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# OPTIMIZED SEARCH TECHNIQUES FOR ONLINE RENEWABLE ENERGY EDUCATION USING THE WORLD WIDE WEB

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**Abstract**— A discussion on the types of world wide web (WWW) sites used for energy education seems to go deeper depending on the global warming and environmental pollution problems. This paper aims to guide the readers on finding the types of such WWW sites which are the most suitable for both teachers and students and also serves to everybody under the life long learning aims. The visitors of the WWW energy sites will get the chance of seeking information about renewable energy types, energy conservation, alternative energy generation systems, energy efficiency, global warming and environmental pollution related to energy. Although optimized search techniques for online renewable energy education using WWW is the objective of the study, the search techniques can also be used for any subject.

## 1. INTRODUCTION

Air pollution is rapidly increasing in Cyprus due to high rate of increase in electric energy consumption and private transportation. The use of renewable energy will help reducing fossil fuel burning and thus pollution. An effective way to achieve this goal is to educate people to use more renewable energy, save energy and etc. The computer illiteracy in Cyprus is high, so everybody can be encouraged to visit the WWW energy sites in order to become aware of the pollution problems from burning fossil fuels for power generation and also they can have some economical benefits if they obtain relevant information.

Cyprus is an island with almost clean environment and suitable for some renewable energy applications such as wind, solar and biomass. In order to keep the environment clean and reduce pollution from power generation the people must be educated. Everybody wants to live in a clean environment. The clean

environment reality of Cyprus can be used for touristical purposes in order to attract more tourist. The people living in Cyprus must be energy educated in order to protect their health and nature. The energy and the related topics should be integrated in curriculums of public schools, especially in primary and secondary schools. The education of renewable energy and environmental aspects can be via the internet (WWW). This is an interesting method in teaching subjects and help students to learn information illiteracy, and the teachers get the benefit of using and teaching via WWW. One of the drawbacks is the numerous outcomes from the search engines. The students and teachers are facing to many results from search engines while surfing on the internet, and unaware of the reliability of the information obtained from the sites they are searching for.

The WWW is a powerful tool for educating people. The 24/7 (24 hours/7 days) based working principle of a help desk will serve for the visitors and answer the questions online and assist them in the teaching and learning process. The WWW that serves for this purpose must be reliable, more useful and user friendly than the others. Easy and direct subject search is attractive for the students and also aid the teachers to guide their students. Also it is more beneficial to outside visitors.

The aim of this study is to present an optimized search technique using the WWW for online energy education and other education areas.



## 2. SUGGESTED SEARCH PROCESS

The chart below shows the different components of the search process and their relationships. Each decision block (question mark box) makes a fork in the path, and each action (plus mark) box is a new step in the process. As an example let us apply the process of; 'cell efficiency' that is going to be searched, so the question at the first step is 'Yes'. Now, look for specific details on 'cell efficiency' about renewable energy and so a list of keywords should be written. After producing a list of phrases, these words are entered into a few selected search engines. As you see the results of your searches, add new terms to your list.

A search with just the word 'cell' might produce a list of thousands of pages ( 1 190 000 000 pages in Google) [7]. Boolean logic and Phrase searching can be started for searching once the list of keywords such as; 'solar', 'photovoltaic', 'electricity' are created.

## 3. USE OF WEB IN EDUCATION

The internet is a promising technology in all levels of education. The web is a resource for students, teachers and other visitors. There is no uniformity and standard in the development of a www site and the materials used in environmental pollution and/or renewable energy resources. A teacher or a student may obtain many results due to their search in the web, which may not be reliable and may have a lot of differences and not subject to any standard or correction. While searching, infinite number of search pathways may be followed. This is a boring and discouraging process because there is no guarantee that all of the results are going to be suitable. For example, while searching information, one may end up a few hundred sites in which only a few of them may contain the required information, and further search may result in many sites which contain link pages.

Another important factor is that these searches may or may not be suitable in classroom use. Searching such a large number of sites, several hours may be spent without locating materials which may be suitable. The time consuming nature and unreliable search results may discourage students and visitors, and also this condition does not help in developing new, easy and attractive methods in renewable energy education and use of new technologies.

## 4. TECNOLOGICAL AND METHODOICAL DEVELOPMENT IN WEB APPLICATIONS FOR EFFECTIVE ON-LINE RENEWABLE ENERGY EDUCATION

In order to define an optimized web, an explanation of how search engines work should be made. For more detailed and technical information about current methods used by search engines like Google, keyword searching, refining the search, relevancy ranking and meta tags algorithms have to be discussed first [2].

Automated software programs known as spiders or bots are used in surveying the web and built the databases. These programs retrieve the documents from the web. Data from each web page are added to search engine indexes.

When a query is entered at a search engine, the query is checked against the search engine's index of all the web pages it has analyzed. The best urls are then returned to the searcher in order with the best results at the top.

### 4.1 Searching With Keywords

This is the most common form of text search on the Web. Most search engines do their text query and retrieval using keywords.

A keyword is simply a word on a webpage. However, if the word has nothing to do with the subject of this webpage (i.e., how search engines work), it is not a very useful keyword. Useful keywords and key phrases would actually tell a user something about the subject.

If the searcher does not specify the significance of keywords for her document (i.e., this is possible by using meta tags), it's up to the search engine to determine them.

Essentially, this means that search engines pull out and index words that appear to be significant. Since engines are software programs, they work according to rules established by their programmers for what words are usually important in a broad range of documents. Words that are mentioned towards the beginning of a document are given more weight by most search engines. Some search engines index every word on every page. Others index only part of the document.[2] Full-text indexing systems generally pick up every word in the text, some of the search engines discriminate upper case from lower case; others store all words without reference to capitalization [2].



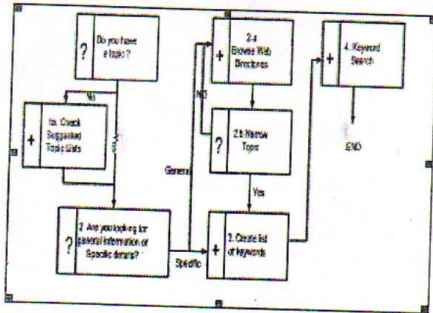


fig 1. Suggested search process [2]

### 1 Keyword Searching problems

Keyword searching has several difficulties such as: file searching, distinguishing between words that are spelled the same way, but mean something different (e.g., hard cider, a hard stone, a hard exam, and the hard drive of your computer) [2]. Some search engines also have trouble with so-called stemming -- i.e., if you enter the word "big", should they return a hit on the word "bigger?" What about singular and plural words? What about verb tenses that differ from the word you entered only an "s," or an "ed"?" [2]

Search engines also cannot return hits on keywords that mean the same, but are not actually entered in the query.

### Defining the type of search

Two types of searches are "basic" and "refined" or "advanced."

A keyword is entered without sifting, in a basic search. This does not mean simple but depending on the engine, "basic" searches can be quite complex [2].

In advanced search refining options, more than one word can be searched or more weight may be given to search terms than the other. Search can also be made within a certain proximity to other search terms.

In many search engines Boolean operators are used to be used to refine the search. These are AND, NOT, and the so-called proximal locators, NEAR

FOLLOWED BY AND means all the terms must appear in the documents, e.g., "Photon" AND "Voltaic". NEAR means at least one of the terms must appear in the documents, e.g., photovoltaic, efficiency OR photon. NOT means at least one of the terms must not appear in the documents. NEAR means the terms entered should appear within a certain number of words of each other.

FOLLOWED BY means one term must directly follow the other. ADJ, for adjacent, serves the same function. A search engine that will allow you to search on phrases uses, essentially, the same method (i.e., determining adjacency of keywords). [2]

Phrases: The ability to query on phrases is very important in a search engine. This speeds up the search process. It usually requires enclosure of the phrase in quotation marks, i.e., "space the final frontier."

Capitalization: To search for proper names of people, companies or products. Unfortunately, many words in English are used both as proper and common nouns--Bill, bill, Gates, gates, Oracle, oracle, Lotus, lotus, Digital, digital--the list is endless. [2]

### 4.3 Frequency of Keyword in Searching

Most of the search engines list the hits according to their decision of how close the result matches the query. This is because search engine technology has not yet reached the point where humans and computers understand each other well enough to communicate clearly [2].

Frequency of the keywords is used by most of the search engines as a primary way. Therefore, a term that you are searching appears multiple times at the top of the list.

Positioning with frequency of the keywords used by some search engines to determine the relevancy. For example, one method is to rank hits according to how many times your keywords appear and in which fields they appear.

The frequency of the linking of a document to other documents on the web is another method.

### 4.4 Meta tags

Some search engines are now indexing Web documents by the meta tags in the documents' HTML (at the beginning of the document in the so-called "head" tag). What this means is that the Web page author can have some influence over which keywords are used to index the document, and even in the description of the document that appears when it comes up as a search engine hit [2]. This is obviously very important if you are trying to draw people to your website based on how your site ranks in search engines hit lists. There is no perfect way to ensure that a site will receive a high ranking. Even if a site gets great ranking, there's no assurance that it will keep it for long. For example, at one period a page from the "Spider's Apprentice" was the number-one-ranked result on Altavista for the phrase "how search engines work." A few months later, however, it had dropped lower in the listings [2].



There is a lot of conflicting information out there on meta-tagging. Someone may get confused because, different search engines look at meta tags in different ways. Some rely heavily on meta tags, others don't use them at all. The general opinion seems to be that meta tags are less useful than they were a few years ago, largely because of the high rate of spamdexing (i.e., web authors using false and misleading keywords in the meta tags)[2].

It is also worth to note that Google, currently the most popular search engine, does not index the keyword metatags. Someone should be aware of this is while trying to optimize the webpages for the Google engine. It seems to be generally agreed that the "title" and the "description" meta tags are important to write moreeffectively, since several major search engines use them in their indices. Using relevant keywords in a title, and varying titles on the different pages make up a website to be a target of many keywords as possible.

As for the "description" meta tag, some search engines will use it as their short summary of your url, so make sure your description is one that will entice surfers to your site.

The "description" meta tag is generally held to be the most valuable, and the most likely to be indexed, so special attention should be paid to this one.

In the keyword tag, listing a few synonyms for keywords, or foreign translations of keywords in order to anticipate traffic from foreign users. It is also required the keywords should refer to, or are directly related to the subject or material on the page.

The "keyword" meta tag has been abused by some webmasters. For example, a recent ploy has been to put such words "sex" or "mp3" into keyword meta tags, in hopes of luring searchers to one's website by using popular keywords[2].

The search engines are aware of such deceptive tactics, and have devised various methods to circumvent them. Using keywords that are appropriate to the subject considered, and making sure that they appear in the top paragraphs of actual text on your webpage helps to avoid entering to the unwanted sites.

Many search engine algorithms score the words that appear towards the top of a document more highly than the words that appear towards the bottom. Words that appear in HTML header tags (H1, H2, H3, etc) are also given more weight by some search engines.

While preparing a web page it is worth to remember that all the major search engines have slightly different policies. In designing a website and meta-tagging documents, it is very useful to check out what the major search engines say in their help files about how they use meta-taggs.

## 5. DISCUSSION AND CONCLUSION

It is necessary to be aware of energy use and the problems related to it. People should be educated. The effective way to educate is via internet. In order to increase the teaching effectiveness some methods has to be used. The basics of how web pages were prepared are discussed. We believe that one way to guide the internet users especially students in energy education is to provide the suitable links to them via public offices such as the web page of the Ministry of Education. Web pages prepared for energy education by the engineers at the Universities in Cyprus will provide reliable information and educate students, teachers and other visitors who are interested in energy. Finally, information obtained from the the web sites of government bodies such as Energy Outlook-USA or Energy Outlook-EU are generally more reliable compared to commercial web sites.

We also do believe that educating the teachers, students and other visitors how they will reach the necessary information and providing them some links that are reliable is a proper way to begin.

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# SOFTWARE DEVELOPMENT TOOLS IN COMPUTER VISION: AN EXPERIMENTAL OVERVIEW TO OPENCV

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**Abstract**—Nowadays, so many software development tools for computer vision and image processing applications, which are commercial or non-commercial, are available. Some of them are developed as Open Source. OpenCV means Intel Open Source Computer Vision Library which is a collection of C functions and a few C++ classes that implement some popular image processing and computer vision algorithms. In this paper, we present some development tools and describe our experience with OpenCV oriented to researchers and developers in computer vision. We overviewed the OpenCV library, its limits when used by researchers, and how we adapted it for researching purposes by producing a set of appropriate tutorials.

One of the aims of this study is also that adaptation duration of researchers who intend to study on computer vision and image processing is to decrease minimum using OpenCV.

## 1. INTRODUCTION

The rapid expansion of computer processing power combined with the rapid development of digital camera capability has resulted in equally rapid advances in computer vision capability and use. Intel has long been at forefront of enabling this advance on the computer hardware and software side. Computer vision software is supported by the free Open Source Computer Vision Library (OpenCV) that optionally may be highly optimized by loading the commercial Intel Integrated Performance Primitives (IPP). IPP now automatically supports OpenCV with no need to change or even recompile the user's source code. This functionality enables development groups to deploy vision and provides basic infrastructure to experts in vision.

The Open Source Computer Vision Library (OpenCV) is a free, open source collection of computer vision routines geared mainly towards human-computer interaction, robotics, security, and other vision applications where the lighting and context of use cannot be controlled.

The Open Source Computer Vision Library (OpenCV) is an open source, free for research and commercial use, computer vision library started by Intel, now an open community effort with Intel contractors responsible for code, documentation and bug fix integration as well as official builds. OpenCV is written in C/C++ but will automatically load optimized assembly language dynamic libraries included with the code. It now also has a Matlab interface for convenient use with research code.

OpenCV enables unexperienced groups to add functionality such as face finding and tracking in a few lines of code. Other groups have vision expertise but were already standart; OpenCv provides experts with a solid vision infrastructure and thereby allows experts to work at a higher level rather than have to worry about the basics. Because of the above, OpenCV's BSD type license is designed to promote free commercial and research use. Optionally, users may install the IPP libraries and benefit from highly optimized code without needing to recompile via the use of automatically selected optimized dynamic libraries.

Given the large number of useful functions of the OpenCV library, we decided to improve the documentation in order to enable researchers to use the potentiality of this library for their studies.

An important advantage of adopting OpenCV for researching purposes is that it is open source. This not only reduces costs but also allows the increasing number of researchers with their own computer and a web cam to work at home and to continue using the library after the project.

In this paper, we will provide an overview of software development tools in computer vision particularly OpenCV and present some examples using the library. Moreover, we describe computer vision routines based on 3d vision. Stereo vision has many applications to image based web mining, image retrieval, video indexing, security, etc. OpenCV has