

Medical Diagnosis Expert System

1. Introduction

In many areas, especially remote or underdeveloped regions, access to medical professionals is limited. Patients often experience symptoms but lack the medical knowledge to understand their condition or determine if they need urgent care.

This expert system is developed to provide basic medical diagnosis based on symptoms described by the user. It mimics the reasoning process of a medical expert by using a knowledge base of symptoms and associated diseases. The system asks the user about symptoms, matches them against known patterns, and provides possible diagnoses.

An expert system is ideal for this problem because it can reason through a set of rules to deliver consistent, explainable, and quick responses. It can be used as a first-level diagnostic tool to assist individuals before seeing a doctor.

2. Knowledge Sources

1. Mayo Clinic (www.mayoclinic.org)
2. WebMD (www.webmd.com)
3. Healthline (www.healthline.com)
4. Medical textbooks:
 - "Introduction to Clinical Diagnosis"
 - "Bates' Guide to Physical Examination and History Taking"
5. Consultation with a general medical practitioner
6. Common knowledge and experience with day-to-day illnesses

3. Facts

% Symptoms

symptom(fever).

symptom(cough).

symptom(sore_throat).

symptom(runny_nose).

symptom(headache).

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symptom(fatigue).
symptom(body_ache).
symptom(sneezing).
symptom(nausea).
symptom(vomiting).
symptom(diarrhea).
symptom(stomach_pain).
symptom(rash).
symptom(chills).
symptom(shortness_of_breath).
```

```
% Disease-Symptom relationships
```

```
has_symptom(flu, fever).
has_symptom(flu, cough).
has_symptom(flu, sore_throat).
has_symptom(flu, body_ache).
has_symptom(flu, fatigue).
has_symptom(common_cold, cough).
has_symptom(common_cold, runny_nose).
has_symptom(common_cold, sneezing).
has_symptom(common_cold, sore_throat).
has_symptom(food_poisoning, nausea).
has_symptom(food_poisoning, vomiting).
has_symptom(food_poisoning, diarrhea).
has_symptom(food_poisoning, stomach_pain).
has_symptom(covid19, fever).
has_symptom(covid19, cough).
has_symptom(covid19, shortness_of_breath).
has_symptom(covid19, fatigue).
has_symptom(covid19, headache).
has_symptom(allergy, sneezing).
has_symptom(allergy, runny_nose).
has_symptom(allergy, rash).
```

4. Rules

```
diagnose(flu) :-
    has(fever), has(cough), has(sore_throat),
    has(body_ache), has(fatigue).
```

```
diagnose(common_cold) :-
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```
has(cough), has(runny_nose), has(sneezing),  
has(sore_throat).
```

```
diagnose(food_poisoning) :-  
    has(nausea), has(vomiting), has(diarrhea),  
    has(stomach_pain).
```

```
diagnose(covid19) :-  
    has(fever), has(cough), has(fatigue),  
    has(shortness_of_breath).
```

```
diagnose(allergy) :-  
    has(sneezing), has(runny_nose), has(rash).
```

5. Prolog Source File

```
% Medical Diagnosis Expert System  
% File: diagnosis.pl  
  
% Symptoms and facts defined as above  
  
% Dynamic predicate  
:- dynamic(has/1).  
  
% Rules defined as above  
  
% Ask user for symptoms  
ask_all_symptoms([]).  
ask_all_symptoms([Symptom|Rest]) :-  
    format('Do you have ~w? (yes/no): ', [Symptom]),  
    read(Response),  
    (Response == yes -> assertz(has(Symptom)) ; true),  
    ask_all_symptoms(Rest).  
  
% Start the system  
start :-  
    retractall(has(_)),  
    findall(S, symptom(S), SymptomList),  
    ask_all_symptoms(SymptomList),  
    (diagnose(Disease) ->  
        format('~nYou may have: ~w~n', [Disease]));
```

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```
write('~nNo known diagnosis.')).
```