Expert system

Expert systems are used to provide expert opinions without the need for the expert by using a system allowing the user to query the knowledge base to find solutions to their problems.

Four parts of expert system

Knowledge base - Information is developed by experts based on a collection of facts and rules.
For example a medical diagnosis expert system would be developed by doctors.

Knowledge base

Inference Engine - The Inference engine will act as a search engine. It will query the knowledge base to match the query of the user.

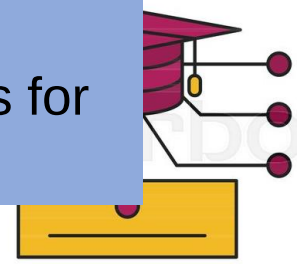
Inference engine

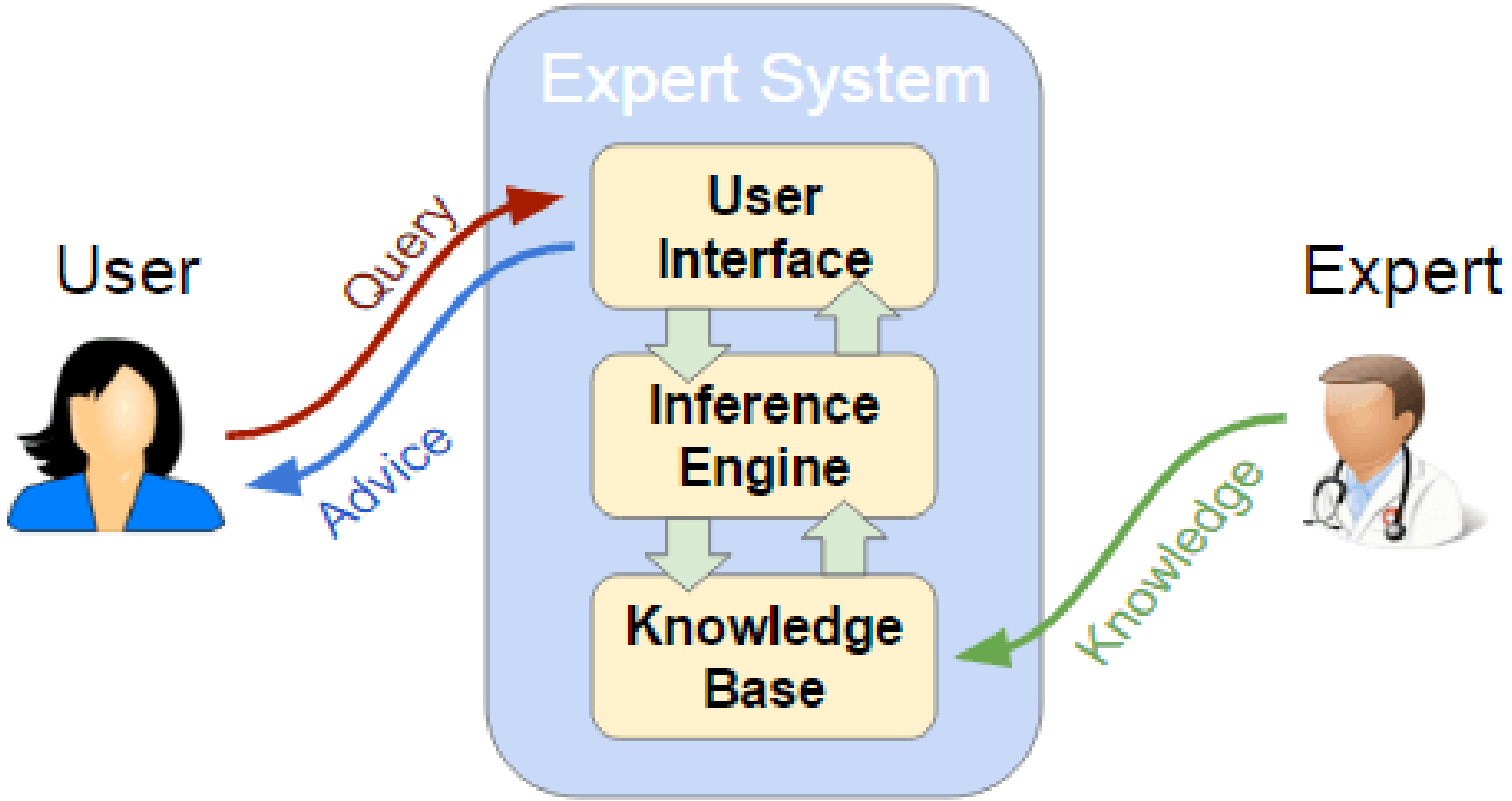
Rule base

Rule base – The human mental process is internal, and it is too complex to be represented as an algorithm. However, most experts are capable of expressing their knowledge in the form of rules for problem solving.
F.ex: IF the traffic light is green THEN the action is go
IF the traffic light is red THEN the action is stop

User interface

User interface - Will allow user to interact with the system to receive feedback.
For example the user may be prompted to enter their symptoms for a medical issue.




Expert System
User Interface
Inference Engine
Knowledge Base
User
Query
Advice
Expert
Knowledge

Creating an Expert System

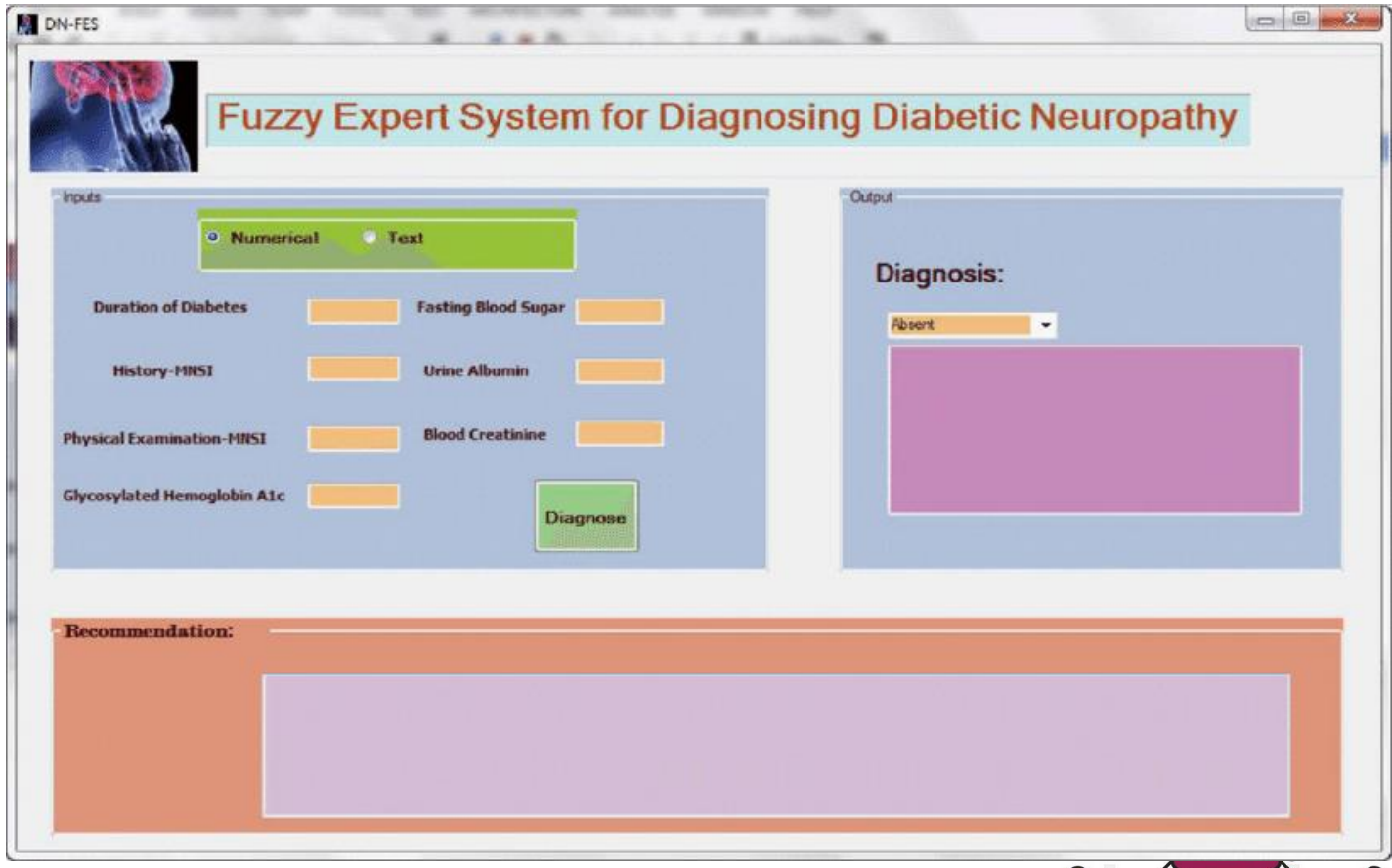
1. Data is gathered/collected from experts to create a knowledge base.
2. The rules base is designed/created based on the information from the knowledge base.
3. A user interface screen is designed/created which would provide the user with the ability to interact with the system.
4. The inference engine is designed/created as link between the user interface and the knowledge base.
5. The system is tested.

User Interface

The user interface is the screen in to which the user types in the query and it has 2 functions:

- Accept input in from the user,
- Output advice to the user.

Depending on the system the user interface might involve a touch screen, keyboard or even just a simple keypad (for example car diagnostic systems)



Inference Engine

The inference engine handles the query from the user and searches the knowledge base for the relevant information. Depending on the data input by the user the inference engine will do one of two things:

- Pass information to user interface asking the user for further information about the problem. This information is then used to narrow down the issue.
- Output some advice to the user.

Example system

- User input > I feel sick – *User enters a query*
- System Output >What did you eat for lunch? – *System asks a clarifying question.*
- User input > Live worms – *User enters further information*
- System Output > Don’t eat worms. – *System outputs advice*

Knowledge & Rules Base

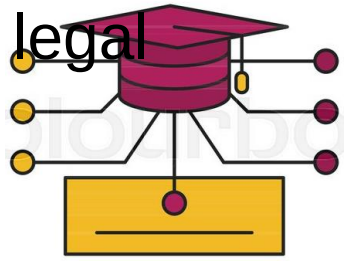
The knowledge base is a database of information that has been populated by experts in the field. A knowledge base contains two parts:

- The knowledge base with the expert information contained within it.
- The rules base that is used by the inference engine to determine which knowledge should be used.

The quality of advice given by an expert system is entirely dependent on the accuracy and depth of information that has been entered in to the system.

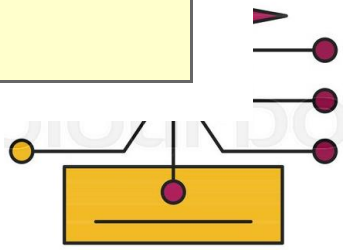
Examples of expert system

- Medical diagnosis system – There are a number of online medical systems where you can input your symptoms and the computer will output a number of likely medical conditions that your problem could be. (WebMD)
- Mineral prospecting – User can input a number of pieces of geological information about a location (rock types, location, climate) and the system will output the likelihood of the being a deposit in the area.
- Car engine fault diagnosis – Car mechanics and engineers use fault diagnosis systems to find out what is causing car faults
- Chess game in computer – For games like chess users can input the position of pieces on the board and the computer will output a move to make.
- Legal systems – There a number of different systems that give online legal advice, depending on the query input.



Advantages and disadvantages of expert system

Advantages	Disadvantages
Fewer mistakes - expert systems never forget answers to problems. People do!	They **cannot make judgments** and lack common sense.
More knowledge than a single human expert **(combine the knowledge of many experts)**.	**Errors** in the **rule base** can lead to **incorrect decisions** being made.
Cheaper to use than **hiring very expensive human experts** to solve your problems.	Require **lots of training** before people can use them correctly.
More consistent answers than human experts (they give the same answers to the same problems every time).	



In wikipedia

- In artificial intelligence, an **expert system** is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if–then rules rather than through conventional procedural code.

Try WebMD – Medical expert system

Try Akinator – Guest people

Read MORE from https://ictlounge.com/html/expert_systems.htm