FUZZY RULE BASED LUNG CANCER DIAGNOSIS EXPERT SYSTEM

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ABSTRACT: The research work explained in this paper will describe the technique used to determine the disease name, stage and the diagnostic treatment using the algorithms and a fuzzy rule base (developed specifically for a disease) for lung cancer. This will help to both Physician as well as Patient. Because this is a fuzzy-based expert system, it can provide maximum accurate results. The objective of this research work is to process the symptoms entered by the patient and give appropriate disease name if patient may have, taking severities to symptoms from the patient for calculating the stage of the disease by using fuzzy rules, displaying the diagnostic reports to patient's about disease, stage & treatment, adding new diseases to the system, and also updating treatments for diseases.

KEYWORDS: Fuzzy Rule Base, Severity of Symptoms, Stage of the disease

INTRODUCTION

Lung infection is the sporadic improvement of cells in one or both lungs, and usually happens in cells that are impeding air exchange. Atypical cells won't make strong conventional tissues; they will segment rapidly and structure tumors. Area of lung development in early stages is out and out vital in treatment. In America, 1 of every 14 men, and 1 of every 16 women are having lung threat. The measure of risk for smoking people is significantly more. Most of the patients of the lung sickness is dissected at 60 years of age. There are 2 unmistakable sorts of lung development, of this too, little cell lung danger is more intense, it suggests that in the early stages it can spread snappier to exchange organs of the body. There are 4 classes for sorting out the lung tumor, regardless; altogether, masterminding is segregated into 3 general periods of the ailment:

Stage 1: the reach is pretty much nothing and constrained to the lung and 85 to 90 percent of the time it's treatment with surgery is adequate.

Stage 2: territory is nearly nothing, and it fuses the lungs and lymph center points and treatment is chemotherapy or chemotherapy merged with radiation treatment and surgery.

Stage 3: territory is greater and despite lungs and lymph center points, it has spread to various organs and treatment is chemotherapy and sometimes chemotherapy solidified with radiation treatment.

PROPOSED RESEARCH WORK

Lung diseases are the second most dangerous disease in the world (for example: lung abscess, lobe pneumonia, bronchitis...). However there are many effective medicines which can treat these lung diseases, the danger is that the patients always ignore some initial symptoms of lung diseases and they are only afraid when those symptoms are likely clear. But at that time, it seems to be more difficult to treat those diseases.

In diagnosing lung diseases, doctors have to cope with many difficulties, the patient's symptoms are usually not clear; the similarities in some lung disease's symptoms are difficult to distinguish. Doctors always have to test many times before making a decision. So the diagnosis result depends on not only patient's symptoms but also the doctors' experiences. Wrong decision means wrong treatment and the patient would suffer more. This System has been developed

as a standalone application used for both patients as well as Doctors. Here patients are called as Users and Doctors as Administrator.

Once the user access the system identification is asked, with username and password. After writing the required names the user can continue the interaction or quits the System. In the main menu, the user can choose either "enter symptoms" or "view last reports", if the user selects "Enter Symptoms" then Symptoms will be displayed to user in a new screen thus user can select his symptoms. After selection, click "submit" then disease can be displayed in a new screen on that screen contains user selected symptoms and "disease name" with a percentage matched to original symptoms of that disease and original symptoms of the disease. If he wish to change his symptoms then he go back to symptoms screen change his symptom for example Headache is the symptom then select severity like "probable" or "low" or "medium" or "high" or "critical". After giving severities to symptoms then clicks "submit" then a new screen will be displayed that contains "disease name, stage & treatment" then he can view his report by clicking "generate report" option.

If in case user selects "view last reports" then reports screen will be displayed. That contains previous reports and giving "report no" and clicks "generate report" then report will be generated.

If admin logins with his username and password then he can able to do several things such as "add Disease" or "Update treatments" or "view no. of users and their details" or "view a particular users previous reports".

If he selects "Add Disease" then "Add Disease" screen will be displayed in that he can add new Diseases to System, if he select "Update Treatments" then he can founds a new Screen that contains List of Diseases thus he can update new treatments to a particular Disease.

If un-registered user cannot be logon to the system, if in case he want use system then he may either register or select as "Guest".

If he is a "Guest" user then he cannot found any "Generated Report PDFs", if he wants that reports then he must register to the system.

Fuzzy Rule Base

This proposed research work makes use of fuzzy rule base to make decision for the diagnosis of disease, and the efficiency of the system depends on the fuzzy rules generated. Rule based systems are mainly used in medical diagnosis. In this, the knowledge base stores all information about the symptoms and disease in the form of rules in the Rule base. The rules are generated as per the data gathered from domain expert. The proposed framework comprises of three modules - Doctor Login module, Implementation module and Report module. Specialist Login module is utilized to check the verified specialist. Just the verified specialists have the rights to see the patient records. Usage module is utilized to decide infection and stage in view of the patient chose manifestations. Fuzzy principle is utilized to decide the malady and limit figuring is utilized to decide the phase of the ailment. Report module is utilized to show infection, stage and treatment for the specific malady. It additionally stores the patient data in database for reference by specialist or doctor.

RESULTS



Fig.1. Registration and Login Form



Fig 2. Home Page

Antiety	Barrel Chest	Excessive sweating	ŕ
Inability to speak in full sentences	Nasal flaring	🖉 Pale skin	
Restlessness	⊠™	🗹 astima	
) bluish skin	🗹 chest pain	chronic cough	
creeking up blood	decreased appetite	🗌 droopy eyelid	
fatigue	🗋 fever	⊠fn	
frequent maps during the day	increased tear	less energetic	11
lips or fingernails turn blue or gray	∑ night sweats	oot mentally alert	
poeumonia	recurrent pulmonary infections	reduced talerance	
aliva secretim	$\underline{\ensuremath{\mathbb{Z}}}$ shortness of breath	🗹 shoulder pain	
sweating on one side of the face	swelling in the face	🗹 weakness	
weakness in the hands	weight loss	ubeezing	

Fig 3. Entering Symptoms



Fig 4. Result Screen

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				-
Welcome, my3best			Logout	
Pale skin Choose Severity of the Symptom:	Pale skin			
⊖ probable ○ low	○ medium	🔾 high	○ critical	
Anxiety	.]	Back To Back	Next	

Fig. 5. Optimization of Results

Welcome, my3best shortness of breath			Logout	
Choose Severity of the Symptom:	shortness of breath Message (i) choose severity of OK	symptom	0 critical	
Anxiety	▼ Ba	ck To	Next	

Fig.6. Severity of Symptoms



Fig.7. Confirmation of Stage



Fig.8. Diagnosis Report

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	my3best Las	st Reports		Logout
ReportNo	Date	DiseaseName	Stage	Treatment
1	3/10/2013 0:0:0	Pleurisy	stage4(Medium)	"decortication." This procedure involves examining the pleural space under ge
2	3/11/2013 0:0:0	Tuberculosis	stage4(Medium)	The most common medications used to treat tuberculosis include: Isoniazi
1	3/11/2013 0:0:0	Squamous cell carcinoma	stage5(High)	Radiation therapy used to treat cancer or to control symptoms related to the s
j	3/11/2013 0:0:0	Squamous cell carcinoma	stage5(High)	Radiation therapy used to treat cancer or to control symptoms related to the second
3	4/27/2013 0:0:0	Bronchioloalveolar Carcino.	stage4(Medium)	Radiation therapy Radiation therapy involves the use of X-rays to destroy can
7	4/27/2013 0:0:0	Squamous cell carcinoma	stage4(Medium)	Chemotherapy used alone. Squamous cell carcinoma of the lungs responds

Fig.9. Last Reports

*				
				Logout
Dise	aseName			
	Symptom1		Symptom2	
	Symptom3		Symptom4	
	Symptom5		Symptom6	
	Symptom7		Symptom8	
	Symptom9		Symptom10	
Add	More Sy	Back To Home	Submit	

Fig.10. Adding Disease Name

CONCLUSION

This research work is helpful to the doctor and in addition the patient for deciding the sort of lung malignancy and the phase of the tumor. The Diseases and symptoms can be updated day to day according to the changes in the medical field.

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