

E-Ecology: A Virtual Lab for Natural Protection

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Abstract: - The ICT and the Internet in particular, have invaded the personal and public activities of a vast number of domains nowadays, constituting them very powerful tools. Such activities include among others learning, culture, government and even ecology. This development has created the term e-services which are slowly but steadily becoming a global reality and part of our daily life. This paper presents in detail the structure of a model and innovative multimedia e-ecology virtual lab. This e-ecology environment enables the user-visitor to be introduced and discover various ecological themes and items like islands environments, mountains ecological systems and about flora and fauna (e.g. birds), through a virtual library environment. Moreover, the user is introduced to the various societies that are occupied with the preservation and protection of nature by navigating through an easily navigable environment and the multimedia content that is offered. Due to this multimedia content, the need to find ways to handle it was brought up and was taken into elaborate consideration. Finally, it was essential to bear in mind the "Design for All" approach to make this e-ecology virtual lab accessible and navigable for the disabled individuals as well and hence, the appropriate tools were incorporated into the system to make this feasible.

Key-Words: - E-services, ICT, Multimedia Data Management, Virtual Lab, Virtual Library.

1 Introduction

Nowadays, the technological advances of various ICT services give network engineers the ability to construct informative and educational environments for every subject of human experience, even for ecology. These structures and developments can reach levels of elaboration in which virtual library learning environments, virtual navigation systems and multimedia content handling systems can be realized for every object of knowledge.

This development combined with the vast number of nature lovers has brought up the need to develop an electronic environment in order to deliver and provide better and more interesting information about Hellenic nature and means to protect it. The latter is basically the main aim of e-ecology. That is to inform and educate the user-visitor as to the dangers that are threatening the Hellenic nature as well as how to communicate with nature protection societies and organizations [14]. Apart from this major role of e-ecology there is also the need to bring the citizens closer to nature through a user-friendly environment and to make them more sensitive and respectful towards nature.

The multimedia information within this e-ecology educational system is presented in such a way so that the users-visitors can feel as though they are in a virtual lab. The usage of such a vast amount of multimedia information required special techniques to manipulate and manage this data.

The efficient management and handling of multimedia data within a database has many significant benefits [6,7]. For a start, data managed in a database and its associated relational data are kept synchronized, secure and are managed together. In addition, by analyzing the metadata embedded in the multimedia data and using it for indexes, it is far easier to find the media being searched for. Finally, database management of media also results in application deployment and system operational savings [9,10,11].

The aforementioned context constitutes a basic body of knowledge for the design and development of e-ecology applications, in general. Bearing this context in mind an e-ecology virtual lab was designed and developed aiming at constituting a user friendly environment for the user by providing all the substantial information and services.

2 Abstract Level Description

The e-ecology system consists of four different aspects that had to be taken into consideration, before the development and design of the system. For a start, there was the issue of the structure content of the virtual lab. Moreover, the issues surrounding a virtual lab and a virtual library had to be addressed before moving on to the multimedia data management techniques that were required to handle the mass of multimedia data. Finally, the technologies that would be used were considered.

2.1 Structure Content

Initially, there was the task of accumulating all the required information regarding the scope of the e-ecology educational system (virtual lab). In other words, information regarding natural protection societies and organizations, information about the flora and fauna of Greece as well as information about the islands of Greece was accumulated and assessed. Following this, the material was sorted and categorized in order to be able to assess the best way to feed the information to the user and make it easily navigable.

The presentation of the information within a virtual lab is materialized bearing always in mind the needs of the user-visitor. The main aim is to render the virtual lab accessible and user friendly to the user-visitor, who will be able to navigate easily and quickly without having to spend time unnecessarily on redundant information. With this context in mind, the virtual lab was divided into four main categories, namely, nature, mountains, islands and birds. Finally, the e-content was embedded into the system.

2.2 Virtual Lab/Library

The idea of a Virtual lab was introduced to enhance the provided services and render the environment more appealing for the user-visitor. A typical virtual laboratory tool usually proposes a simulation allowing distance interaction with the laboratory instruments [1,2]. It aims to make available to the user-visitors an extensive database of valuable information. It replaces physical machines with virtual machines on one host server and eliminates the limitation that users have to complete security exercises on the local operating system [3,4].

Virtual Libraries are directories with resources that administrators have organized in a logical way. They are often referred to as annotated directories as well. It is helpful to think of these specialized

directories as being similar to libraries, because people who are committed to finding the very best resources on the Internet have carefully selected and maintained the resources in a virtual library [5].

2.3 Multimedia Data Management

Multimedia information includes web content such as video, audio and images all of which contain a large amount of embedded information. This complex information is omnipresent on the Internet and hence available to the millions of users. Due to this increase of quality as well as quantity of data, it has become essential to use a digital multimedia content management system that facilitates easy, simple and quick access, browsing, manipulation and secure access of multimedia content through the Internet.

To achieve easy access to the aforementioned embedded information certain tools have been developed to extract the hidden information within the multimedia data, in order for the user to be able to search, access and manipulate it.

In this e-ecology virtual lab a flexible multimedia manipulation technique was used, which treats the embedded semantic information contained in a multimedia document as a first class unit that can be identified and searched for like conventional data. The system allows users to extract automatically and manually the desired information from an image and assign new information to an image [13]. The extracted and assigned information is then entered back into a database which allows other users to efficiently search and query the multimedia information.

Entering the derived or generated data into the database and associating it with the original information gives other users automatic access to the conclusions, thoughts, and annotations of previous users of the information. This ability to add, modify, adjust, enhance information and then share that information with others is a very powerful service. This type of service requires cooperation between the multimedia data handling tools and the information repositories scattered across the network. Generated or extracted information must be deposited and linked with existing information so that future users will not only benefit from the original information but also from the careful analysis and insight of previous users [8,12].

2.4 Technologies

The final task had to do with the in depth study of the standards and technologies used for the creation of this virtual lab. Such technologies include HTML for the design of the web pages and the FLASH technology, which was used in order to provide zoom in and zoom out services to individuals with visual impairments [15]. The “design for all” approach was adopted constituting the web environment user friendly equally to disabled individuals as it is for normal citizens.

3 System Analysis

The virtual lab's Main page namely, "E-ecology Services", contains four links, regarding information about nature and ecology, as it can be seen in the following Fig. 1.



Fig. 1: E-ecology Main Menu

All four of these links, will be analyzed in detail, namely, “Nature”, “Gr Mountains”, “Gr Islands” and finally “Gr Birds”.

3.1 The Nature Subsystem

This subsystem presents to the user-visitor well known societies and organisations in Greece whose main target is none other than the protection of the natural environment and the wild life. The aim of this subsystem is to make these societies known on the one hand and on the other to awake the public consciousness and render it more sensitive towards matters of nature.

The provided links contain a great deal of information regarding the work of these societies through extensive articles and photographs as well as information regarding how to become a member. Such societies include the Eco-culture, the Hellenic animal Welfare society, the Greek Bird society, Mountain Wilderness and others.

Apart from the societies, there is another final section regarding a magazine called “Nature and Ecology”, where the user-visitor may read selected articles.

3.2 The GR Mountains Subsystem

The GR Mountains subsystem includes photographs of Greek mountains, lakes, rivers national parks forests, life in Greece and flora and fauna in Greece, which are organized in their respective categories.

The subsystem uses the Flash 5.0 technology, easing this way the navigation of the user-visitor. At the top of the page there is a navigation bar indicating the aforementioned categories, where a drop menu appears whenever the user scrolls the mouse on a certain link. This menu indicates the photographs that are presented for the specific category. This constitutes a very convenient and user-friendly navigation approach, as it can be seen in the following figure 2, where the cursor is on the link “Mountains” and a list of all the mountain photographs appears.



Fig. 2: The Gr Mountains Menu

When clicking on one of the links the corresponding mountain photograph appears, as it can be seen in the following figure 3:



Fig 3: The Olympus Mountain

3.3 The GR Islands Subsystem

In this Gr Islands subsystem the user-visitor can be introduced and discover the environment of the Greek Islands through an extensive amount of photographs, which depict the natural beauties of the islands as well as the architectural excellence of these islands (doors, chairs, little churches, colors, stairs). In addition there are links that navigate the user-visitor to interesting textual information

regarding the Greek islands. More specifically the choices can be seen in the following figure 4:



Fig. 4” The Gr Islands Menu

This subsystem uses the Flash 5.0 technology also and this can be seen in the most interesting part of this subsystem, which is the “Photo journey of islands’. Upon clicking on the link, a new list appears gradually with different islands. Each one of them has a list of photos. By clicking on the name of photo, a new window opens as in the following figure 5.



Figure 5: A Greek Island

As it was mentioned before, the FLASH technology was used in order to provide zoom in and zoom out services to individuals with visual impairments. By right clicking the mouse and selecting the “zoom in” function, the user views a larger version of the web page, which is depicted in the following Fig.6.

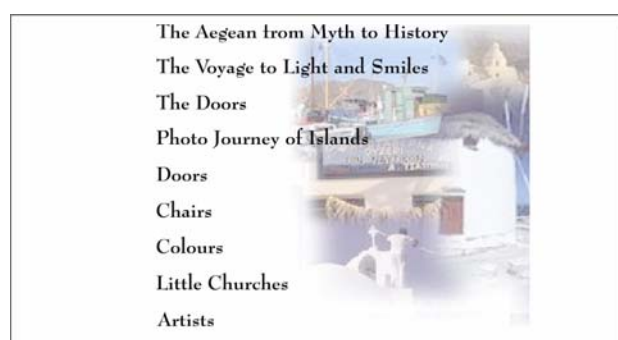


Fig.6: The Zoom-In Service

Reversely, by choosing the zoom out function, the user can view the original version of the web page. The same service applies for all the aforementioned subsystems as well as for the one that follows.

3.4 GR Birds Subsystem

The GR Birds subsystem presents the birds that live in Greece. In the Main page, the user-visitor finds two links namely, “General Information” and “Birds’. The former, enables the user to access textual and image information regarding wildlife sanctuary, immigration, birds threats or how to study the birds as well as others. With the latter, an alphabetic list appears at the top of the page, whereby by clicking on a certain letter or group of letters, a list of birds whose name begins with those letters appears. This list indicates the links to the bird’s corresponding photographs as it can be seen in the following fig. 7.

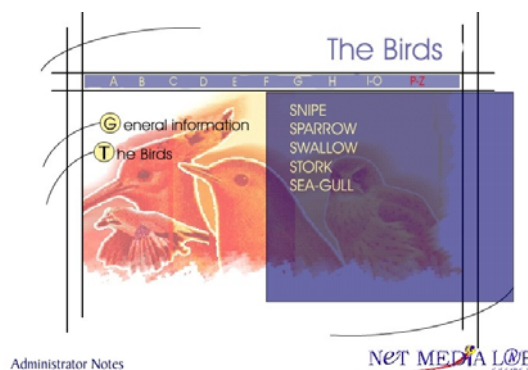


Fig.7: The Gr Birds Menu

Hence, the visitor has the possibility to see pictures of a bird as well as a small text with information such as its size, where it lives and what it is eating.

4 Conclusion

Upon the completion of the analysis of this model e-ecology virtual lab, it becomes apparent that the advantages and benefits of such a task are indeed very attractive.

The transition from traditional ecology to e-ecology gives various societies and organizations that engage in nature protection tasks, the opportunity to disseminate their role and work to a much larger target group and simultaneously adapt to a completely new environment. The communication between these organizations and the common citizens as well as the distribution of the ecological information is strengthened, affecting the sensitivity and activity of more people in ecological matters.

ICTs have the potential to create appealing, user-friendly and easily navigable informative and educational environments when used intelligently. The user-visitor acquires information regarding a vast area of human activity such as ecology and the various important matters concerning it easily, quickly and effectively, fulfilling hence, the main aim of e-ecology.

The process of creating such an environment involved the issues of multimedia data management and virtual labs and libraries, which are both challenging and demanding. Since the virtual lab is packed with multimedia data, it was absolutely necessary to manage it using an appropriate technique. On the other hand, virtual labs provide the unique experience of creativity making simultaneously the process of navigation more interesting. Taking the above context into account the e-ecology system (virtual lab) slowly but steadily became a reality for both common citizens and disabled individuals rendering the equal access to information and knowledge for all a new reality.

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