

Virtual Museum Net

Pier Augusto Bertacchini¹, Eleonora Bilotta¹, Elvira Di Bianco¹,
Gianpiero Di Blasi¹, and Pietro Pantano²

- ¹ Department of Linguistics, University of Calabria, Ponte P. Bucci Cubo 17/b,
87036 Arcavacata di Rende, Italy
{pa.bertacchini, bilotta, e.dibianco, gdiblasi}@unical.it
<http://galileo.cincom.unical.it>
- ² Department of Mathematics, University of Calabria, Ponte P. Bucci Cubo 30/b,
87036 Arcavacata di Rende, Italy
piepa@unical.it
<http://galileo.cincom.unical.it>

Abstract. A project named "Virtual Museum Net of Magna Graecia" is presented, whose objective is to provide an unitary image of the archaeological heritage of Calabria (a Southern Italian region), through Computer Technology, Multimedia Designing and Virtual Reconstructions. The project aims to encourage the technological transfer of the most advanced researches in the exploitation and conservation sector of the Cultural Heritage. The "Virtual Museum Net of Magna Graecia" project is included in the context of Knowledge Media Design for Museums. This project links the museum scenery and multimedia, in order to use technology as system of representation.

1 Introduction

Cultural production and entertainment centres are among the major industrial resources of free time, catalysts of interest, multipliers of business, as well as instruments for the re-qualification of the archaeological and monumental patrimony.

The possibility to visit an archaeological landscape or site and at the same time to experience interactively its reconstruction makes the experience more engaging, culturally enriching and entertaining for visitors. In fact archaeological sites and ancient monuments are usually perceived by naive people as fragmented, partial, and difficult to interpret and comprehend, and out of the contemporary age context.

Visitors are in need of interactive and mobile tools [11] to access data about the cultural background of the site, artistic aspects, historical context and other valuable information that could enrich their experience. At the same time visitors of one archaeological site require to relate their visit to other culturally similar archaeological sites, to build a wide picture of cultural and stylistic interrelations between various sites.

Internet technology will be used for allowing remote access to contents by citizens and for linking archaeological sites too. In this way it will be possible to browse material about an archaeological site and other related sites.

In this vision the concept of museum changes and the museum modifies its status from centre of conservation of the organized and classified culture to centre of propulsion for the culture. The traditional places of the artistic fruition are reviewed in the direction of the technological one. The use of the new technologies in the archaeological and museum context allows to eliminate the existing space-temporal distance.

The concept of "museum network" has been defined in recent years. This term describes the museum as an open entity to the circulation, distribution, connection and creativity of several forms of knowledge, in which the social dimension of the fruition acquires a preponderant role [5, 6, 7, 9].

The cultural heritage represents also an important resource for all countries from the economic point of view, and it is a powerful tourist attraction. This is mainly true for a country like Italy that have a considerable part of the whole artistic world patrimony.

The South of Italy has an exclusive heritage of archaeological finds and historical materials which date back to the colonial expansionism period of the Ancient Greece in the Mediterranean area [8]. These artefacts are actually housed at the principal southern Italian museums such as the Museum of Reggio Calabria, Locri, Crotone, Sybaris, Metaponto, Taranto, Velia, Paestum and Naples or at the archaeological sites. Although most of these finds are not exhibited and accessible to visitors but stored in museum warehouses (sometimes without any cataloguing process), they constitute, from a cultural standpoint, a unitary set which, for logistic reasons, is no more than fragmentary.

The basic idea in realizing a project on the Calabrian Magna Graecia, is to collect all this material, organize it in a digital form and make it accessible via network to the national and international community. The Virtual Museum Net of Magna Graecia will put on-line information (images, movies, history of the main cities, and Museums) which will be accessible to specialists, researchers, students, and to a wide range of naive users. Providing this material aims not only to spread out information but also to build up educational-formative paths. The purpose of this system is to spread out the Magna Graecia history through the history of the cities and their related finds.

2 The Project

The Virtual Museum Net of Magna Graecia project was born to realize a virtual museum system that promotes, through the most recent and innovative technological solutions, an overview of the Calabrian archaeological patrimony.

The technologies of Information and Telecommunication used in such project will allow to give an unitary image of the Calabrian archaeological patrimony, avoiding the disorganized effect that until today has characterized the fruition of Calabrian Cultural Heritage.

The project has as secondary objective the organization of a net of museums and will constitute a net of complementarity through the universities, the schools, the museums and other organizations.

The project will encourage the technological transfer of the most advanced researches in the exploitation and conservation sector of the Cultural Heritage: 3D graphics, virtual reconstructions and virtual reality, videogames, semantic web, etc.

The system foresees the access and the visit to a remote site: the innovative quality that the Web Site will assure to the system identifies itself with the packages of virtual visit and with the three-dimensional reconstructions of various archaeological evidences [3]. The packages of virtual visit will be supported by Quick Time VR system, the user will be able to visit the environments of the museums and the archaeological sites with the impression to be immersed in the same ones. Such virtual visits will be provided with didactic-informative materials (texts, photo and video).

The Web Site will be an expandable tool, through the continuous insertion and updating of the data, to spread information in an innovative, exhaustive and coordinated way on the Calabrian archaeological patrimony of Magna Graecia. The virtual museum system will be founded on:

- a central pole, centre of the server where all geographic information, all documentation and the indexing of the information will be contained; the central pole will be a service centre for didactics, formation and technological transfer;
- more peripheral poles that will have the possibility to benefit in remote the system, to insert and/or to update the data contained in the system.

The net will allow the communication among the poles through news, e-mail, cooperative job, and so on.

The system will be articulated in five levels of access to the information that will correspond to as many reading keys of the territory (see Figure 1).

The first level contains the geographic information concerning eight Calabrian archaeological districts: the northern Tyrrhenian coast; the Sybaris area; the southern Tyrrhenian coast; the Gioia Tauro plain; Crotona; Squillace; the Locri area; Reggio Calabria.

The second level contains all documentation (texts, photos, videos, virtual visits, 3D reconstructions) about some archaeological sites and museums of Calabria: Amendolara; Cassano Jonio; Cosenza; Crotona; Locri; Palmi; Reggio Calabria; Scalea; Tiriolo; Vibo Valentia.

The third and the fourth level contain more information about the areas of study, the hinterlands and the specific centres.

The fifth level contains the documentation concerning the cultural districts, in order to increase the artisan and tourist resources in the territory: Laos/S.Maria del Cedro for archaeology and citrus cultivation; Sybaris for archaeology and oenology; Crotona for archaeology and gold manufacture; Roccelletta for archaeology and weaving; Vibo Valentia for archaeology and gastronomy; Rosarno for archaeology and olive cultivation; Locri for archaeology and ceramics.

An example of access to the information is brought in Figure 2: it starts from a geographical information of a museum to reach the map of the same and finally to the positioning of an archaeological find inside a determined showcase.



Fig. 1. An example of the available information about Calabrian towns

In Figure 3 we show an example of access to the information relative to an archaeological park.

3 Three-Dimensional Reconstructions and the Virtual Theatre

The virtual reconstruction of monuments and environments of particular importance overcomes the limits of textual or traditional graphical or audiovisual descriptions. These descriptions imply a mental effort of reconstruction on the user's part, without the sensation of 'being there' provided by the three-dimensional computer-generated imagery, that instead effects in a natural way human motor-perceptual apparatus.

Vision and perception are very important in archaeology, architecture and art history: inserting an item in its context is very important, for example, to verify the complete effect so as to validate an historical hypothesis. Proportions, equilibrium, spatial distribution can be valued by using the primary perceptual mechanisms on which they depend and for which they have been created.

Technologies as virtual reality can extend the ways of using the cultural patrimony both in real and remote context. In fact, even though the integration through Internet of the rich cultural and historic-artistic patrimony has created



Fig. 2. An example of access to the museum information

the basis for the creation of personalized visits, however the hyper-textual consultation can not enhance the correlation with the territory and results rather limitative when the type of patrimony in consideration is architectonic and archaeological. So there is the need to enjoy the cultural heritage in an contextualized way with the territory giving the possibility to combine together real routes with virtual ones.

The development activity of the project foresees some three-dimensional reconstructions of some monuments of Calabrian Magna Graecia (see Figure 4). In this activity we will try to exceed or, at least, to minimize differences in perception between the archaeological find and its reconstruction, through the use of virtual reality techniques in an immersive environment, making possible the superimposed and interchangeable view of the 3D model and the real object [14].



Fig. 3. An example of access to an archaeological park information

For the present, a theatre, a temple, a house, an agor have already been reconstructed.



Fig. 4. The ruins of a Greek theatre and a three-dimensional reconstruction

In this development activity of the project we present a system aimed at creating a Virtual Theatre for educational and museum applications. In particular, the design of this "artificial" environment allows spreading of new theatrical interactive modalities which lead the final user to interact with Greek and Roman matters in unconventional manner.

The main goal of this environment is the creation of 3D virtual masks able to reproduce particular behaviours for executing specific tasks [10]. Starting from

a canonical 3D face model and making use of collected information of typical Greek-Roman masks (i.e. Menandro’s masks) [2], a simplified 3D model has been generated (see Figure 5). We have implemented different facial expressions that reproduce mask’s personality associated with each character of a comedy. Partially inspired by Perlin’s puppet [12], we have developed a complete interactive environment where it is possible to manipulate the model to infer, for each mask, several custom facial expressions (fear, surprise, sadness, disgust, etc.). A noise perturbation of some face’s details has been added to emulate the corresponding unintentional micro-movements [13].

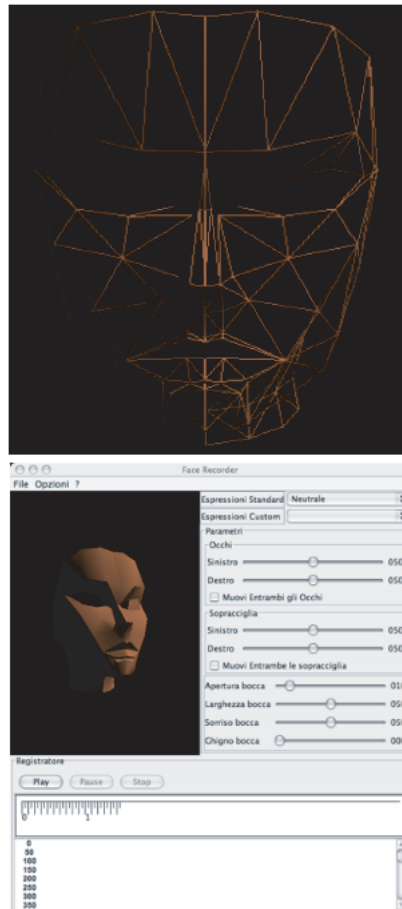


Fig. 5. An example of 3D virtual masks creation

By using an ad-hoc "3D-Recorder" it is possible to perform a sort of speech and/or facial synchronization with an audio file containing a real actor performance, specifying all relative parameters (i.e. start/end point of speech and/or corresponding facial expression, relative frequency, etc.). A suitable "3D-player" reproduces the above collected info reconstructing by simple interpolation some missing temporal data; typical scenes containing also the reciprocal interaction between two or more virtual actors can be easily assembled and distributed (see Figure 6).

The Java framework allows to obtain a cross-platform product without particular constraints due to the local operating system. The scalability with respect to the computational power and available resources is demanded to the JVM (Java Virtual Machine) without requiring manual "tuning" of the source code [1].



Fig. 6. An example of the Virtual Theatre system

4 Further Developments

The Virtual Museum Net of Magna Graecia project offers highly innovative solutions and products for the documentation, research, promotion and cultural heritage of the Mediterranean.

All materials presented in the Web Site will be indexed and accessible for didactic purpose. Didactic packages based on advanced researches and innovative technologies will be predisposed.

The Virtual Museum Net can be organized like a laboratory in which learning and above all handling activity, closely linked to intellectual planning, are automatically fed, not only with written or audio transmitted explanations, but especially with a complex equipment of multimedia tools which allow to handle, visualize, transform informative contents exploring multi-sensorial systems or communication ways including all human senses.

Educational methodologies, to be used in such environments, so different from those in which the learning process is conveyed according to traditional ways, have to utilize actual technologies and, above all, they have to allow users to put their hands on the objects and concepts which the same objects imply [4].

The concept of museum as educational laboratory in which user are able to play and handle objects and contents in hypermedia way, is certainly a fundamental structures for organizing an augmentation system of the human knowledge capabilities and for creating environments (adaptable to any training, entertaining, and educational context) where elements which facilitate the conceptualization and learning are considered.

Further developments of the system foresee a particular attention to the synergies between the cultural patrimony, the environmental resources and the tourism through the use of innovative technologies [11].

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