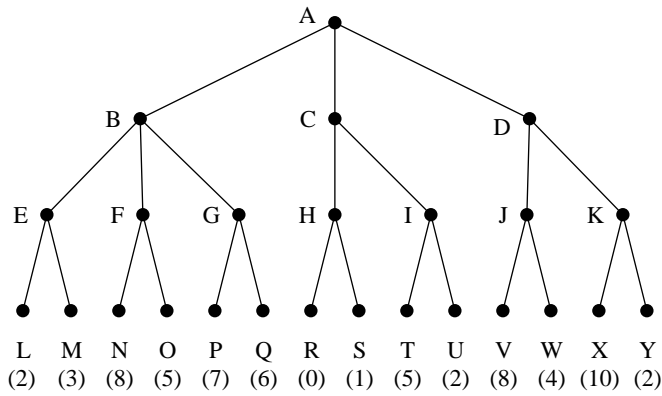


CIS 716 Homework 3

- Consider the following game tree in which the scores for the leaf nodes are given from the first player's point of view. Assume that the first player is the maximising player.



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- What move should the first player choose?
- What nodes would not need to be examined using the alpha-beta approach, assuming that nodes are examined from left to right?

(30 points)

- Most game-playing programs do not save search results from one move to the next. Instead they usually start over from scratch when it is the machine's turn to move. Why?

(10 points)

- (The next two questions refer to the animals rule base given at the end of this assignment.)

Given the following facts

```

animal gives milk
animal chews cud
animal has black stripes
  
```

use forward chaining to find out what animal is implied.

Note that I don't just want the answer, what I want is for you to give me all the facts that forward chaining infers.

(10 points)

4. Given the following facts

```
animal can fly
animal lays eggs
animal is good flyer
```

use backward chaining to see if you can prove that the animal is

- (a) An ostrich
- (b) An albatross

Note that I don't just want the answer, what I want is for you to show the proof process that backward chaining goes through.

(20 points)

5. What sets of facts would suffice to establish that an animal was an ostrich?

(10 points)

6. Suppose that we allowed rules with OR connectives in, as well as just AND. What changes would we need to make to our forward and backward chaining algorithms to support these enriched rules? Give pseudo-code for the algorithm.

(20 points)

The Animals Rule Base

```
R1: IF animal has hair
    THEN animal is a mammal
```

```
R2: IF animal gives milk
    THEN animal is mammal
```

R3: IF animal has feathers
THEN animal is a bird

R4: IF animal can fly
AND animal lays eggs
THEN animal is bird

R5: IF animal eats meat
THEN animal is carnivore

R6: IF animal has pointed teeth
AND animal has claws
THEN animal is carnivore

R7: IF animal is mammal
AND animal has hoofs
THEN animal is ungulate

R8: IF animal is mammal
AND animal chews cud
THEN animal is ungulate

R9: IF animal is mammal
AND animal is carnivore
AND animal has tawney colour
AND animal has dark spots
THEN animal is cheetah

R10: IF animal is mammal
AND animal is carnivore
AND animal has tawney colour
AND animal has black stripes
THEN animal is tiger

R11: IF animal is ungulate
AND animal has long legs
AND animal has dark spots
THEN animal is giraffe

R12: IF animal is ungulate
AND animal has black stripes
THEN animal is zebra

R14: IF animal is bird
AND animal does not fly
AND animal has long legs
AND animal has long neck
THEN animal is ostrich

R14: IF animal is bird
AND animal does not fly
AND animal can swim
AND animal is black and white
THEN animal is penguin

R15: IF animal is bird
AND animal is good flyer
THEN animal is albatross