Web-Based Expert System For Respiratory Disorders In Human Using Backward Chaining Method

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Abstract

Respiratory disorders are various types of diseases or disorders that inhibit lung function. This disease can affect the ability to breathe. Respiratory disorders can be transmitted anytime and anywhere. Respiratory disorders are more common than other organ system disorders or infections. They start from the common cold with relatively mild to severe pneumonia, cough, fever, sore throat, and shortness of breath. Inadequate medical equipment also triggers the difficulty of treating and diagnosing a disorder. This study aims to help the community diagnose respiratory disorders and determine how to deal with them effectively and efficiently. This website-based expert system for diagnosing human respiratory disorders uses the Backward Chaining inference method. The results of this study will produce a website for diagnosing respiratory disorders in humans.

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Keywords : *Respiratory Disorders, Expert System, Website, Backward Chaining*

INTRODUCTION

Respiratory disorders are diseases commonly affecting the human respiratory system, primarily involving the nasal passages. Failure to address this issue with the appropriate level of gravity may result in fatality.

According to the study by Usman and Selvian in 2017, Idiopathic Steroid-Resistant Nephrotic Syndrome (ISPA) is a medical condition that can manifest in individuals across all age groups and is prevalent within the general population. It is observed that individuals with a compromised immune system are more susceptible to this condition. In severe cases, ISPA has the potential to result in mortality. One of the most severe infectious diseases is particularly prevalent among children and toddlers. According to the PDPI (2014),

This phenomenon holds particularly true when considering the correlation between the number of individuals requiring hospitalization and subsequent increases in the overall case count and the heightened occurrence of severe complications. Moreover, it is worth noting that this factor is the primary contributor to mortality rates compared to other instances of infection (Steel et al., 2013).

Lung and respiratory tract disease is a prevalent condition affecting individuals of all ages, irrespective of demographic factors. In the realm of daily existence, it is commonplace to encounter discussions about various ailments prevalent within society, including but not limited to asthma, bronchitis, tuberculosis, and coughs and fevers. Despite the absence of immediate life-threatening consequences, it is important not to dismiss lung and airway diseases as inconsequential due to the potential for various complications to arise (Octavia & Fadli, 2014).

According to Yolanda and Rusmawan (2017), implementing a system design to address issues encountered in the monitoring process, particularly those necessitating a time-consuming follow-up procedure, may adversely affect customers.

This study aims to facilitate the identification of respiratory disorders among the general population

by utilizing their presenting symptoms. Utilizing web-based platforms facilitates the remote diagnosis of respiratory disorders, enabling individuals to access this service conveniently and at any time.

Expert systems are extensively employed because they store expert knowledge in specific domains within computer programs, enabling computers to make decisions and engage in intelligent reasoning (IndraPerwira & Aziz, 2013).

The process of Backward Chaining involves the matching of facts or statements, commencing from the right side. In other words, it entails reasoning that initiates from the hypothesis and proceeds to search for relevant facts within the knowledge base. The employed search technique involves utilizing established facts, which are subsequently compared to the THEN portion of the THEN-IF Rule for identification and correlation.

METHOD

The stages in the research are as follows:

a. Data collection
   To get correct, accurate, and relevant data as input for the system. Data was collected by conducting literature studies in journals, books, and interviews with a nurse named Rini Lestari
b. System planning
   They are designing a software system to discover what diseases and symptoms the patient is experiencing, questions and knowledge of the types of symptoms, and how to deal with them.
c. The method used is the backward chaining method; this method searches from a problem to its solution. Then the process will provide a conclusion.

RESULTS AND DISCUSSION

Based on a problem analysis that involved data collection, literature reviews in journals and books, interviews, and the storage of the results in a knowledge base.

The following research design table is in Table 1 to help manage data entered into the knowledge base:

Table 1. Respiratory Disorders

No	Code	Respiratory disorders
1	GP01	Asthma
2	GP02	Pneumonia
3	GP03	Ispa
4	GP04	Lung cancer
5	GP05	Bronchitis
6	GP06	tuberculosis
7	GP07	sinuses
8	GP08	Diphtheria

In table 1 are types of respiratory disorders consisting of 8 respiratory disorders

The symptoms that often attack respiratory disorders are:

Table 2. Symptoms in Respiratory Disorders

Code	Symptoms Experienced
G01	Hard to breathe
G02	Cough with phlegm
G03	Headache
G04	Chronic Cough
G05	Bleeding cough
G06	Chest pain
G07	Coughs
G08	Fever
G09	Sore throat
G10	Wheezing
G11	Chest tightness
G12	Chest Pain When Breathing
G13	Nausea and Vomiting
G14	Have a cold
G15	Swallowing Pain
G16	Sweating at Night
G17	Nasal congestion
G18	Pain in the Face
G19	Decreased Ability to Smell
G20	Hoarseness

G21	Lumps Appear on the Neck Due to Swollen Lymph Nodes

Table 2 shows the respiratory symptoms that often occur in respiratory disorders that occur in 43 symptoms often felt in daily activities.

The following is how the Backward Chaining method works:

1. Then (Asthma et al.) IF (Shortness of Breath AND Coughing AND Wheezing AND Tightness in Chest)
2. Then (Pneumonia et al.) IF Fever AND Coughing With Phlegm AND Chest Pain When Breathing AND Nausea and Vomiting
3. Then (Lung et al.) IF Chronic Cough AND Shortness of Breath AND Coughing Up Blood AND Chest Pain
4. Then (Isp Respiratory Disorders) IF Cold AND Fever AND Swallowing Pain AND Headache
5. Then (Bronchitis et al.) IF Cough AND Fever AND Shortness of Breath AND Sore Throat
6. Then (Tuberculosis et al.) IF Coughing Up Blood AND Fever AND Chest Pain AND Night Sweats
7. Then (Sinusitis et al.) IF Cold AND Stuffy Nose AND Pain in the Face AND Decreased Sense of Smell
8. Then (Diphtheria et al.) IF Sore Throat, Hoarseness Cough, AND A Lump Appears in the Neck Due to Swollen Lymph Nodes

a. System Requirements Analysis

The system requirements analysis that will be designed is adjusted to the user needs analysis. Analysis of system requirements includes:

1. Data Input (Input)

   The input data required are disease, symptoms, causes, and solutions. Disease data is needed because it is the core of knowledge used for diagnostic purposes. Symptom data is data that is shown or will be selected by the user. Systems required for input data specifications:
2. Data Output (Output)

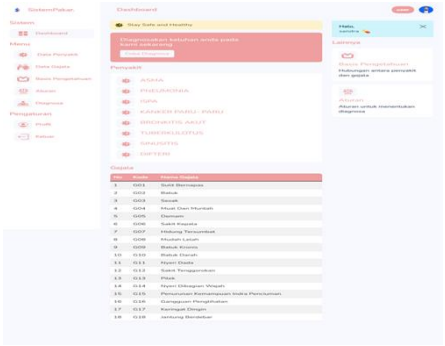
   The system designed can provide output in the form of:
   a. Can display possible diseases from the diagnosis results.
   b. Can display the percentage value of the disease
   c. Can display causes and solutions according to the disease diagnosed
3. Process

   The data that will be processed to become the result of a diagnosis begins when the user selects the symptoms that are felt; these symptoms will be processed by the system with backward chaining tracking. This method will compare each symptom with the existing disease and calculate its capacity until the highest value is obtained, which is the result of the diagnosis. The result of the process is a diagnosis of the name of the disease that the patient (user) is likely to suffer from with a percentage value of the certainty value of the disease.

b. System Implementation

System Implementation is the Design stage of the analysis results and is the result of a ready-to-use website.

The following is the implementation of the website dashboard system for diagnosing respiratory disorders in humans.



CONCLUSION

The system can analyze the symptoms displayed by a person with a specific type of sickness, according to the findings of research on expert systems for detecting respiratory ailments, using the website-based backward chaining method.

This website's Respiratory Disorder Diagnostic Expert System will provide a condition's initial diagnosis and details on its definition, prevention, and treatment to help medical professionals identify the symptoms and different kinds of respiratory problems. Before speaking with specialists or doctors, this technique may help regular people diagnose symptoms and respiratory problems early.

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