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A Systems Approach to Designing a Graphical Interface in eHealth

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Abstract

The aim of the study is to understand ehealth technology and its applications. Doc24 is a pilot study web application where the user can retrieve the information about the disease based on the symptoms. Doc24, uses the Common Gateway Interface (CGI) as the interface, with basic Cascading Style Sheets/ Hyper Text Markup Language (CSS/HTML) for its design. It is a primary study in the medical e-consulting field, where the user can retrieve general information regarding the disease in accordance to the symptoms provided, as well as further access to literature and other types of information. It uses MySQL as the database to store hospital related information which is unique to this application. The user can obtain the information regarding a particular disease based on the symptoms chosen. The availability of hospital related information helps the user to find the hospitals and clinics closest to the user.

Keywords: eHealth, GUI, CGI, CSS.

Introduction

The use of internet as a source of health information is not a new concept and is a major advancing field where every individual tries to get oneself educated on the medical conditions, so that they can play an important role in the decision making process. There are numerous factors associated with the user which influence him or her in using the internet for extracting health information and also as to how the information affects their decisions [1]. A study led to the creation of a hypothesis pertaining to two groups of users and found that in one category, the users who do not have access to the internet, have a greater interest in using the online health information compared to those who did have access to the internet. This, the researchers feel may be due to the fact that the information provided may not be adequate or the quality cannot be trusted [2]. It has also been found for a fact that majority of the experimented users did not share their online findings with their health care providers [3], [4], [5]. Though the number of websites based on health may be on a rise, yet there are certain websites that maintain their quality of sources and practical diagnosis [6], [7], [8] and thus remain so far the most commonly visited health websites. Though these sites help the user to comprehend the correct knowledge, this condition is not always satisfied [9]. The impact that the websites create on the patient physician relation is significant. It not only helps them relate with their physicians better but also helps them gain encouragement from their online support groups [10]. Doc24 is such a website that tries to enhance the patient physician relationship.

Background

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Design Criteria

The medical information is abundant in the worldwide web and it is generally tough for the user to find, who may have a time constraint and may require going through many security checks in order to access the information. The main aim of Doc24 is to provide the disease related information in a concise and clear manner where the layman can have a better understanding. Though there are a few and growing websites with the similar goal, Doc24 also has tried to provide hospital related information as well as genetic information for the diseases searched upon.

The disease information, which have been referenced from acknowledged medical sites such as National Institute of Health, WebMD, National Center for Biotechnology Information, has mainly been presented as i) introduction ii) symptoms iii) causes iv) treatment and preventive measures.

To understand the basic working methodology of Doc24 we use the example of the eye.

- The user on selecting the symptoms option from the introductory page would be guided to the symptoms page which includes an interactive image of the human body.

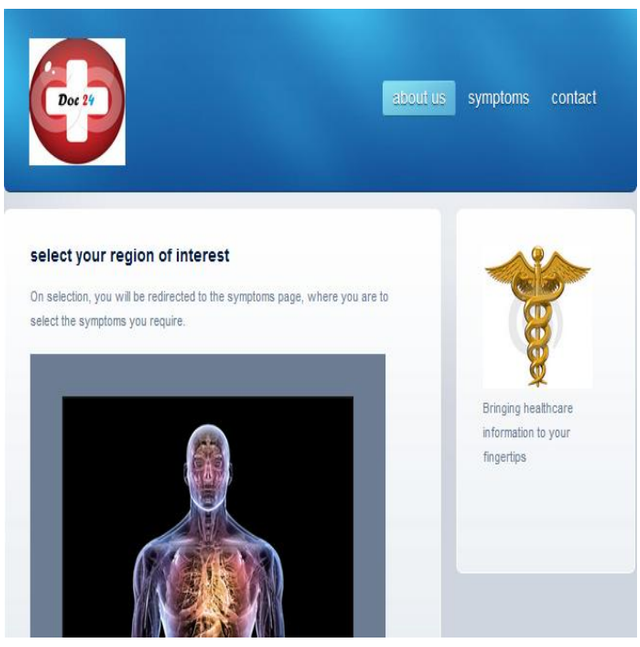

Fig.1. Selection of the Region of Interest

- Based on the example here, the user on selecting the eye region, which gets highlighted once the mouse is hovered on the region, is guided to the symptoms page for the eye.

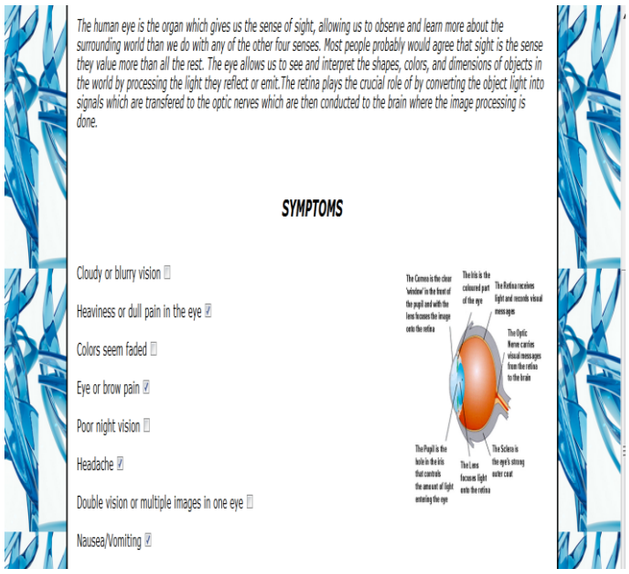

Fig. 2. Eye Region Symptoms Page

- The user now selects the symptoms most appropriate to him; say options a, b, c. On submitting the query the user is guided to the results page.

- A matching process is done with the options to give two sets of results. First, the highly matched disease and second, the probable ones. This is currently done by CGI PERL programming. This can however be improved by using the MySQL database for more efficient querying.

- The results page also displays a link to hospital related information, where the user selects the region of the human body in which he is interested; along with any state in India he is interested. The MySQL queries the result with that of the database and gives the available list.

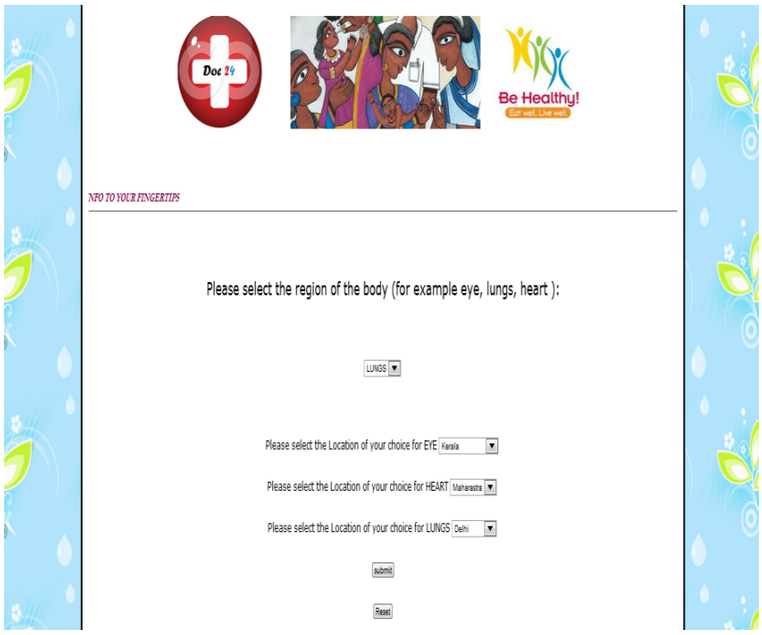

Fig. 3: Hospital Information

Website Design

In case of seeking medical information online, it is always true that the human mind tries to search for the assumed diseases based on the symptoms, as this is easier for us to relate to. The website Doc24 is proposed to be an eHealth tool, which brings the user closer to the health care information without having to depend on the doctor for the most basic information for a particular disease. The program involves, first the selection of the region of the human body which the user is interested in and secondly an interactive tool where the user enters the required details through an HTML page and chooses the symptoms, for which the program provides the required information on basis of the chosen symptoms and the region of the body.

The user on selecting the appropriate symptoms will be redirected to the results page where he also can choose the option, where the user can view a list of hospitals pertaining to a particular region of the body. The program is coded using CGI interface with PERL and HTML/CSS to enhance the design of the website. Along with a literature section for the better understanding of the disease for more research oriented users, for each of the disease, a separate gallery for the images has been provided.

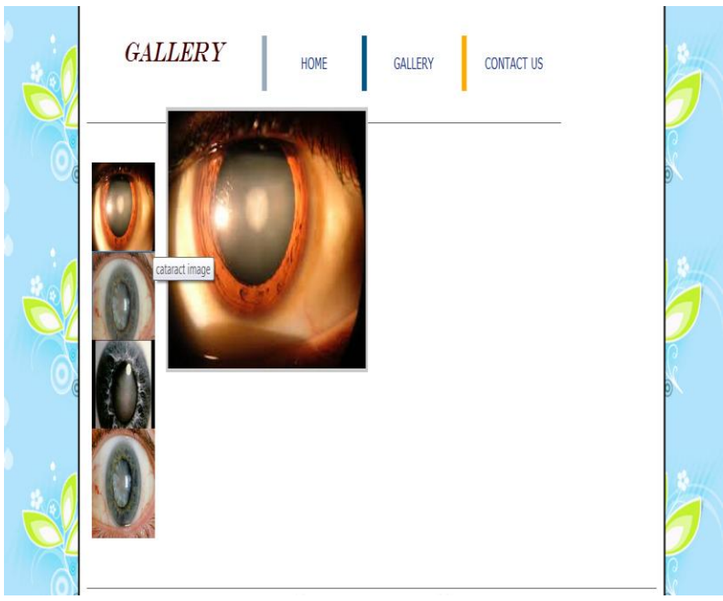

Fig. 4: Gallery for the particular disease (Eye)

Database Design

MySQL, which is an efficient and portable database, is used for the storage of hospital related information. Initially, it was thought, to index the web pages also, but it was understood that the information would already be present in the webpage itself, so no retrieving of any particular information was required. There can always be changes made to the initial design hence other related data can be added in the future. The user queries the region of interest to retrieve the hospital information from the database. A proposal for including a sign up page is thought of, and if applicable, a table for storing each of the user's username and password will be done, so that whenever the user enters the username and password the pattern recognition coding will allow the user to enter another section of the website.

Results

Doc24 starts with the user choosing the region of interest and then is guided to the symptoms page, where the users based on the symptoms provided, can select and query the keywords for the results. The disease page shows a list of associated diseases that match the symptoms based on the information collected from authenticated sources and also the information regarding the hospitals, which can be accessed by the user based on the selection of any state of interest for India. Any particular disease page would have images and genetic information on the particular disease. A link for access to literature is also provided for each disease. A basic login is programmed where the user can register and enter a forum page.

Discussion

Technology is advancing and so are healthcare and its vast amount of information. Access to this information has become crucial for both the patient and the physician. Doc24 is a symptom based website, where users based on their symptoms retrieve the relevant information. Since this being a pivotal study, many features can be added to the website, such as every user viewing the information in their own language.

Compared to the other commercial medical websites Doc24 is purely a symptom based prediction web application that can be enhanced further to be involved with computational biological data that can be used by doctors for a better understanding of the diseases by learning their molecular mechanisms. It can also be used in tertiary hospitals, such that every patient need not wait for long hours in the waiting room. A registration option can be provided in the webpage where the user along with his personal details and symptoms can register himself with the physician, thus allowing the hospital to concentrate on emergency medical conditions.

Later the physician can give appropriate appointment timings and can contact the user by email or phone. The option of viewing the hospital location based on the body region can narrow down the search for a specialist hospital. However superior the technology may reach, it is always essential that the physician's diagnosis should always be taken as the final say. No website or program can ever or should ever replace that. Improvements on existing technologies and forming innovative ideas can surely lead to the development of a well-connected worldwide health care system where each patient regardless of his background can experience quality healthcare.

Conclusion

In today's age of widespread internet usage that allows the user to be informed of the most recent advancements in any field, it also finds its growing use in the field of healthcare. The internet plays a very important role in mediating the process between the user and his or her access to the healthcare information. Physicians can now stay connected to their patients and vice versa without the need for frequent visits to the health care centers to know their patients wellbeing. Doc24 uses a graphical user interface (GUI) environment that helps the user to understand about a specific disease. It also provides a vast collection of information from different sources in a comprehensive manner.

Acknowledgements

The authors would like to convey their sincere gratitude to VIT University for giving an opportunity to step into the field of health informatics and would take this opportunity to notify that this is a university level project that has not yet been uploaded to any domain for a commercial purpose. It was developed to study how to create an e-consulting web page for a better understanding of the ehealth domain. Since Doc24 is a pilot study built for research purposes, only a few diseases and hospital related information has been used. With growing technology, this project can be improved using high speed querying techniques and enhanced graphical user interface.

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