied” document. This perspective is somewhat relevant to discussions about Digital Humanities in the field of Philology, as

this is an area that constantly uses the material aspects of texts, especially in extralinguistic analyses – linked to Codicology. Therefore, thinking about a disembodied text, according to Paixão de Sousa [1, p. 52], obliges us to.

“[...] to abandon categories of analysis designed for the analysis of physical objects, both in the documental dimension (this is the case of the “support” category) and in the categories through which we think about the circulation of artefacts, such as the separation between ‘production’ and ‘publication’”.

Thus, advances in computer technology have reconfigured the work of re-researchers from different areas with so-called primary sources. Firstly, we should highlight the new possibilities for producing and making available facsimile editions, i.e. the mechanical reproduction of documentary sources. Proof of this is the emergence of various repositories and text banks full of high-resolution photographs, which allow remote access to texts that, in the not so distant past, could only be consulted in situ where they were stored. This access is therefore becoming more widespread, as Quaresma [7, p. 154] points out: “Artificial Intelligence, with its subfield of Natural Language Processing, can play an important role in the analysis and characterisation of historical texts and in their dissemination and widespread access”.

With regard to digital access to documentary sources, it’s worth highlighting a very important point: if on the one hand we have research that doesn’t require physical analysis of the material, because it’s interested in the materiality of the texts – support, inks used, etc. – on the other hand, we have research that can only be carried out, given the physical distance from the archives, through sources made available online.

When drawing up our research corpus, we took care to photograph the ex-votos we found with a professional camera and observing some photography techniques. The product we obtained was high-quality images that will later be made available as a by-product of our research. In this way, we will collaborate with the tripod that is very dear to us: preservation, popularisation and research.

Two other tasks that have benefited greatly from advances in computer technology are transcribing and editing texts. The emergence of new software has greatly expanded the capabilities of those who need to transcribe and edit a text (handwritten and/or printed). Optical Character Recognition (OCR) resources, for example, have already been widely used to recognise characters in facsimile editions, thus facilitating the transcription of these texts. An applied example of these resources is the Transkribus platform – a platform for digitisation, recognition, automated transcription and historical research of ancient texts – created by researchers at the University of Innsbruck in Austria.

Another important aspect brought about by these advances was the possibility of associating images (facsimile editions) and transcriptions in an increasingly interactive way. Thus “the hypertext editions also allow simultaneous access to all materials and versions, enabling the reader’s view rather than the editor’s.” [8, p. 125]. This collaborates directly with the process of scientific replicability. In other words, the reader (from the least to the most specialised), when faced with the edition of a document, when comparing image and text, can perceive the interpretations made by the editor and can even propose their own interpretations.

When proposing a digital edition of an old text, it is possible to combine different aspects, or layers, of the same text. In this respect, Lose et al. [9, p. 78] emphasise that.

“[...] the digital edition, and not merely an edition in digital format, proves to be a completely appropriate type for Philology, which needs to work not only on the text, but also on the paratext, the information that contextualises and gives meaning to the edited document. In previous editions, this information came as background information, but in the digital edition this informational framework is fully integrated into the transcribed text, thus creating a perfect harmony between the transcription and all the information that was necessary for the philologist to enter this text and, consequently, perform his function (of bringing the text to life) with more confidence and clarity. The surroundings of the text are always fundamental for a good edition and the digital edition makes this dialogue possible in a natural and sovereign way. Digital editing is complete because the editor can choose the criteria of any type of transcription that already exists and make it dialogue with its paratext through hyperlinks, as well as unfolding abbreviations, corrective movements by the author in the case of a modern text, among other possibilities. What’s more, making a text digital means making it easier, more accessible and more widely available”.

In the case of *ex-votos*, a digital edition (or in Banza’s words, “hypertext”) would make it possible to combine the transcription with various images of these objects. In addition to the multimodal nature of these objects, as they are paintings in small frames, the application of physics and chemistry techniques – areas that are somewhat overused in the study of cultural heritage objects – would make it possible to image the objects and characterise them chemically and physically. An example of this type of work was presented by Fachin et. al. [10, p. 95] with a manuscript from Pernambuco from 1826. According to the authors,

“[...] imaging with different bands of the electromagnetic spectrum and lighting techniques is an initial stage in which it is possible to record relevant aspects of the object as a whole and reveal areas that can potentially be analysed later with other techniques”.

The proposal would then be to superimpose on a digital edition of the *ex-votos* a conservative transcription and a modernised transcription, a photograph with normal lighting, a photograph with shallow lighting, a record with transmitted lighting, an ultraviolet fluorescence record, an infrared reflectography record and an x-ray fluorescence record. With all these records, we would create an edition with the various layers (some more visible than others) of the *ex-votos* we are working with.

To make our proposal a little more tangible, below we present a set of images produced by researcher Márcia Rizzutto of a picture painted by restorer Márcia Rizzo in 2009, created to demonstrate some imaging techniques.

It is noticeable that each technique brings different aspects to analysing the object. At the top of Fig. 4, for example, using infrared reflectography photography, it is possible to access a non-visible layer of the painting, in other words, an underlying image: CADAPAC/M RIZZO RESTAURAÇÃO (our transcription) (Figs. 3 and 5).

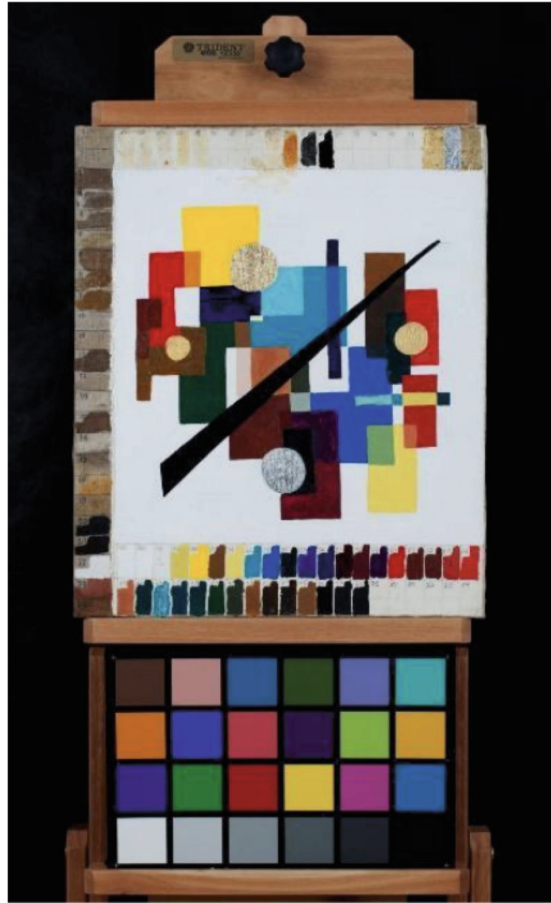


Fig. 3. Visible light photography. Source: IFUSP/Jade Zendron.

With the help of Digital Humanities, overlaying and making available the various layers of ex-votos will allow us, in addition to more complete documentation, to understand part of the production process of these objects which, according to Art History researchers [11], are made with little technique. From a philological point of view, this information will help us to better understand the extralinguistic aspects of the ex-votos, which have a direct impact on the intralinguistic and textual aspects.

To carry out this type of editing, it is necessary to carry out various character and text coding tasks. This task is only possible through multidisciplinary work involving philology, linguistics and computing.

Character coding will be indispensable due to the need to include special items in the transcriptions given the varied particularities of each ex-voto (each ex-voto is a text produced in a different place, at a different time and by a different person). It's worth pointing out here that, according to Paixão de Sousa [2, p. 129], "a character on a computer screen is a simulation: it's a visual illusion corresponding to a mathematical code



Fig. 4. Photography with tangential light. Source: IFUSP/Jade Zendron

and [...] it's something we can't hold in our hands". Thus, we return to the "disembodiment" of digital text, which gives us the possibility of infinite representation. Text coding, on the other hand, is related to the organisation of information in the virtual space of the screen and "[...] can serve the purpose of reproducing as closely as possible a printed or handwritten text on paper, or it can serve to construct new text-objects, free from the simulacrum representation of pages, lines, etc.". [2, p. 129].

In addition to editing the ex-votos, in our research we studied Discursive Traditions as a way of understanding the historicity of these texts [5].

To do this, reliable editions must be taken as a starting point for the subsequent survey and systematisation of Discursive Traditions. At this stage, the use of digital processing and corpora processing tools is essential. This is because when dealing with various data and different variables, the machine helps us to identify recurring traits.

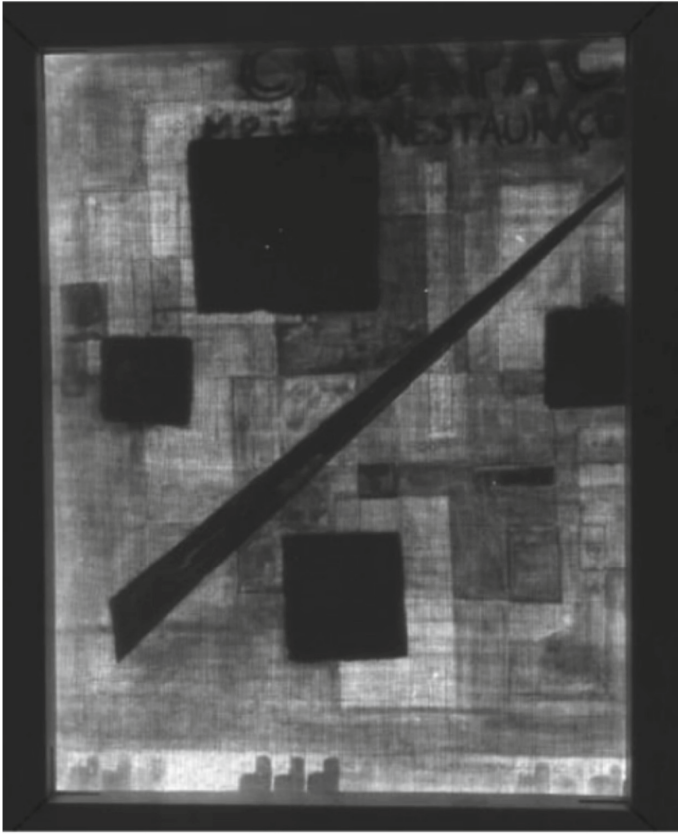


Fig. 5. Photography infrared reflectography photography. Source: IFUSP/Jade Zendron

3 Final Considerations

In this text, we seek to present some initial reflections produced from our work with painted ex-votos from the 18th and 19th centuries and a possible use of digital tools.

Some people say that machines will replace human beings. We don't agree with that. Technological advances are there to facilitate and automate tasks that were sometimes too costly. Digital Humanities has proven that it is possible to process and analyse a greater amount of data in less time. In this way, research, especially in the fields of philology and historical linguistics, is increasingly able to get closer to the linguistic reality witnessed in documents. The data that reach-es us – as Labov emphasised with the metaphor “[t]he art of making the best use of bad data” [12, p. 20] – is very fragmented. The more data that can be analysed, the better.

Looking at ex-votos from the perspective of Digital Humanities is no different. The most complete possible description of these objects cannot ignore their multimodal nature. Only through Digital Humanities is it possible to describe and give access to the multiple layers (textual and supratextual) that make up these objects which, in their materiality, are so fragile and need to be preserved.

One criticism is the use of so much technology - professional cameras, image processing resources, good word processors, etc. – to ultimately produce a print-ed edition and, when made available online, without any digital interaction.

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Comments. The ex-votos presented in this work are part of the corpus of my doctoral thesis. All the material was collected and recorded by me using a semi-professional camera. They were collected through fieldwork at religious sites in Alentejo, Portugal, and in muse-ums in Minas Gerais, Brazil. About the quality of the images, it should be borne in mind that, as the paintings were fixed in different places in museums or churches and could not be removed from their places for recording, there are differences in the photographs caused either by the geographical position of the painting or by the incidence of lighting on the object.

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