*Skrivet av Evan Saboo och Perttu Jääskeläinen*

Expert systems are computer systems with the purpose of making logically based assessments within a complex domain where human knowledge is inadequate or errorable. In short, expert systems should be able to help a novice to make the same decision and draw the same conclusion that an actual expert would make or possibly exceed. These systems consist of a knowledge base and an inference engine, where the knowledge base consists of stored facts about the domain in terms of networks, rules and frameworks. The purpose of the inference engine is to then apply the stored knowledge from the knowledge base in the given case by logical rules, thereby generating "new" knowledge that will exceed or measure the expert's opinion. [[1]](#footnote-0) [[2]](#footnote-1)

A Knowledge Based system is essentially an expert system but they use two different domains of data. A knowledge system generally works with information which currently is available, which may or may not be valid. On the other hand, an expert system works with reliable information which is known to be correct.[[3]](#footnote-2)

The knowledge of these systems consists of Knowledge Representation, which is not pure data - it can be represented in many ways from the data that is available. Among others, knowledge representation can consist of rules (ex. if A and B are true, so is C), logic and semantic networks, which together build the knowledge of the system. Using the previous example, if the knowledge base consists of the rule C :- A, B; the Knowledge Representation is A and B to represent C.[[4]](#footnote-3) [[5]](#footnote-4) [[6]](#footnote-5)

Knowledge representation is not limited to these types of systems, it is an area where methods to represent data from the real world for computers/AI, in the form of various methods, some mentioned in the previous paragraph.

What is the main purpose of Expert Systems?

The main purpose of Expert Systems is to replicate knowledge and skills of human experts in a particular area, and then to use this knowledge to solve similar problems without human experts participation. In short, expert systems should be able to help a novice to make the same decision and draw the same conclusion that an actual expert would make or possibly exceed. [[7]](#footnote-6)

What is the difference between knowledge based systems and expert systems?

A Knowledge Based system is essentially an expert system but they use two different domains of data. A knowledge system generally works with information which currently is available, which may or may not be valid. On the other hand, an expert system works with reliable information which is known to be correct.

What is procedural and declarative knowledge?

Procedural knowledge is the knowledge of how something is done, for example knowing how to drive a car.

Declarative Knowledge is the knowing of basic facts and the recall of stored information.

[Lecture 4]

Give 4 useful tools which can help with prototyping knowledge presentations.

Graphic maps can be used to easier understand how the structure is represented. These are cognitive map, inference network, decision tree and charts.[Lecture 4]

What are the limitations of expert systems?

* They can only handle specific domain compared to a human expert which can handle more domains.
* They don’t have common sense or emotions to be aware of the situation.
* Expert systems can’t learn for themselves and needs to manually receive new data.[[8]](#footnote-7)

What are the limitations of expert systems?[[9]](#footnote-8)

It can be difficult to extract all information needed from human experts, there may be facts that are known but the methods to derive the facts may not the as easy to represent in a knowledge based system.

What is Knowledge Representation?

It is the way the knowledge is stored in the knowledge base. For example, in a rule-based knowledge base where A and B are true, knowledge representation can be: IF A AND B THEN C. The knowledge of C is represented through the rule including A and B.

What is a cognitive map?

A mental representation/map of one’s environment, which can be represented as graphs or fuzzy cognitive maps in expert systems.

What is an example of a system that uses expert systems?

MYCIN is a rule-based expert system that is used to diagnose bacterial infections of the blood. It does so by asking questions and using backward-chaining through a rule base of about 500 rules, to then determine and recommend effective drug prescriptions.[[10]](#footnote-9)

What are some areas where expert systems have been commercially applied?[[11]](#footnote-10)

Finance: insurance evaluation, credit analysis, tax planning, financial report analysis etc..

Data processing: system planning, equipment selection equipment maintenance etc..

1. <https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert_systems.htm> [↑](#footnote-ref-0)
2. Lecture 4 in the course [↑](#footnote-ref-1)
3. <https://www.quora.com/Whats-the-difference-between-a-knowledge-based-system-and-an-expert-system> [↑](#footnote-ref-2)
4. <https://web.stanford.edu/class/cs227/Lectures/lec01.pdf> [↑](#footnote-ref-3)
5. <http://groups.csail.mit.edu/medg/ftp/psz/k-rep.html#kr> [↑](#footnote-ref-4)
6. <https://fenix.tecnico.ulisboa.pt/downloadFile/3779571248588/Cap1.pdf> [↑](#footnote-ref-5)
7. <http://202.114.32.200:8080/courseware/208405/20840511/Test/chap3.htm> [↑](#footnote-ref-6)
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9. <https://eliazakharia.files.wordpress.com/2012/10/decision-support-systems-and-intelligent-systems.pdf> s. (bok 564, pdf 587) [↑](#footnote-ref-8)
10. <https://eliazakharia.files.wordpress.com/2012/10/decision-support-systems-and-intelligent-systems.pdf>

    s. (bok 552, pdf 575) [↑](#footnote-ref-9)
11. <https://eliazakharia.files.wordpress.com/2012/10/decision-support-systems-and-intelligent-systems.pdf> s. (bok 554, pdf 577) [↑](#footnote-ref-10)