SIT215 – Week 1 – Take Home Task

Creating a Rule Base

Overview

In week 1 we are looking at Rule-based Expert Systems. There are one of the earliest attempts to capture domain expert knowledge into a software system, to provide a mechanism for automated decision systems, automated decision support, and rule-based control systems. You should review the week 1 lecture before undertaking this task.

Task: Diagnosing problems with starting your car

Consider the following section from the workshop manual for a Nissan car:

> *Turn the key and try to crank the starter. If it is dead (i.e., engine does not turn over) or cranks slowly, turn on the headlights. If the headlights are bright, the trouble is either in the starter itself, the solenoid, or in the wiring. To find the trouble, short the two large solenoid terminals together. If the starter turns normally, the problem is in the wiring up to the ignition switch or in the solenoid, so check them. If the starter does not work normally, check the bushings. If the bushings are good, send the starter to a test station to replace it.*
>
> *If the headlights are out, or very dim, check the battery. If the battery is okay, check the wiring for breaks, shorts, and dirty connections. If the battery and connecting wires are not at fault, turn the headlights on and try to crank the starter. If the lights dim drastically, it is probably because the starter is shorted to ground. Have the starter tested or replace it.*

Activities

1) Draw a diagram depicting the sequence of tests and checks described in this manual entry.

2) Write each test or check in terms of the antecedent (conditions) and consequent (conclusions/actions) using IF, THEN, AND, OR as keywords, to produce a set of rules.

Hints

1. You can write rules such as

   IF you crank the starter AND result is that starter is dead THEN …

2. You might like to formalise your condition/action clause, to simplify your rules. E.g.,

   IF activate(starter) AND result(starter test, DEAD) THEN …

3. Each conclusion should be a deduction made about what is wrong with the starter system, or an action that can be taken (e.g., another test).

4. You can add linguistic uncertainty, by using words such as *probably*, or *might*. E.g., "*the starter is probably shorted to ground*".

5. Try to use no more than seven rules!