

Information Systems Prelim 0708

Section 3

25. a. A decision support system (DSS) is a mechanism for collating information that is used as part of the process by users allowing them to make decisions.

An expert system is designed to provide the actual advice that is used to treat a patient.

It uses a knowledge base of facts and rules, and from such the experts system itself infers new knowledge.

A DSS is used mainly at a tactical level within an organisation whereas an expert system operates at all levels.

b. Category: Planning

Main Characteristics: Provided instructions to allow a robot to navigate a room.

Major influence in development of planning expert systems.

26. a. If vessel is pleasure boat and power is by an engine THEN this boat is a power boat.

If this boat is a power boat and engine is mounted outside the stern THEN engine type is an outboard engine.

If this boat is a power boat and engine is inside the hull of the boat THEN engine type is an inboard engine.

If vessel is pleasure boat and power is by the wind THEN this boat is a sail boat.

b. Classification. It is being used to take an item's characteristics to state a particular group (such as pleasure boat) the item belong to. This is a means of classification.

c. (i). Many domains have information which is uncertain in nature, i.e. how sore is the pain. Using certainty factors allows the system to more accurately reflect advice in a way that a human expert would be able to.

Certainty factors allow the user to see there is an element of doubt in accepting the system's advice so they are unlikely to be completely surprised if problems arise.

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26. c. (ii). Some expert systems do not use certainty factors because the nature of the domain may be such that there is no uncertainty in advice provided and answers offered.

Another chosen expert system may not support certainty factors without the Knowledge Representation Language.

d. (i). Conflict resolution strategies are required as at any particular point during a consultation there may be more than one rule that could fire. A rule is in a state to fire when the conditions attached to the rule match the facts held in working memory.

(ii). The RETE algorithm provides a conflict set at each point during a consultation by examining the facts held in working memory in comparison to rules in the knowledge base to evaluate which rules could fire.

(iii). The refractoriness strategy works by removing any rule that has already fired from the conflict set to remove the possibility of infinite loops.

27. a. Using an expert system will provide the engineers with immediate access to the specialist knowledge of one or more human experts.

It also can be used to provide the engineers with a valuable second opinion when they are not completely convinced of their own diagnosis of a problem.

b. The service engineer is responsible in that he is meant to be a professional in solving such problems and it is part of his job to ensure that the advice he provides is correct.

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27. c. (i). The domain expert could provide information which turns out to be incorrect.

(ii). The knowledge engineer could wrongly code the (correct) information that he has received from the domain expert.

d. Representation of data/knowledge

A RDBMS stores data as fields and records in tables of data.

An expert system stores data as facts and rules in a knowledge base.

Extraction of data/knowledge

With an RDBMS data is extracted by the use of queries where users choose the criteria to enter in one or more fields to isolate records that match the query constraints.

An expert system extracts data by the user answering questions during a consultation via the user interface until one or more pieces of advice are generated.

With an RDBMS, the user has to know exactly what they are looking for in terms of deciding query constraints. They will have used the expert system because there is no need for this knowledge. The onus on the user is simply to answer questions posed by the system which will then provide the required advice.

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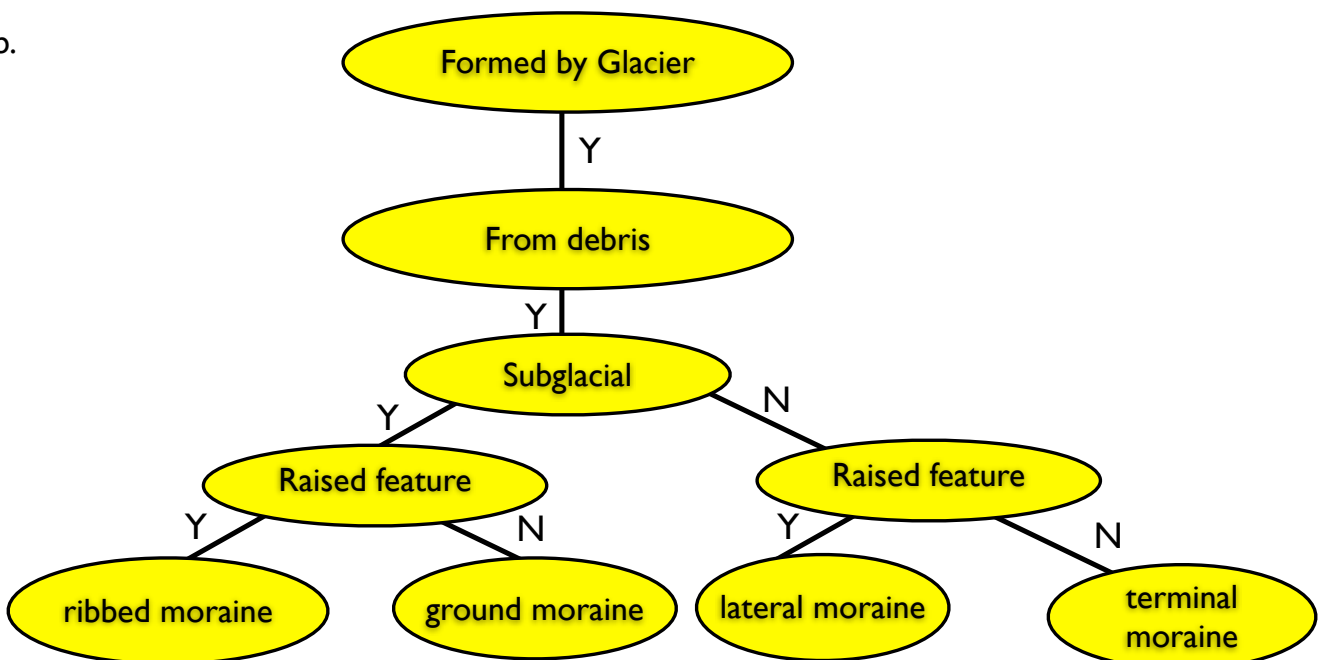
28. a. gorge(landform, extends_beneath_terrain, has_steep_cliffs, formed_by_erosion)

valley(depression_between_two_mountains)

rivervalley(valley_formed_by_river)

glacialvalley(valley, formed_by_glacier)

b.



28. b. (ii). Decision trees provide a more visual representation of domain knowledge and make it easier to trace how advice is provided during a consultation.

Factor tables give a detailed breakdown regarding how every domain constraint affects each and every possible outcome.

Factor tables can be easier to update in light of new or amended knowledge.

c. A deductive database is a system that combines the search/sort and storage facilities of a database with the inferencing capacity of an expert system.

d. (i). The inference engine starts with an initial hypothesis of what the advice to be generated should be. It then works backwards to collect evidence to confirm this hypothesis. If the hypothesis is rejected, then another one is chosen and the same system repeats again.

(ii). Structure is arete IF feature is a thin ridge of rock between two valleys.

Structure is plateau IF feature is a raised area of land consisting of a flat region.