Design And Implementation Of An Expert Diet Prescription System

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Abstract

Expert Diet Prescription System (EDPS) is proposed to identify an ailment by its name or symptoms, and return a result prescribing an appropriate diet corresponding to that ailment. The system has three access levels to the database, the; patient, doctor and an administrator. A database was created consisting of Seven known ailments, these ailments includes; Cancer, Diabetes, Measles, Cholera, Malaria, Goiter and Enlarged heart disease. The knowledge base for the database created was obtained from the experts. Wamp server, PHP and MYSQL and code charge studio was used to design the database, interface and graphics for the system. The introduction of expert diet system has become very necessary because of the long term devastating effect of drugs either as a result of drug abuse or its reaction on certain patient with exceptional cases. This will readdress the issue of adverse reaction of drugs, by the use of food/fruit as an alternative treatment to drugs.

Keywords: Ailment**,** Database, Expert System, Symptoms, Nutrition

1. INTRODUCTION

The expert diet prescription system is an expert medical system, which, is centered on Nutrition/Diet. The system is meant to provide direct, non artificial treatment which is readily absorbed into the bloodstream of human beings.
A lot of drugs are effective, but the long term use of these drugs has devastating results. Hence, lead to more harm than good. Example of such adverse reactions could be skin disease; rupture of internal organs, stomach upsets stiffness palpitation and many more. Sometimes it could even be o f high severity thereby leading to death of the patient if not checked in due cause.

Instead of taking analgesic drugs such as Aspirins, Paracetamol, and Panadol in order to stop a persistent headache, one could try a cold glass of milk and adequate rest. It could work perfectly without having to go through the stress of swallowing pills, thus, leaving behind a refreshed feeling. It Is very rare for natural foods to cause any severe adverse reactions, rather, they enhance the general well being of the entire body, thereby leaving one healthy, refreshed and vibrant.

2. EXPERT SYSTEMS

Expert systems have developed from a branch of computer science known as artificial intelligence (AI). AI is primarily concerned with knowledge representation, problem solving, learning, robotics, and the development of computers that can speak and understand humanlike languages (Townsend, 1987). An expert system is a computer program that uses knowledge and reference procedures to solve problems that are difficult enough to require significant human expertise for their solution (Townsend, 1987). Simply stated, expert systems are computer programs designed to mimic the thought and reasoning processes of a human expert.

3. REVIEW OF RELATED EXPERT SYSTEMS

Several notable expert systems have been developed in recent years. For example;

3.1 CALEX

CALEX is an expert system which was developed for the diagnosis of peach and nectarine disorders by the University of California (Plant et al., 1989). Like most experts systems, CALEX is rule-based system and uses certainty factors, so that the knowledge-base consists of production rules in the form of IF, THEN statements. The inference engine pieces together chains of rules in an attempt to reach a conclusion. The knowledge base of the CALEX/Peaches diagnostic system contains approximately 600 rules for the diagnosis of 120 disorders of peaches and nectarines, representing most of the disorders in California (Plant et al., 1989).

The structure of the CALEX knowledge base language makes it particularly appropriate for complex problems like irrigation scheduling, and the expert system shell was designed with applications such as this in mind. The first large-scale implementation of a CALEX-based crop management decision support system is CALEX/Cotton for irrigated crop management in the San Joaquin Valley, California. The irrigation scheduling module of CALEX/Cotton can use a variety of methods to generate either the estimated date of the next irrigation or, at the user's request, a complete irrigation schedule for the remainder of the season. The methods used include scheduling based on leaf water potential, growing degree-days, the water budget method, last irrigation based on estimated cutout date, and last irrigation based on observed optimal dates. Here we give a brief summary of the functioning of the CALEX expert system shell and then describe in detail the methods of irrigation scheduling used in CALEX/Cotton and how the shell is coupled with appropriate knowledge bases to form an expert system for implementing these methods.

3.2 CITPATH

CITPATH, a computerized diagnostic key and information system, was developed to identify five major fungal diseases of citrus foliage and fruit in Florida (Ferguson et al., 1995). CITPATH also utilizes a rule-based approach which provides hypertext-linked descriptions and graphic displays of symptoms with reference to chemical control methods (Ferguson et al.)

CITHPATH expert system makes diagnosis on the basis of response/responses of the user made against queries related to particular disease symptoms. The knowledge base of the system contains knowledge about symptoms and remedies of 14 diseases of Indian mango tree appearing during fruiting season and non-fruiting season. The picture base of the system contains pictures related to disease symptoms and are displayed along with the query of the system. The result given by the system has been found to be sound and consistent.

3.3 THE PENN STATE APPLE ORCHARD CONSULTANT (PSAOC)

The Penn State Apple Orchard Consultant (PSAOC) is an example of another type of expert system which has demonstrated the advantage of using specialists from different areas to develop large integrated modules. Horticultural applications presently developed include modules for weed control, foliar analysis interpretation, trickle irrigation scheduling and visual diagnosis of nutrient deficiencies (Crassweller et al., 1989).

Agricultural production has evolved into a complex business. It requires the accumulation and integration of knowledge and information from many diverse sources, including marketing, horticulture, insect, mite, disease and weed management, accounting and tax laws. To alleviate this problem, current information must be structured and organized into an accessible system for growers and agricultural specialists. Because no organized structure is available for information storage and retrieval, technical information is often lost or unavailable to potential users. The use of electronic decision support systems is one way to make this information readily available.

3.4 VITIS

VITIS, a grape disease management expert system, has also been developed similarly in cooperation with specialists from Pennsylvania, New York, Ohio, and Michigan (Travis et al., 1992b). The VITIS model was also used as a model for AustVit, an Australian viticultural management expert system. AusVit uses the same logic in the approach to decisions and integrates viticultural, entomological, and plant pathological decision making to arrive at an integrated recommendation (Travis et al., 1992c). Several other notable prototype expert systems with applications in agriculture have also been developed but few have been released commercially (Beck et al., 1989; Bergsma et al. 1991 ; Drapek et al., 1990; Heinemann et al., 1993; Holt, 1989; Kable, 1991; Muttiah et al., 1988; Sullivan et al., 1992; Rogowski and Ranquist, 1992; Travis et al., 1992a).

VITIS presents new models for predicting bilberry and cowberry yields from site and stand characteristics. These models enable one to evaluate the future states of forests in terms of berry yields. The modeling data consisted of visual field estimates of site and tree stand characteristics, as well as berry yields from 627 forest stands. Berry yields were estimated using a scale from 0 to 10. Using these data, models were prepared which predict the berry yield scores from those sites and stand characteristics which are usually known in forest planning calculations. The model predictions correlated positively and often quite strongly with earlier models. The results were in line with previous studies on the effects of site and tree cover on berry production. According to the models, sites of medium and rather poor fertility produce the highest bilberry yields. Increasing, tree height increases, and the basal area of spruce and proportion of deciduous trees decrease, bilberry yield. With mineral soils, cowberry yields are best on poor sites. A high proportion of pine improves cowberry yields. The yields are the highest in open areas and very young stands, on the one hand, and in sparsely populated stands of large and old trees, on the other hand. In pine swamps, the yields are best on rather poor sites. Increasing basal area of deciduous trees decreases cowberry yields.

3.5 KNOWLEDGE REPRESENTATION

After the domain has been identified and knowledge acquired from a participating expert, a model for representing the knowledge must be developed. Numerous techniques for handling information in the knowledge-base are available; however, most expert systems utilize rule-based approaches (Townsend, 1987). The knowledge engineer, working with the expert, must try to

define the best structure possible (Jones, 1989). Other commonly used approaches include decision trees, blackboard systems and object oriented programming.

4. RESEARCH METHODOLOGY

The design of the expert diet prescription system is based on case base, which makes it easier to make diagnosis based on the knowledge of previous experiences of one or more similar case(s). This design works by storing a list of past case of ailments, which include the ailment name, description, symptoms and the corresponding diet prescription. The database is constantly queried using a structured query language (SQL), to get the stored information. Ailments can be searched by inputting symptoms if it is a patient querying the database or simply inputting the ailment name, by an experienced doctor to get possible list of symptoms related to the ailment name provided by the doctor.

Literature review on expert system was conducted, knowledge of samples of certain aliments, together with their associated symptoms and diet prescription where obtained from the internet. Database for these aliments were created together with an application program for accessing the database.

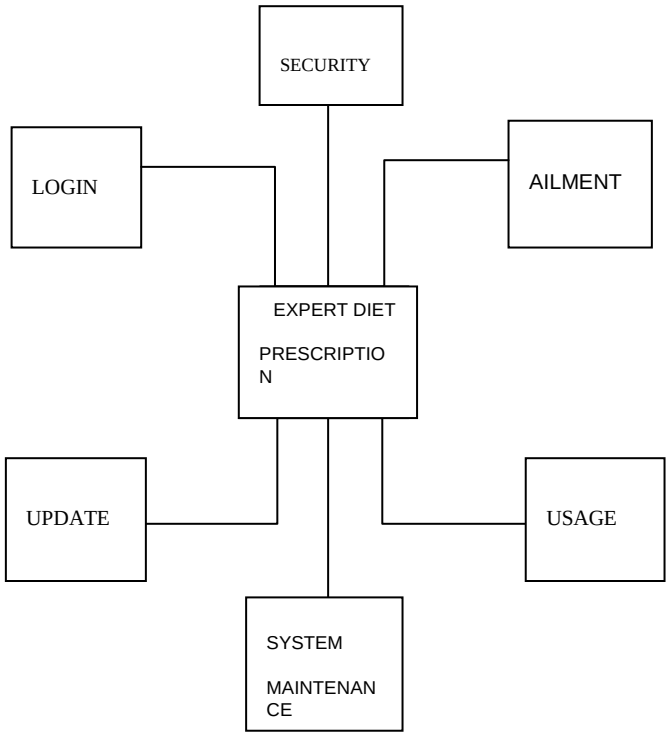

FIGURE.1: Conceptual model of the expert diet prescription system.

5. DATABASE DESCRIPTION

The database of the expert diet prescription system was designed to constitute 8 tables in general. The tables contained in the database are namely;

- Access
- Doctor

- Patient
- Administrator
- Ailment
- Symptoms
- Mailbox
- Users

Each table is represented as an entity in the database, associated with its attributes.

Ailment name	Ailment Number
Cancer	1
Cholera	2
diabetes	3
Enlarged heart disease	4
Goiter	5
Malaria	6
Measles	7

Table 1: Ailments available in the database

6. ENTITY RELATIONSHIP DIAGRAM

The entity relationship model depicts the data in terms of the entities and relationships described in the data. The entity-relationship model (ERM) for the expert diet prescription system is an abstract conceptual representation of its structured data. Entity-relationship modeling is a relational schema database modeling method, used in software engineering to produce a type of conceptual data model of a system, often a relational database, and its requirements.

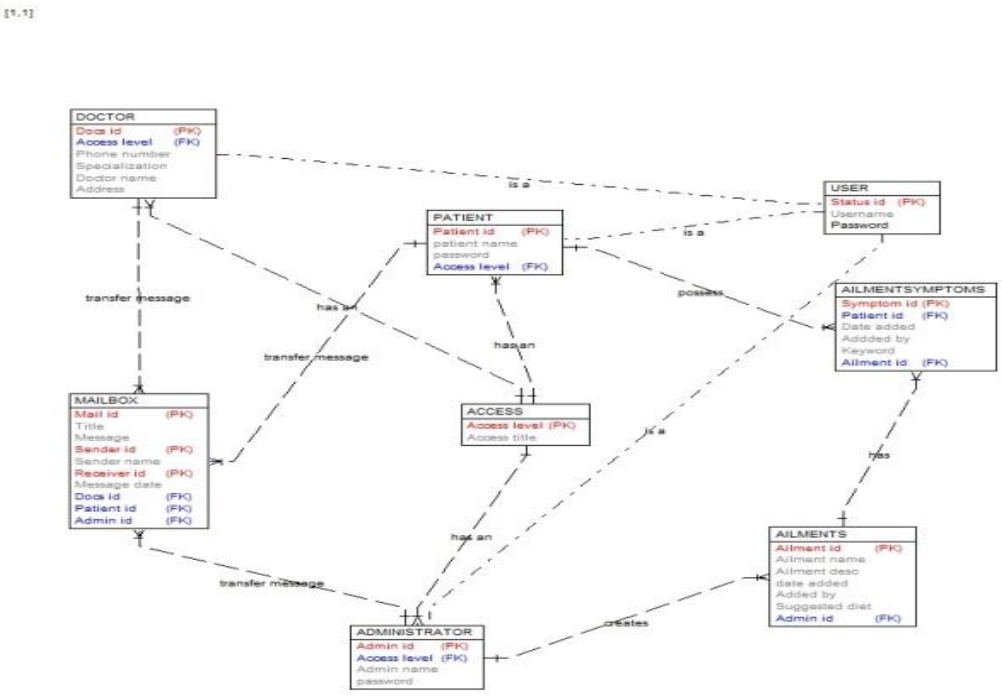

FIGURE2: An entity relationship diagram of the expert diet prescription system

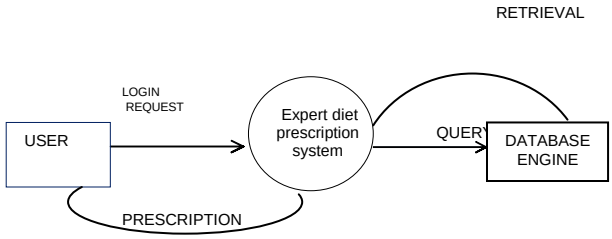

FIGURE3: Dataflow diagram of the expert diet prescription system.

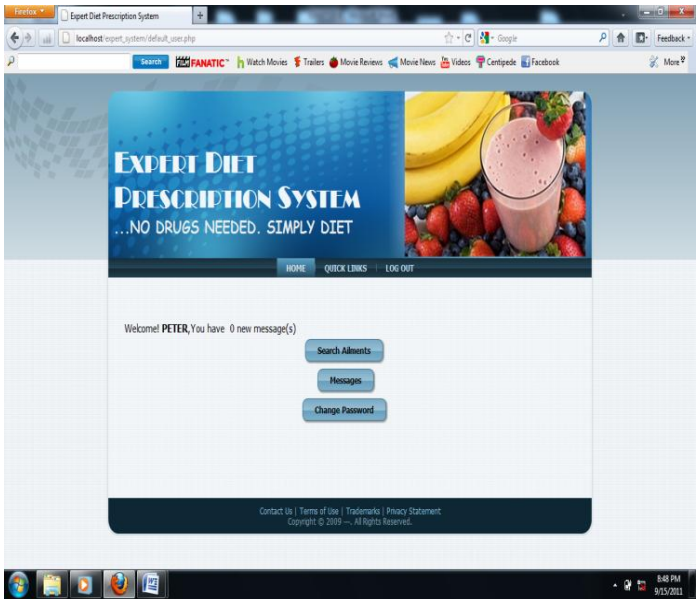

FIGURE4: patient's home page

Figure.4 above shows the home page after logging in as a patient. A patient can only perform operations such as search ailments, view or send messages and change password. A patient cannot add or update an ailment or create a user account for anyone.

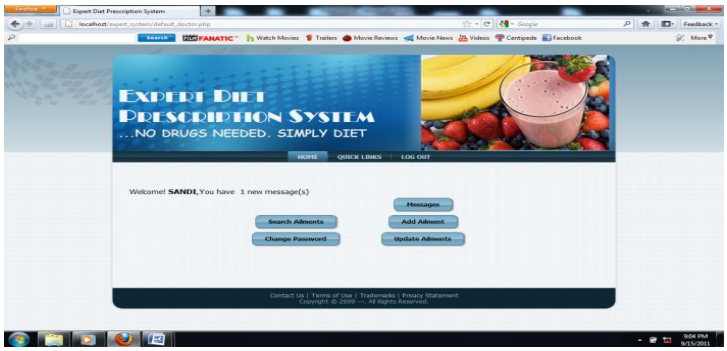

FIGURE5: Doctor's home page

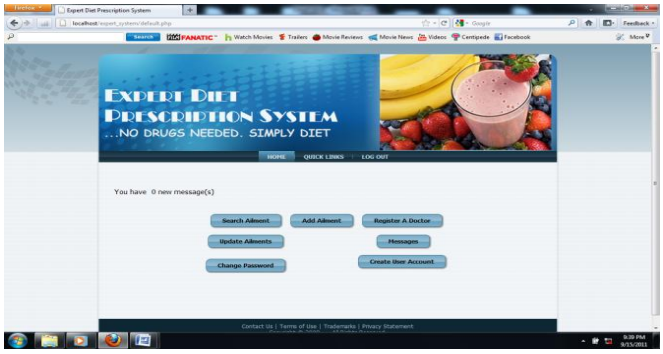

FIGURE6: Administrator's page.

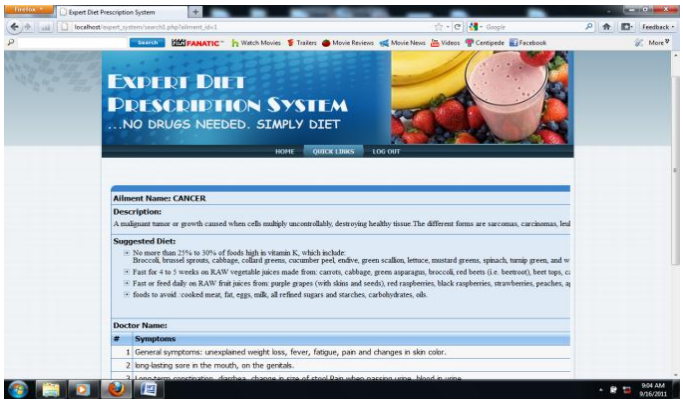

FIGURE 7: A result of search by symptoms

7. CONCLUSION

Expert diet prescription system can be configured for home or commercial use by any number of persons. A method of treatment by nature's finest fruits, vegetables and food, compared to drugs, has no adverse reactions or side effects. The system will be of great benefit to the society at large, thus, promoting a very healthy life style for any age distribution from infants to the aged, if properly utilized.

From the result obtained from this work, the following recommendation can be made;

The system should be configured for use in hospitals, at home and even in eateries because of its enormous benefits to health and the length of queue in hospitals today is quite alarming, if people have systems like this configured in their various homes, it would go a long way in improving the situation.

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