

Software Application for Tentative Diagnosis of Poultry Diseases

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Abstract- Poultry production is a growing business sector worldwide, owing partly to its profitability and partly to being a ready and affordable source of protein requirement for man. A major problem facing poultry is disease, a state of ill health that could lead to death or poor level of performance of the affected poultry. The scope of this paper, therefore, covers the control and management of disease outbreak in poultry, focusing on the tentative diagnosis of an implicated disease through software application. The software developed, called *Pathfinder*, using Java programming language and MySQL, provides users, e.g. veterinarians and animal health technologists, an easier, quicker and more precise procedure for tentative diagnosis of poultry diseases. However, application of the software does not rule out confirmatory laboratory test but should assist in commencing treatment procedure of a disease (to prevent spread of the disease) and deciding which confirmatory tests to carry out after the tentative diagnosis has been concluded.

IndexTerms—Software, Poultry, Disease, Tentative Diagnosis

I. INTRODUCTION

Poultry farming is an expanding business sector. The wind of cultivation and modernization blowing across the globe has ushered in commercial poultry farming in various parts of the world. Poultry farming serves as a ready and affordable source of protein requirement of man and an alternative source of income. In time past poultry production is not recognized and birds were raised at subsistence level to meet only the nutritional need of households because great benefits were not believed to be derived from poultry as it were today. Nowadays, this field has developed and occupied a place of pride among other livestock enterprises basically due to its rapid monetary turn-over [7].

Poultry is classified into egg and meat productions. Eggs are got from laying birds that are called layers while meat is derived most especially from the birds, which may be either broiler or cockerel. In the olden days man got his meat utility from cockerel and layer but now due to scientific advancement broiler serves as the most desired source of meat in comparison to other strains of bird. There is an increase shift to broiler production in developing countries like Nigeria [1].

Many people are venturing into poultry production business but yet, many are foot dragging about their investment in the

sector. The major reason many investors shrinks back from venturing into the poultry industry is the fear of running into an incurable losses, especially during the production phase. It is an unpleasant and enough heart-breaking sight to witness the death of a large percentage of flock largely as a result of disease outbreak.

Disease has been defined as a state of ill health, but more concisely put, disease is any deviation from or interruption of the normal structure or function of any part, organ or system (or combination thereof) of the body that is manifested by a characteristic set of symptoms or signs. Poultry diseases may result in death of the affected birds or poor level of performance [9]. Smith [13] revealed that most important health related problems occur by disease infection caused by respiratory disease, salmonellosis, infection of the yolk sac, and ascaris mycoticosis.

In dealing with poultry diseases, clinical signs and post mortem lesions are very crucial. Clinical signs are the overt observable manifestation seen in the life sick birds, observed in the period succeeding the pre-patent period of an infectious disease or succeeding period after the effect of a non-infectious agent is manifested in the sick birds [5]. These clinical signs are the obvious signs which show that something is wrong with a bird or a flock. But to know or spot that something is wrong with a bird or a flock, one must first know the normal state of poultry birds.

Post mortem lesions or findings, otherwise referred to as necropsy, involve the examination of a dead animal. In poultry birds, a single bird cannot show the state of the entire flock. Therefore, depending on the number of birds on the affected flock, the farmer should submit as many carcasses as possible for the post mortem examination so that detail of the flock's condition could be properly represented.

However, diseases in a poultry flock could be prevented, managed or controlled. The scope of this project does not cover preventive measure, but the control and management of disease outbreak in the poultry flock. This project is, therefore, focused at making the first step in the management of poultry diseases, which is the tentative diagnosis of implicated poultry diseases through application software. Application software is a suite of programs written to accomplish specific tasks, i.e. for solving

certain problems for end users. The software developed, named *Pathfinder*, provides users, e.g. veterinarians and animal health technologists, an easier, quicker and more precise procedure for tentative diagnosis of poultry diseases which will be the first step involved in the arrest of such diseases.

This is important because arriving at a confirmatory diagnosis sometimes involves expensive procedures which may not be in the easy reach of the poultry farmers practicing on small scale. Also, some of the tests available in some areas take a longer period of time to carry out and if ventured into before a necessary treatment procedure is carried out, it would allow the spread of the disease condition in the flock and eventually more losses would be incurred. Therefore most veterinarians in such areas could go ahead with the treatment procedure of a disease after the tentative diagnosis is reached, but often this involves the use of broad-spectrum antibiotics.

However, it would be much more appropriate to have a confirmatory diagnosis and treatment done with the precise drug of choice for combating such a disease agent. The use of the computer software does not rule out the use of confirmatory laboratory test but should assist the veterinarians in deciding which confirmatory tests to carry out after the tentative diagnosis is concluded. The main objective of this work is, therefore, to develop application software to carry out tentative diagnosis of poultry disease with a view to reducing spread of disease condition, incurable losses and poultry casualty.

II. MATERIALS AND METHODS

The materials utilized in the process of accomplishing this project were both hardware and software in nature as well as other informative materials on livestock diseases (poultry in particular). The chief device used in the project was a laptop computer with the following specifications: Intel Pentium Dual Core T4300 2.1GHz, 4GB of Memory, 500GB of Hard Disk, Windows 7 Home Basic edition (Service Pack 1) and the system type is 64-bit Operating System. The software materials used in the application development were programming language software such as the Java Net Beans IDE, Wamp Server and MySQL Relational Database System. Poultry diseases manuals and textbooks were also consulted, among which are Poultry Health and Production Principle and Practices [2], Diseases of Poultry [11], Newcastle Disease and other Paramyxovirus Infections [3], Poultry Diseases [6] and Merck Veterinary Manual [8].

The design of the information system was carried out based on the specification arrived at during the functional requirements activity. The main functionalities of the system includes the ability to electronically capture relevant data, update the captured information where necessary, and returning of accurate results or information based on the query parameters specified.

For the application development, the first activity is the designing of the database behind the scene, which is the most important aspect or key factor in the software. Database is specified by a data model, describing what sort of data will be held and how it will be organized [12]. The database was created using MySQL Relational Database Management System, through the help of Apache WampServer (an interface with which to interact with MySQL) and named 'pathfinderdb'. The 'pathfinderdb' database consists of five tables as shown in Fig. 1, namely: clinicaldiseasetb, clinicaltb, diseasetb, pmdiseasetb and pmtb.

Having designed the database, programs were written using Java Programming language to capture, store, query and retrieve the data in the database. The programs are designed to implement a process model (or functional specification). The actual software development methodology follows a more engineering approach called System Development Life Cycle (SDLC). SDLC is a systematic procedure of developing software through stages that occur in sequence [14]. The seven stages of the SDLC are designed to build on one another, taking the outputs from the previous stage, adding additional effort and producing results that leverage the previous effort and are directly traceable to the previous stages. This top-down approach, shown in Fig. 2, is intended to result in quality software that satisfies the original intentions of the customer.

The clinical signs and post-mortem findings were collected from various poultry diseases manuals and textbooks and entered into the software's database.

III. RESULTS AND DISCUSSION

The size of the tentative diagnosis application software is 4.8MB, and so to install it on a computer, the system must contain a hard-disk with enough space to accommodate the installation. For the fact that the software was developed using Java Programming Language and MySQL, it means it is platform independent.

Figures 3 to 10 show the screen captures of the software in operation. The software has eight (8) major interfaces. The Home/Welcome Interface, shown in Fig. 3, serves as the welcome page of the software. It contains buttons that links to the different parts of the software. The links on the Home/Welcome Interface are:

- TheNew Disease Button
- TheDisease Linker Button
- New Clinical SignButton
- The Update Clinical Sign Button
- New Necropsy Button
- Update Necropsy Button
- Tentative Diagnosis

The New Disease Form, shown in Fig. 4, displays a form to help the user register or admit a new disease into the database of the software.

On the Update Disease form shown in Fig. 5 and represented by Disease Linker button on the Home/Welcome page, users are given the opportunity to display a form on which the user can edit or change the information on any of the disease already stored in the database.

In Fig. 6, the New Clinical Sign form is the gateway to adding new clinical signs detected into the software's database. It provides the interface for the user to enter the new Clinical Signs which goes straight into the database. Also, already stored clinical sign can be updated (change or modify) through the Update Clinical Sign form shown in Fig. 7.

Figure 8 shows the New Necropsy form on which the user can register new Post-Mortem findings into the database, while the user can edit or change the information on Post-Mortem findings in the database using the Update Necropsy form shown in Fig. 9.

The hallmark of the software, the "real juice" in the application, is the ability to respond to user's queries for tentative diagnosis of poultry diseases. The query is entered through the Tentative Diagnosis form shown in Fig. 10 by asking the application to find the possible diseases that might

be responsible for some Clinical Signs and Post-Mortem findings fed into it. The software responds by scouring through its database and displaying the best possible diseases that match the clinical signs and post-mortem findings.

An easier, quicker and more precise computerized procedure for tentative diagnosis of poultry diseases have been developed with the goal of assisting veterinarians and animal health technologists. The software differs from CICADA [4] which is for reporting over the Internet, of companion animal diseases encountered by veterinarian. Also, *Pathfinder* makes tentative diagnosis based on the clinical signs and post-mortem findings in the database unlike SAVSNET, whose aim is to collect (over a network), collate and analyse data from veterinary diagnostic laboratories [10]. Moreover, the software is not Internet based which removes the challenges of platform and Internet connection.

IV. CONCLUSION

The software was designed to allow for future changes to the information in the database. The database was loaded with up-to-date information available (i.e. Clinical Signs and Post-Mortem Findings from different poultry disease manuals and textbooks). This was done during the testing of the software so as to see the efficiency of the program. However, the information in the database could be updated with the latest accessible information.

The essence of the software should not be undermined as veterinarians and animal health technologists involved in the Poultry Industry all around the world are faced with the challenge of controlling the diseases of poultry birds which are manifested by different Clinical Signs and Post-Mortem lesions. Interactive software like the "Pathfinder" affords veterinarians and animal health technologists the opportunity to get familiarized with the different Clinical Signs and Post-Mortem Findings associated with the different poultry diseases so as to make tentative diagnosis. This will assist them in deciding on the next course of action in controlling such a disease outbreak.

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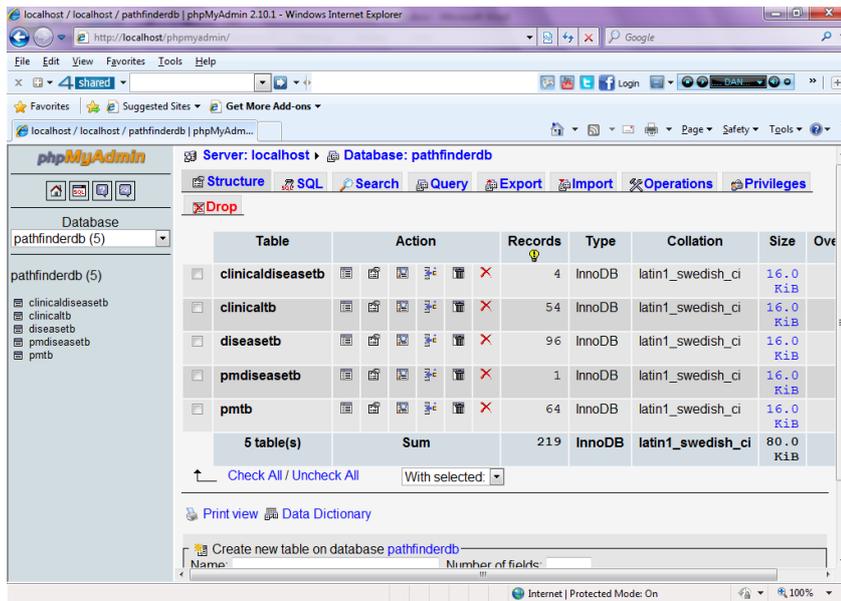


Figure 1 - pathfinderdb on Apache WampServer

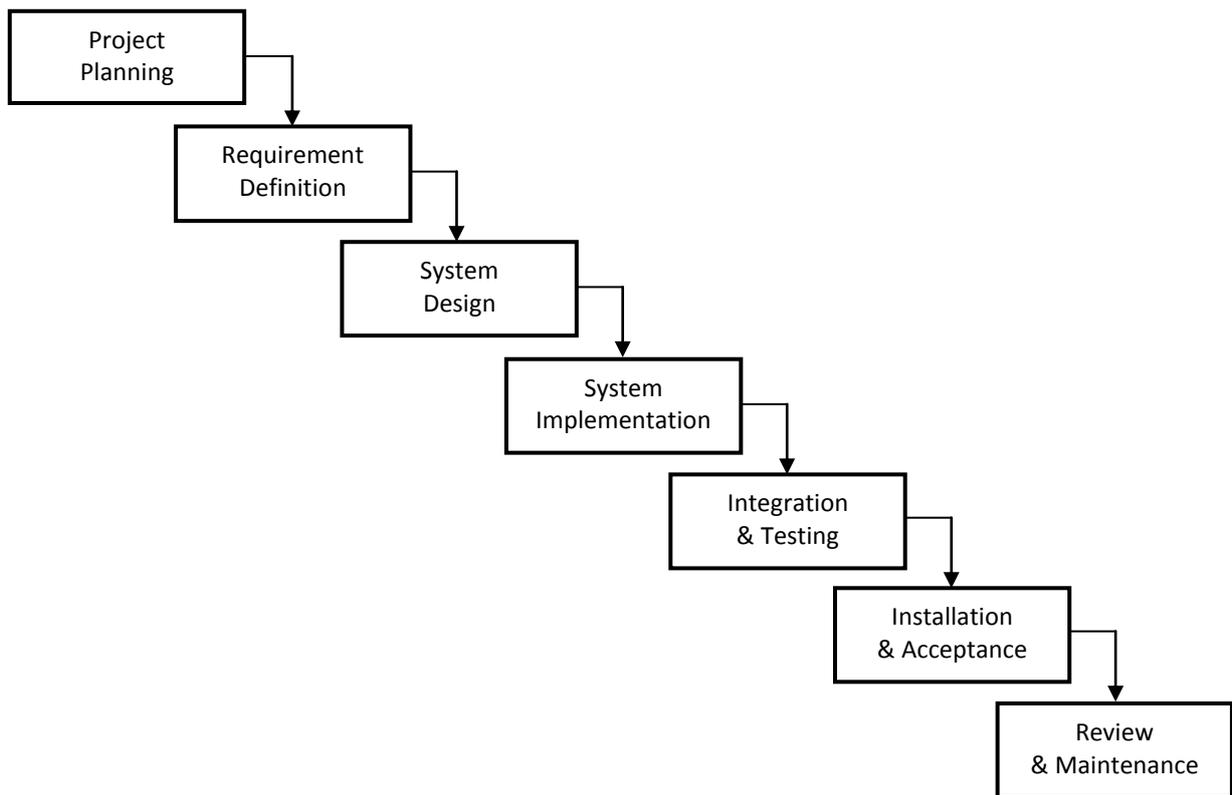


Figure 2 – System Development Life Cycle Stages

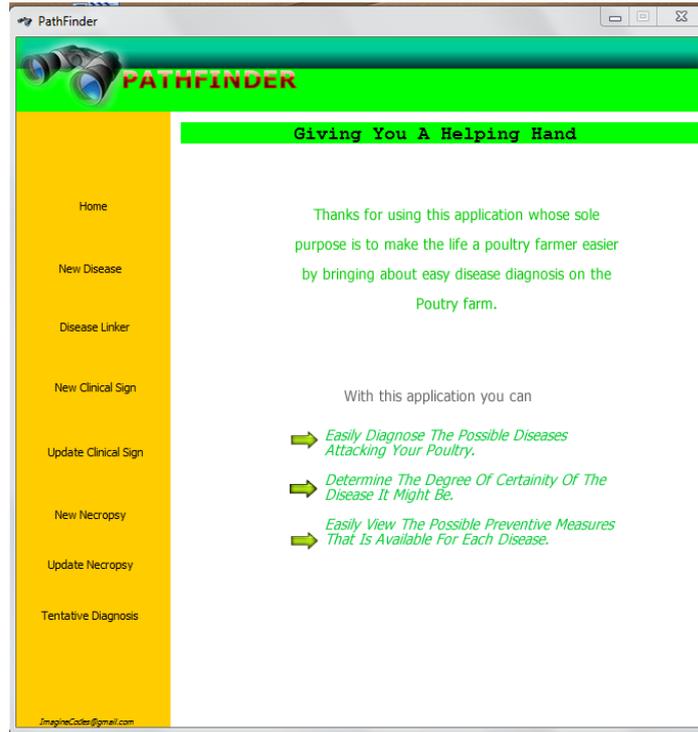


Figure 3 – The Welcome/Home Interface

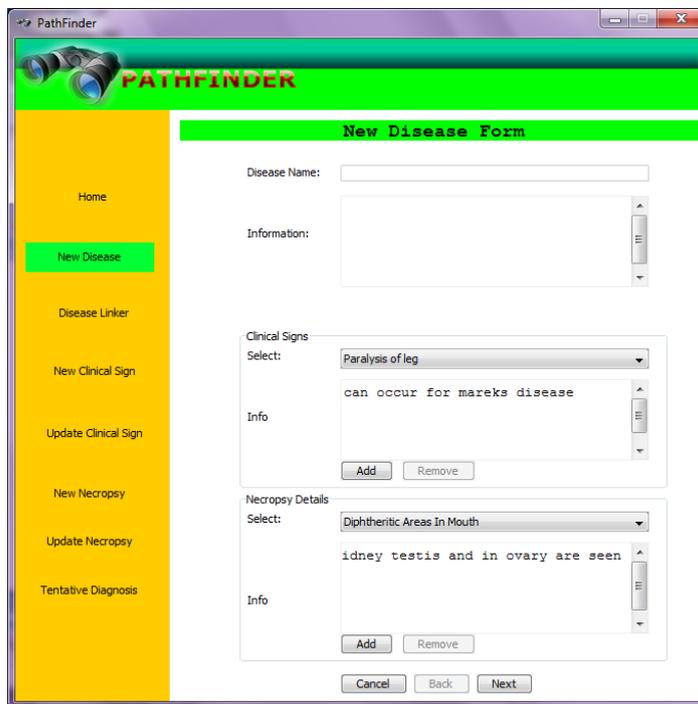


Figure 4 – New Disease Form

The screenshot shows the 'Update Disease Form' window in the Pathfinder application. The sidebar on the left includes 'Home', 'New Disease', 'Disease Linker' (highlighted), 'New Clinical Sign', 'Update Clinical Sign', 'New Necropsy', 'Update Necropsy', and 'Tentative Diagnosis'. The main content area has a title bar 'Update Disease Form'. Below it is a 'Select Disease' dropdown menu with 'Blue Comb Disease' selected and a 'GO' button. A text field contains 'Avian Monocytosis'. Under 'Information:', there is an empty text area. The 'Clinical Signs' section features a 'Registered Clinical Signs' list (empty) and an 'Available Clinical Signs' list containing: 'Paralysis of leg', 'wing enlargement', 'wart like growth on face', 'wart like growth comb', 'wart like growth on wattles', 'wart-like growth on face', and 'wart-like growth on wattle,feathers'. There are '>>' and '<<' buttons between the lists. The 'Necropsy Details' section has a 'Registered Necropsy Signs' list (empty) and an 'Available Necropsy Signs' list containing: 'Diphtheritic Areas In Mouth', 'Necrotic Spots on tongue', 'Necrotic Spots on palate', 'Necrotic Spots on crop', 'Drying Of Tongue Tip', 'Yellowish Discoloration', 'Drooling Mucus From Mouth', and 'Oral Cavity Inflammation'. There are '>>' and '<<' buttons between the lists. At the bottom are 'Cancel', 'Update', and 'Delete' buttons.

Figure 5 – Update Disease Form

The screenshot shows the 'New Clinical Sign Form' window in the Pathfinder application. The sidebar on the left includes 'Home', 'New Disease', 'Disease Linker', 'New Clinical Sign' (highlighted), 'Update Clinical Sign', 'New Necropsy', 'Update Necropsy', and 'Tentative Diagnosis'. The main content area has a title bar 'New Clinical Sign Form'. Below it is a 'Clinical Sign Name:' text field. Under 'Description:', there is a large text area. The 'Possible Diseases:' section has a dropdown menu with 'Blue Comb Disease' selected and a '>' button. Below the dropdown is an empty list box with an upward arrow button. At the bottom are 'Cancel' and 'Save' buttons.

Figure 6 – New Clinical Sign Form

The screenshot shows a web application window titled "PathFinder" with a green header and a yellow sidebar. The main content area is titled "Update Clinical Sign Form".

Update Clinical Sign Form

Clinical Sign Filter

Select Clinical Sign: Paralysis of leg

GO

Editor

Description: can occur for mareks disease

Add/Remove Diseases: Blue Comb Disease

Marek's Disease

Buttons: Cancel, Save, Delete

Figure 7 – Update Clinical Sign Form

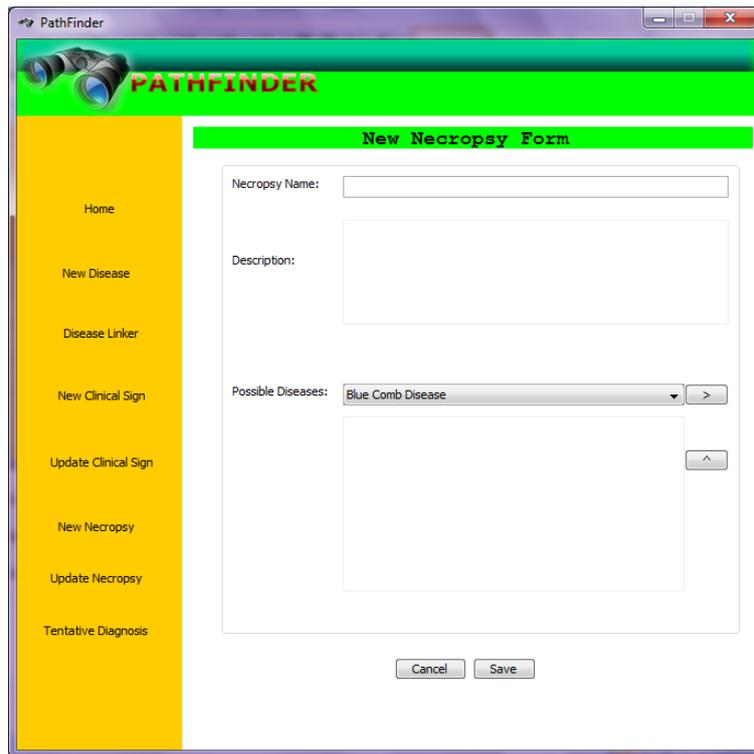


Figure 8 - New Necropsy Form

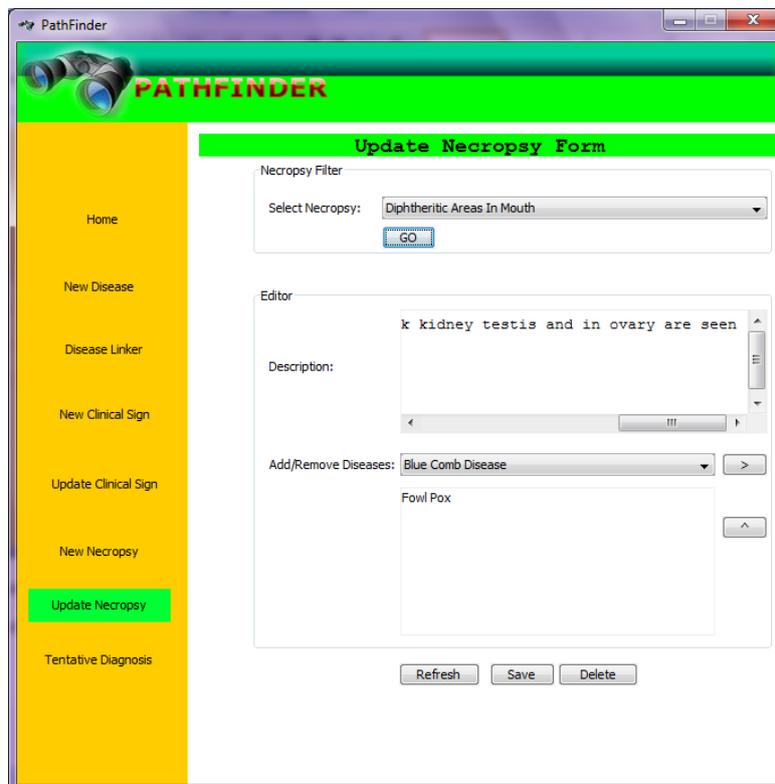


Figure 9 – Update Necropsy Form

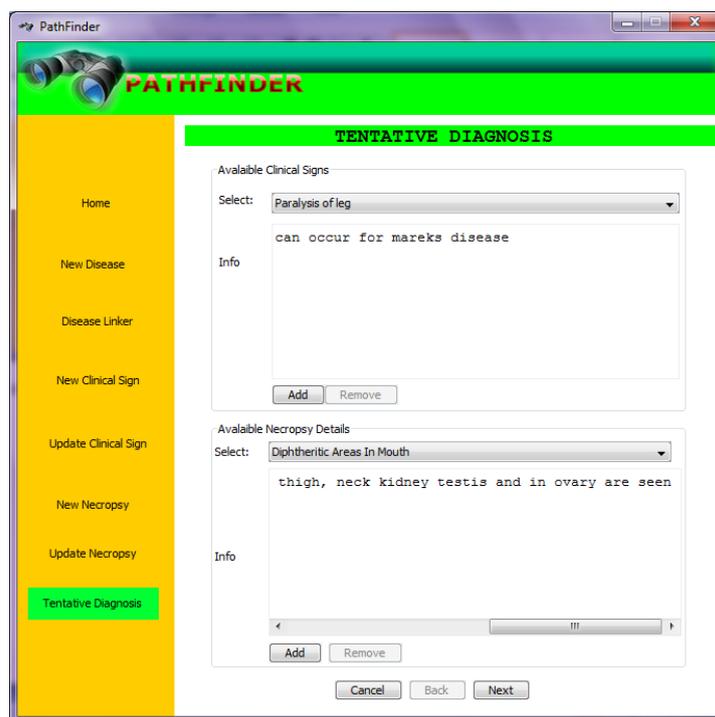


Figure 10 - Tentative Diagnosis Interface