

Experiment No : 6

Aim : Develop an Expert System to analyse the symptoms of common flu and suggest proper remedy. Consider at least 5 different symptoms and 5 different conditions to suggest remedies.

Theory :

An expert system is computer software that attempts to act like a human expert on a particular subject area. Expert systems are often used to advise non-experts in situations where a human expert is unavailable (for example it may be too expensive to employ a human expert, or it might be difficult to reach location). An expert system is made up of three parts:

1. A user interface - This is the system that allows a non-expert user to query (question) the expert system, and to receive advice. The user-interface is designed to be as simple to use as possible.
2. A knowledge base - This is a collection of facts and rules. The knowledge base is created from information provided by human experts
3. An inference engine - This acts rather like a search engine, examining the knowledge base for information that matches the user's query

Code :

```
#include<vector>
#include<iostream>
#include<bitset>
using namespace std;
class ExpertSystem{
protected:
vector<string> qs;
vector<bool> ans;
bitset<100> result;
vector<bitset<100>> knowledge;
public:
void add_q(string q){qs.push_back(q);}
bool getAnswer(){
char ans;
cin>>ans;
while(ans!='y' && ans!='n'){
cout<<"You answered " <<ans<<" " <<(ans=='y')<<endl;
cout<<"Answer y for yes or n for no. Please try again"<<endl;
cin>>ans;
}
return ans=='y';
}
};

class FluExpert:public ExpertSystem{
public:
FluExpert(){
knowledge={
0b00101, // fever && sore throat -> flu
0b10100, // sore throat && body ache -> flu
0b10001 // body ache && fever -> flu
};
/* Questions:
0. fever
1. cough
```

```

2. sore throat
3. runny nose
4. body ache
*/
add_q("Does the patient have a fever?");
add_q("Does the patient have a cough?");
add_q("Does the patient have a sore throat?");
add_q("Does the patient have a runny or stuffy nose?");
add_q("Does the patient have muscle or body ache?");
}
void infer(){
int i;
// Generate answer bitset
bitset<100> answer;
for(i=0;i<ans.size();i++){
answer[i]=ans[i];
}
/* cout<<answer<<endl, */
// Use knowledge to get inference
bool hasFlu=false;
for(i=0;i<knowledge.size();i++){
if(knowledge[i].count()==(knowledge[i]&answer).count()){
hasFlu=true;
}
}
// Print inference
cout<<"CONCLUSION:"<<endl;
if(hasFlu){
cout<<"Patient has the common flu"<<endl;
}
else if(answer[0]==0){
cout<<"Patient does not have the common flu"<<endl;
}
else{
cout<<"Inconclusive. Patient may or may not have the common flu"<<endl;
}
}
void run(){
int i;
// Ask questions
for(string question :qs){
cout<<question<<" [y/n]"<<endl;
ans.push_back(getAnswer());
}
}
};
int main(){
FluExpert patient0=FluExpert();
patient0.run();
patient0.infer();

```

}

Output :

Does the patient have a fever? [y/n]

y

Does the patient have a cough? [y/n]

n

Does the patient have a sore throat? [y/n]

y

Does the patient have a runny or stuffy nose? [y/n]

n

Does the patient have muscle or body ache? [y/n]

n

CONCLUSION:

Patient has the common flu

Conclusion : An expert system to analyze the symptoms of common flu and suggest proper remedy was successfully written and executed

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