Design and Implementation of Web-based Intelligent System for Agriculture

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Abstract: *"Web-based intelligent system is an intelligent decision system will develop as a means of providing automated decision analysis assistance in crop management practices [6]. The implementation of intelligent systems technology will provide decision analysis the guidance to the farmer and to deliver domain knowledge. The proposed intelligent system offers crop cultivation and management techniques, pest and disease control technology, intelligent database technology, multimedia and network technology. The system has the functions of browse, enquiry, identification, diagnosis, consultation, water management problems and other functions for crop management by farmers desiring to achieve maximum yields. The advancement of system is: by using images, names and characteristics of diseases and pests, soil it can separately use three different methods, including pattern recognition, the name enquiry and feature recognition, and make use of the real time of experts online system to realize intelligent decision for prevention and control of crop diseases and pests in a real sense. In addition, the system is based on neural network engineering theory, database technology and advanced network technology, and has characteristics of low cost, advanced technology, simple and friendly interface [1]*

I. Function of the system

"Web-based intelligent system for Prevention and Control of crop diseases and pests" can be divided into five modules, including: Query, diagnosis, database and Neural Network, and Decision [4]
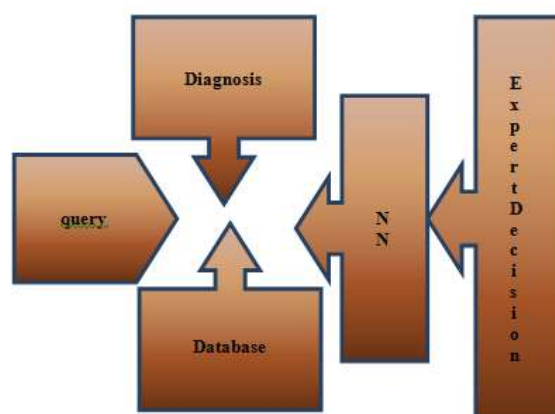

Figure 1: The function of system

II. Selection of Development Environment

According to the technology adopted by system and function, we will be primarily taken into account the following factors for selection of development environment: scalability, functions, cost, openness and interoperability [5].

A. Hardware

Processor: Intel Pentium; memory: 64MB; hard disk space: 500MB or more; CD-ROM: to install operating system and other software required for the development site; NIC: with ISA or PCI interface; graphics card: SVGA display adapter.

B. Software environment and development tools

Operating System: Windows 2000 Server/Windows XP (SP2); browser: Internet Explorer 5.0, recommend IE 6.0; e-mail servers: Outlook 4.0 above; software: Microsoft Internet Explorer; data storage software: Microsoft SQL Server 2000/Oracle/Sybase/ Other; database: Access2003; server: iis6.0; Adobe Photoshop 9.0.

III. System Design and Implementation

A) System Design to Control of crop diseases and pest.

The proposed system of crop diseases and pests having five modules, which are the core of the entire system, including: homepage, crop' knowledge inquiry, cultivation management, pest inquiries, diagnosis and prevention. Website updated information will be friendly highlight at home page. Knowledge Query for pests mainly contains pests' query, common pests, knowledge schools, which can help to study and to understand various aspects of pest prevention and control.

B) Implementation of Automatic Identification System for Pest.

Automatic Identification System for pests is realized by combining pattern recognition with feature recognition method. According to images, names and characteristics of diseases and pests, it can separately use three different methods, including pattern recognition, the name enquiry and feature recognition, and make use of the real time of experts online to realize agriculture information platform in a real sense. It can also make use database technology and expert system technology to give the name of pests, diagnosis, prevent and control methods, according to images, names and characteristics of pests [2].

C)The design and implementation of on-line expert system.

The structure of on-line expert system mainly contain four modules, including: User Registration and log in , display module, published the module, management module. The structure of system function shown in Figure 2. The function of user management module mainly contains registration, user personal information management. In this module, the user name must be unique. After users register, some information can also be edited and modified. System administrators can also edit or delete user information [3].

In the Admin management module, the main operation is to be completed by the system administrator, including add, edit or delete sections, as well as the publishing operation of sections moderator.

The Query module is the most crucial module in the system. It contains four sub module:

- Browse modules: In this module, users can browse the subject information of query. By clicking the link of subject information, you can browse the details of this message.
- Query: users cannot use this module; only registered users can create the new query.
- Answer module: This module only should be used by registered users. Users can reply to the query and edit their own query.
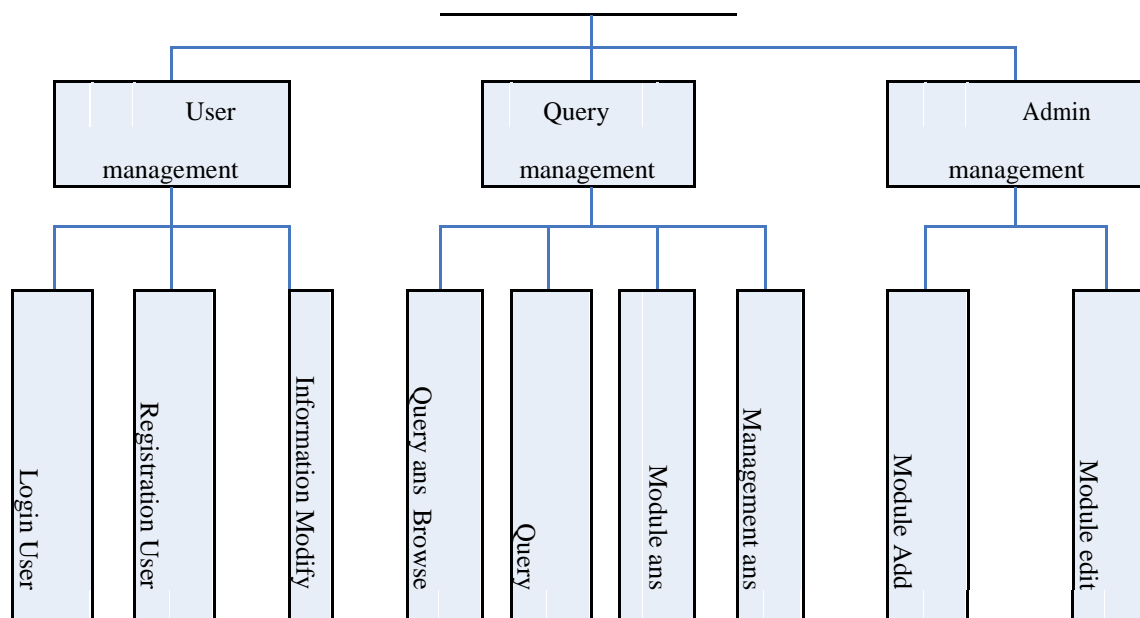

Figure 2. System structure of on-line expert system

Management module: In this module, the moderator manages the ans.

System function module is divided into four users. The system administrators have the highest authority, and can manage the forums and users. Moderators have administrative privileges, and can manage the query in own section. The registered users have the user management authority and posts management authority, but are limited to their own posts and personal information, and are unable to deal with other people's information; Non-registered users only have the minimum permissions that can only browse the information at the Forum, and there is no other operation.

In Information system, the user can get all the static information about different sp ecies, Diseases, Symptoms, chemical controls, Preventions, Pests, Virus of crops and plants[2].

In Advisory System, the user is having an interaction with the expert system online; the user h as to answer the questions a sked by the Ex pert System. Depends on the response by the user the expert system decides the disease and displays its control measure of disease.

This web application is expected to have the following features:

1) This web application provides time-to-time updates of Tomato information to the users at their doorsteps regarding diseases, virus and its control measure, which leads to good yields.

2) This site contains four major sections named Information Systems of Tomato crop, Tomato Advisory System, other services related to web application and an additional feature is links to other agriculture system.

3) Varieties, articles, and the discussion forum service provided in the website will help the crop fraternity in a greater way to interact each other to produce better findings in the area of agriculture field [2].

IV. Functional Requirements of Expert System

A) Inputs – The system needs the information about the symptoms from the user to produce the output.

B) Outputs- The outputs of the system will be:

1) Information Diseases,

2) Small Description about the disease

3) Chemical controls

4) Preventions

C) Store- The information collected through experts is stored as a database (Knowledge Base) that serves as a repository for quick processing and future retrieval. The system stores the information in html files.

D) Rules- A set of rules, which constitute the program, store in a rule memory of production memory and on an inference engine required to execute the rules.

E) Dataset- The monitoring data is in the MySQL database. It can be used as any other data stored in a database. This greatly increases the opportunity with which you can conduct post-analysis of the monitoring data.

V. Conclusion

"Web-based intelligent system for Control of crop diseases and pests" is a integrated agricultural information platform, which uses some practical technology, such as pattern recognition technology, crop cultivation and management techniques, pest and disease control technology, intelligent database technology, multimedia and network technology. The advancement of system is: In order to meet modern agricultural management needs and characteristics, the system is advancement, practicality, reliability, flexibility and low cost; According to image, name and characteristics of diseases and pests, it can separately use three different methods, including pattern recognition, the name enquiry and feature extraction, and make use of the real time of experts online to realize intelligent decision for control of crop diseases and pests in a real sense. In addition, the system is based on software engineering theory, database technology and advanced network technology, and has characteristics of low cost, advanced technology, simple and friendly interface.

The system made the high-tech, management technology and practical agricultural technology as an important factor of productivity which be used in all aspects of agriculturalmanagement. The application and promotion of the research will effectively promote agricultural science and technology innovation system, the quality and security system of agricultural products, and agricultural market information system process. It greatly enhances agricultural standardization, information and modernization.

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