Perspective Paintings of Naples in Augmented Reality

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Abstract

With this contribution we intend to continue a research started in a previous study on the construction of a narrative strategy to communicate the pictorial images of historical cities. Resuming the theoretical and cognitive process started previously, which directed the research towards the construction of a geocoded map of urban paintings and their use in augmented reality, we now intend to validate the proposed methodology on the pictorial image of Naples, chosen as a case study application, identifying weaknesses and strengths of the research process and its possible future directions.

Keywords
ICT, AR, geocoding, perspective paintings, Naples.
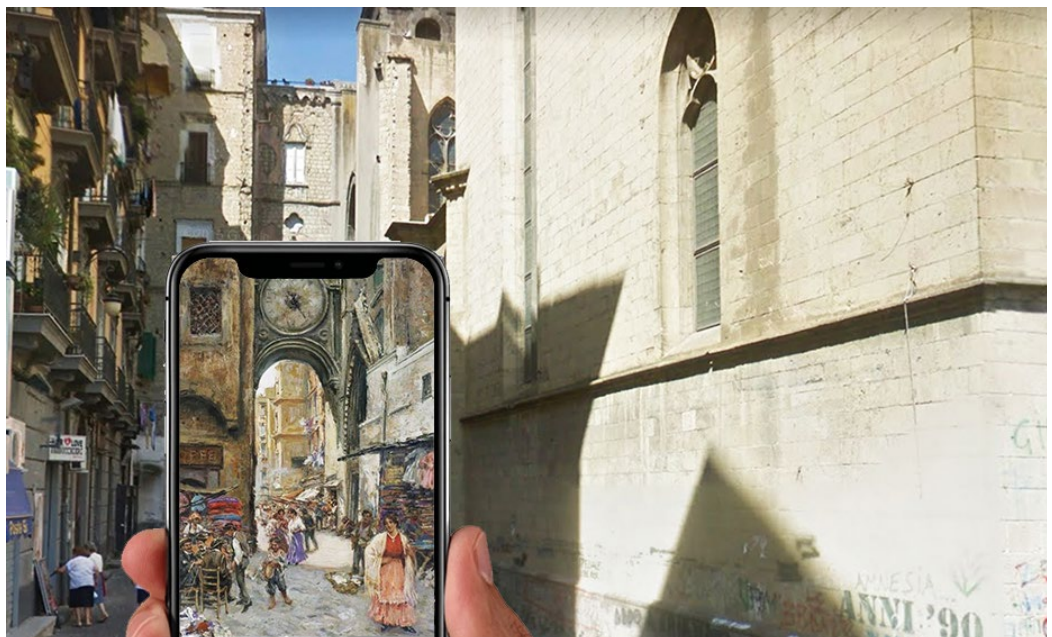
Introduction

Information and Communication Technologies (ICT) play an increasingly decisive role in our society. Their constant evolution and involvement in every aspect of daily life have contributed over the last twenty years to a paradigm shift in the modalities of knowing and experiencing the world. The intertwined dynamic between humans, digital artefacts and outside world has produced an 'intercategorial fusion' [Simondon 2014], changing the symbolic structure of the human cognitive and informative system [Asensio et al. 2010]. As Gianfranco Pecchinenda observes, «contemporary man considers himself a material entity predisposed to receive, process and communicate information with an external reality composed 'indifferently' of entities similar to himself, or of purely immaterial entities» [Pecchinenda 2010, p. 128]. In a world where atoms and bits tend to contaminate each other [Mandelli et al. 2011], important issues and new challenges also arise for the communication of the Cultural Heritage. Today's public needs new communicative strategies to perceive the cultural traces contained in the Heritage itself, which would otherwise risk remaining silent without subjects able to perceive and interpret them [Toscano, Gremigni 2008]. Therefore, we asked ourselves what role the representation could play in the construction of a communicative action able to emphasise «the invisible information which any artefact conveys per se, beyond the mere material dimension» [Bergamo et al. 2016, p. 3]. Representation, in fact, by embedding meanings in a visual system of signs, has always constituted a universal communicative language usable in the interpretation of the operative relationship between man and world [Maldonado 2015]. In particular, this research investigates representation as a tool to increase knowledge of cities, using paintings with urban scenes in a new narrative key. City paintings, being visive documents of a specific era, contribute to the construction of a permanent visual memory of the urban organism which, by its nature, is dynamic and changing [Socco 2000]. Often, paintings of the city allowed academics to formulate architectural hypotheses, identify the relationship with the landscape or even understand the places considered most significant in a specific historical period. It is true that painters have often made use of imaginative components in order to mask the city's weak points, recreate ideal harmonies or balanced pictorial compositions, but, in Laura Carlevaris' words, «if in representing [...] so many illustrators and engravers have felt the need to narrate the invisible, perhaps this invisible has actively participated in the consolidation of a more complex image, certainly, but no less persistent, effective and in any case inescapable» [Carlevaris 2014, pp. 29-30]. In other words, artists have always been able to propose their own vision of the world, often linked to the cultural and social imagery of their time. The pictorial drawing of the city, therefore, even if filtered by an artistic interpretation, constitutes a valid instrument of knowledge and communication, not only for those who use the iconographic apparatus as a documentary source for studying and planning space, but also for society itself which, through the paintings, can receive those perceptive-sensorial data, not extrapolable from purely objective sources, linked to relationships, events and uses of urban spaces. The value of these paintings, therefore, does not end with their conservation, but is expressed in their ability to give people a greater awareness of the space in which they live, of its past and future setting.

Case Study

This research develops as a natural continuation of a previous study on the use of representation as a narrative tool for urban metamorphosis [Attademo 2020]. The previous study was launched in 2020, during the lockdown period which, due to the pandemic emergency, had 'forced' cultural institutions to close. This dramatic event, which still partly affects us, has encouraged cultural sites to build a new virtual relationship with the public. There has in fact been an acceleration in the digitalisation of cultural content, a factor that has certainly contributed to the dissemination of culture with no space-time constraints. However, what has often been lacking is a rethinking of the way in which cultural content

Fig. 1. Evolution of the urban pictorial image of Naples.

1472-1473
Strozzi Table
Francesco Rosselli (attr.)

1647
Bird's eye view of Naples
Didier Barra

1710
View of the Riviera di Chiaia
Caspar van Wittel

1795
The Vomero hill
Franz Vervloet

1817
Vesuvius in eruption
Joseph Mallord William Turner

1930
Fish market in Porta Capuana
Vincenzo Migliaro

1946
Suburbs of Naples
Giordano Felice

is narrated. The communicative language has rarely been intended as visual storytelling; by re-proposing exclusively analytical, typological and descriptive approaches in the virtual, the gaps and weaknesses already present in the communication strategies of the physical places of culture were revealed. This led us to hypothesise a strategy for narrating the pictorial images of historic cities, through the construction of a geocoded map, within which we could locate certain pictorial views according to the point of view taken by the painters, connected to an augmented reality app that would allow the overlapping of the painting with the real urban context. The present research intends to activate the experimentation of the method proposed in the previous study, expanding the cognitive and theoretical process at its basis. We believe, in fact, that the methods used to deal with the effects produced by the health emergency should not only be considered as temporary solutions, but also as the way towards which the communication strategies of the 'future normality' are directed. The aim is to validate the methodological process by applying it to an experimental case study in order to identify weaknesses and strengths of the research process. The goal is therefore to verify if the narration of paintings through new technologies can increase the intrinsic capacity of cultural heritage to «arouse emotions, establish connections, awaken curiosity» [Paolini et al. 2005, p. 51]. The city chosen as a case study is Naples, whose image, over time, has been strongly conditioned by the various political dominations and cultures that have followed one another uninterruptedly (Fig. 1). Moreover, Naples has maintained a central role in the figurative arts for centuries, becoming not only a centre for the development of pictorial movements, but also a focus of interest for artists who, depending on the dominant features of their era, used different languages, methods and techniques to represent it. The numerous paintings depicting Naples symbolise those urban signs and meanings that the artists were able to capture and crystallise in images in order to stimulate the interest and curiosity of observers.

Research Methodology

Narrating cultural heritage to a non-specialist audience means creating a balance between the scientific principles of representation and today's narrative strategies. Contemporary communication, influenced by social media, Internet and video games, is increasingly abandoning the passive transfer of knowledge and moving towards participatory forms of meaning-making by the user. In order to understand urban paintings, the viewer will be all the more motivated the more he is able to independently create a relationship between them and the contemporary city. Comparison allows differences and changes to show themselves more clearly to the unskilled observer. Therefore, for the Naples

project, we chose to narrate paintings whose urban image is constructed through the perspective method. This choice derives from the fact that perspective produces images that are «verisimilitude [...] that translate into the plane the third dimension which the paper support (or at least the two-dimensional one) is obviously lacking» [De Rosa et al. 2001, p. 5]. The ability to transcribe the appearance of forms on a flat surface [Kemp 2006], means that the viewer can understand that communicative code (*perspectiva artificialis*) even without knowing its technical-scientific rules, because he has already assimilated it through his own visual experience (*perspectiva naturalis*). In these images, moreover, the view «places the eye of the observer of the perspective in the centre of projection used to construct it [...] When the observer assumes this position, his vision of real space and his vision of the graphic, two-dimensional perspective of that space collide perfectly» [Carlevaris et al. 2010, p. 142]. The observer in front of the perspective painting represents the centre of the construction, taking the place of the artist and thus becoming himself the creator of the spatial image: this feature is very appropriate to the participatory and interactive expectations of the contemporary user. In the experimentation, the decision to overlap the paintings on the actual urban scenario imposed the need to consider some elements of the perspective representations as binding. The height of the artist's point of view must correspond to the average height of a man, so the centre of projection on the plane of representation can be adapted to the points of view that today's observer can assume in real views. The observer's position must also be findable in the urban walks that the contemporary city allows. Finally, the distance between the observer and the object must be respected, so that the pictorial and physical scenery can overlap. In order to satisfy the parameter of viewpoint, only paintings in perspective with a vertical plane were selected for the experiment on Naples. The perspective of many paintings has been analysed, by recreating the painted space using the inverse procedure of conical linear perspective. The internal reference has been identified starting from the main point Vo, orthogonal projection on the plane of the observer's point of view V. The horizon line has been identified as the place of intersection points of the horizontal lines perpendicular to the plane, while the fundamental line has been placed coinciding with the lower limit of the painting. The observer's position has been identified through the distance circle with the radius VoV*, where Vo belongs to the horizon line and V* corresponds to the point of view overturned on the frame [Pagliano 2005, p. 42]. The observer's position in paintings is also recognised through the analysis of documentary sources, specific references in the title or description of the painting, or identified through specific architectural or natural features (Fig. 2). This was then searched in the current image of Naples through Google Street View, a tool that allows a virtual exploration of the city through a representation obtained from the composition of millions of panoramic images. Therefore, 19 paintings with the above characteristics were selected from the large repertory of pictorial images of Naples to constitute the first collection for experiment (Fig. 3).
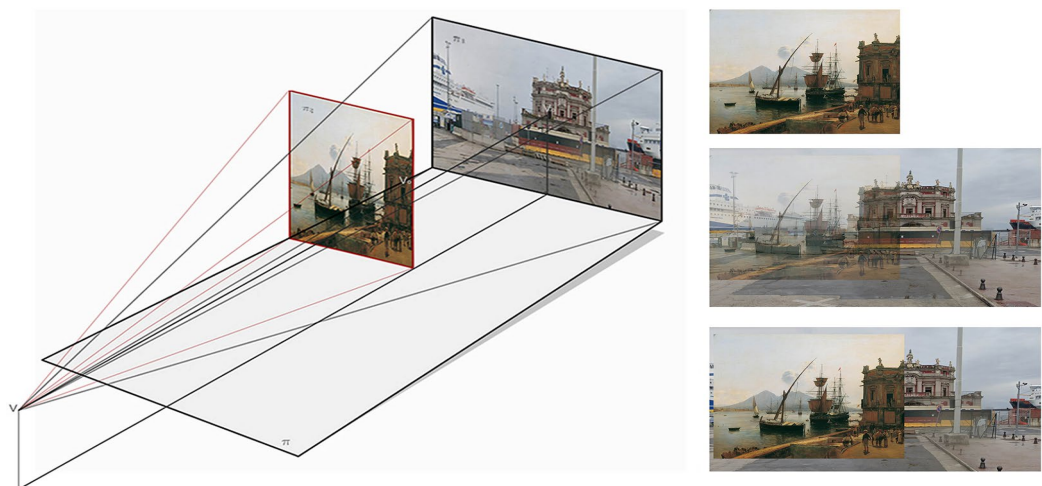

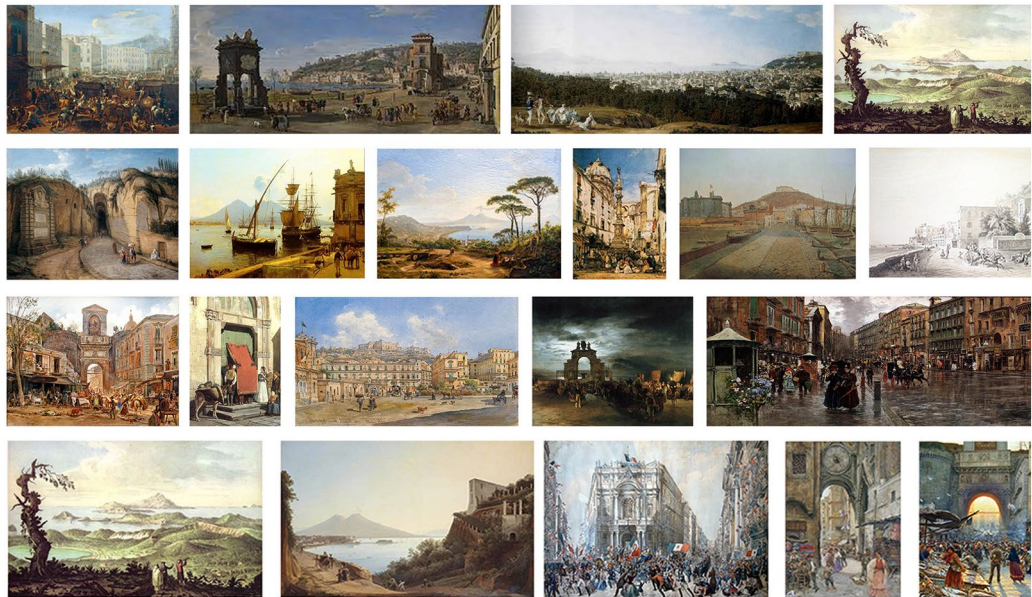Fig. 2. Perspective analysis of paintings of Naples and superimposition on the contemporary urban image.

Fig. 3. The collection of 19 paintings chosen for the experiment.

The points of view depicted by the painters in their Neapolitan views are inserted into a geocoded map (Fig. 4). This is constructed using MyMaps, a free and accessible Google tool that allows maps to be customised, adding points of interest, multimedia and text files. This tool was chosen because, by simulating the graphics of the better known Google Maps, it allows for greater recognisability and ease of use by the user that has only the task of accessing the preconstructed map and virtually exploring its contents. The map, however, can always be modified by the designer, ensuring that the narrative can be reorganised and implemented. The map is structured on a fixed layer, the current cartography one, to which pins are added to identify the position of the different paintings according to the point of view taken by the artist in the perspective representation. The overall reading of the map is facilitated by the presence of labels, each related to a pin, allowing the observer a user-friendly navigation, which allows him to recognise points of interest without the need to digit their geographical position. Each label is linked to two images: one relating to the painting, implemented by information on the author, the year of creation and the pictorial technique used; the other, showing the corresponding perspective view in real space, first identified on Google Street View and then captured by positioning oneself centrally in it, in order to remove the perspective distortions typical of wide-angle images. The map constitutes only the first level of knowledge of the imago urbis that, in order to be perceived, requires the observer to become part of the narrative through his mental and visual capacity. Implementing the narrative of a painting is a complex operation, because the painting itself is the result of the artist's interpretation; for this reason, it is the pure observation that provides a more objective narrative of the artwork, since the viewer can put it back into the present, interpreting it and making new associations. Moreover, the bombardment of images to which we daily are exposed has considerably reduced the attention threshold of the public [Manovich 2001]; The observation of the pictorial image, therefore, can be implemented by enriching its sensory perception, allowing it to capture the public's curiosity and interest. Considering that «movement is the strongest visual appeal to attention» [Arnheim 1974, p. 372], the research chooses Augmented Reality as a narrative strategy. This technique, by allowing a new visual layer to be superimposed on the existing physical space, can enrich the ways in which people experience the city. We choose Artivive, a free augmented reality app, using views of the current urban scenario as markers, i.e. as images that the technological device will have to recognise to activate the virtual content (Fig. 5). Once the marker is framed on the mobile device, in fact, some video clips are activated showing the current urban image on which the corresponding painting image is slowly superimposed. In the previously constructed clips, the perspective
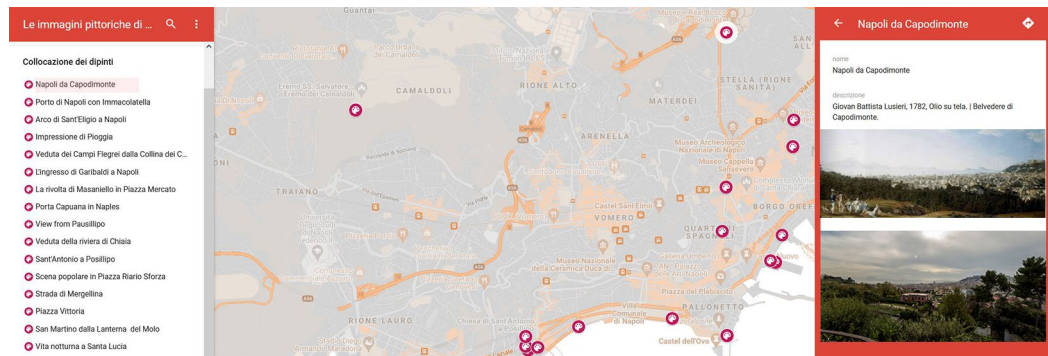
Fig. 4. The geocoded map of pictorial Naples.

of the paintings is superimposed on that of the images of the contemporary city already present in the map (Fig. 6), using a central position to further obviate the possible marginal aberrations of wide-angle views. Once overlaid, the views are cropped, so that only the perspective-corrected visual elements are preserved. By activating the augmented reality content, the observer becomes an active part of the narrative, recognising, in some cases, the transformation in the use of spaces, through the superimposition of narrative local history scenes on the daily background of the city, in others the different perception of places, through the comparison of colours, tones, lighting and urban relationships.

Research Results And Future Perspectives

The experimentation of the method on the case study of Naples allows to evaluate strengths and weaknesses of the communication strategy. The construction of the geocoded map permits the combination of cultural narration with today's intelligent geographic information systems, which are widely used in the virtual knowledge of urban places. Although art mapping systems already exist, they generally indicate the place where the artwork is displayed, and not the place represented in the painting, which is an innovative and original factor in the city's narrative. The geocoding of the paintings transforms the map not only into a digital database that can be continuously consulted and implemented by scholars, but also into a new interactive cultural portal that can be easily used by citizens. This model of use, following playful and recreational learning mechanisms, allows for greater cognitive accessibility to cultural heritage, especially for those sections of the population that do not find themselves in the classical methodologies of culture transmission. However, the preliminary research regarding the paintings to add to the map and their perspective analysis have required a long and careful bibliographic and iconographic study.In the future, the construction of specific software using artificial intelligence to process the geometric data of the painting, such as the height of the viewpoint and the position of the observer, would certainly speed up the analysis processes and expand the number of paintings mapped. As regards the use of the paintings in augmented reality, the strengths are certainly interesting. In fact, augmented reality is a versatile and easy-to-use tool, becoming a privileged instrument for communication to the non-expert public. The user becomes not only a viewer, but also an agent of knowledge. The opportunity to superimpose a new level of information on the physical space can contribute to change the user's impression of urban contexts: by exploring not only the spatial but also the temporal dimension, the user builds a dynamic city image through its stories, customs and perceptions. In technical terms, the experiment is exclusively virtual. The activation of the augmented content, in fact, takes place by framing from a mobile device a photographic image contained in the map, that shows a place in the physical urban space. This image, being digital, is immediately recognised by the Artivive app, allowing the activation of the augmented content. It would be interesting, in a future application, to transfer the same methodological processes in a project that could combine augmented experience and real physical space. We could imagine, in fact, the insertion of some information poles in urban

ARTIVIVE

Do you want to know more?
Discover Augmented Reality
with this app

Download the
ARTIVIVE app
on Playstore
or Appstore

Launch the app,
frame the marker with your
smartphone / tablet and watch
the images come to life

Fig. 5. Activation of augmented reality content through the Artivive app.
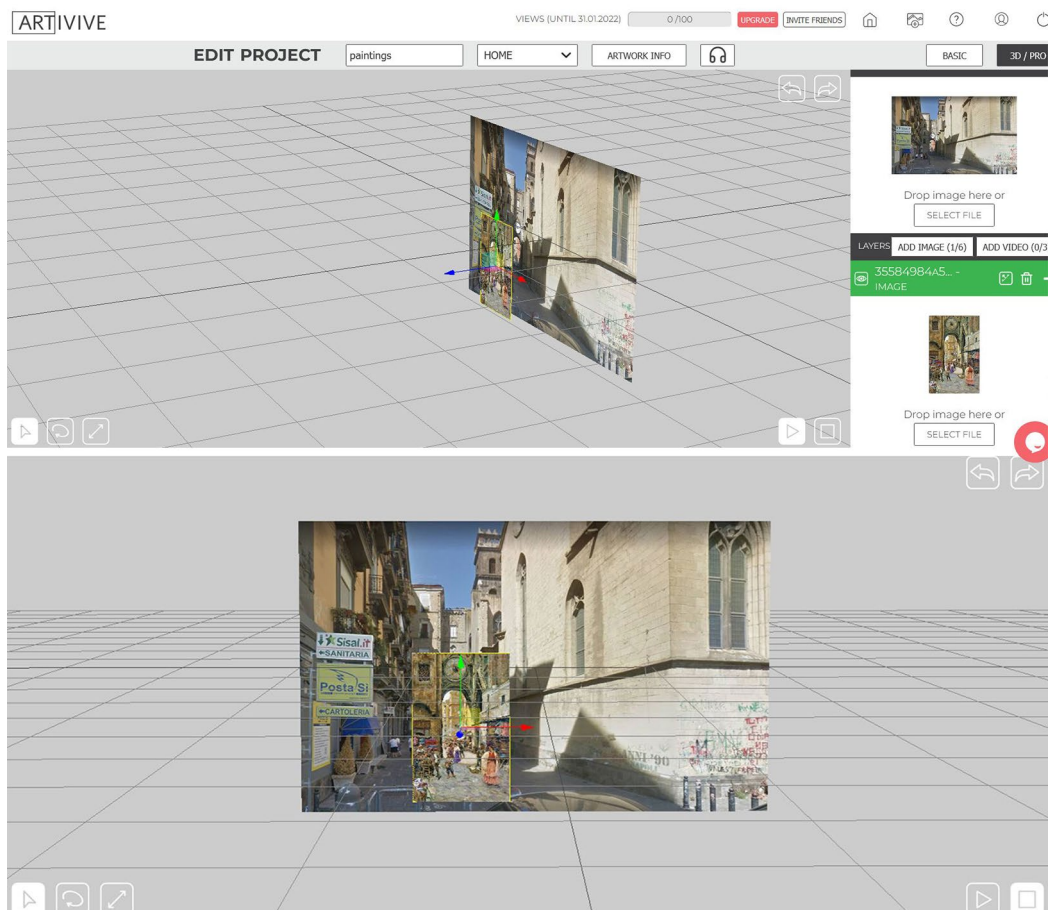

Fig. 6. Construction of augmented reality content by superimposing the point of view of the painter and that of the contemporary observer.

places showing the presence of an augmented reality content. The user, being close to one of them, would follow the instructions to download the Artive app. By framing the portion of the city with his smartphone, the latter would become the marker to be recognised. This would allow the painting to be superimposed on the urban reality and not on a digital image of it. Although this process is much more complex, because it would require

detailed studies and experiments on the factors for the recognition of the marker (light effects, presence of objects, movement of people, etc.), it would allow the creation of a real phygital experience, thus transforming the city into an open-air augmented museum. The experimentation carried out in Naples, however, shows how the conscious choice of technologies and their combination with scientific studies can contribute to increasing the knowledge of the city: the physical one, to which historical and artistic information is superimposed through augmented reality, as well as the represented one, whose point of view is provided in relation to the real space through the geocoded map.

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