CSCU9T6 Spring 2019

Tutorial on Inference and Rule-Based Systems

1. Here are some rules which form part of a knowledge base for identifying dinosaurs.

   RULE [Rule 1] IF [diet] = "carnivorous" AND
   [weight] > 5000
   THEN [dinosaur species] = "tyrannosaurus rex"

   RULE [Rule 2] IF [diet] = "carnivorous" AND
   [weight] < 5
   THEN [dinosaur species] = "compsognathus"

   RULE [Rule 3] IF [appearance of teeth] = "sharp, pointed, blade-like" OR
   [appearance of face] = "front facing nostrils and eyes"
   THEN [diet] = "carnivorous"

   RULE [Rule 4] IF [appearance of teeth] = "flat, leaf-shaped"
   THEN [diet] = "herbivorous"

   The dinosaur specimen before us has front facing nostrils and eyes. We estimate that its weight is about 3 kg. Luckily for us, it is asleep, so we cannot observe its teeth.

   Using *forward chaining*, i.e., starting with the observable facts, what can we infer about the dinosaur? Show all the steps involved.

   Now, show how we could use *backward chaining* (or goal-directed search) to arrive at the same conclusion.

2. In a rule-based system which uses certainty factors we have the following rules (perhaps amongst others):

   Rule 1. if B and C then A @ 90

   Rule 2. if J or E then B @ 100

   Rule 3. if D or E then C @ 60

   Rule 4. if G and H then D @ 100

   Rule 5. if K and F then E @ 100

   If we are given CFs as follows: CF(F)=75%, CF(G)=90%, CF(H)=80%, CF(I)=75%, CF(J)=70%, CF(K)=50%, calculate the CF for A.

3. Given the set of rules in the previous question, suppose that the system contains another rule of the form if … then A, and that by using this rule we obtain a CF for A of 50%. What CF do we get for A overall?