



AI AND MACHINE LEARNING EXAMINATION

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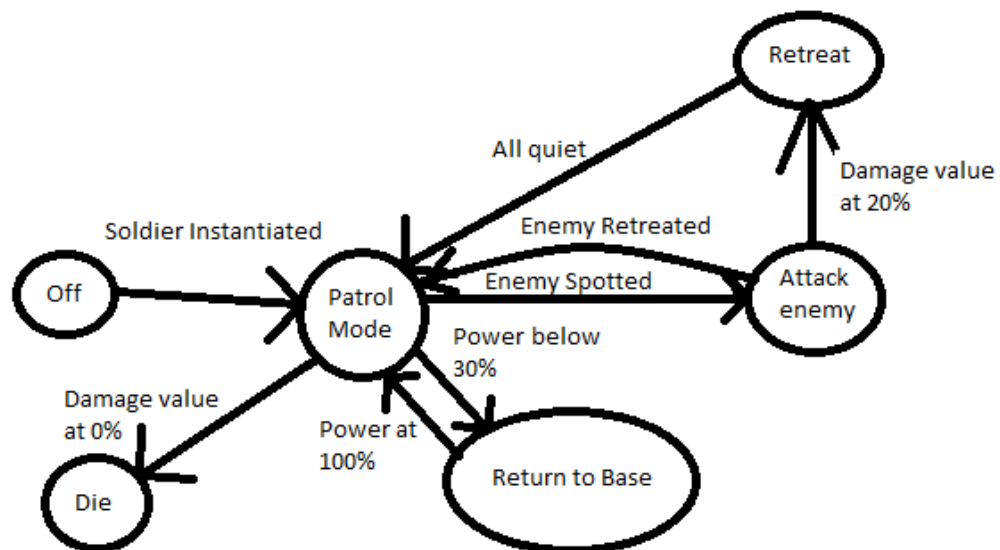
Contents

Question One	2
Part A.....	2
Section i.....	2
Section ii.....	3
Part B.....	3

Question One

Part A

Section I



Section II

Attack::Enter()

```
{  
    enemyRetreated = false  
}  
  
Attack::Execute()  
  
{  
    While (true)  
        If (enemyRetreated == true)  
            Patrol()  
        Else if (dmgValue < 20%)  
            Retreat()  
        Else  
            Fire()  
}
```

Part B

There are two different types of State Machines: Finite State Automata (FSA), and Finite State Machines (FSM). The main difference between these two is that an FSA does not output anything until a terminal state is reached and is used to recognise patterns and to classify sequences, while an FSM produces an output every time an input symbol is consumed. There are also two types of FSM: Mealy Machines, and Moore Machines. The main difference between these two is that Moore Machines output data depending on the state, while Mealy Machines output data on each transition, and so need fewer states.

Question Two

Part A

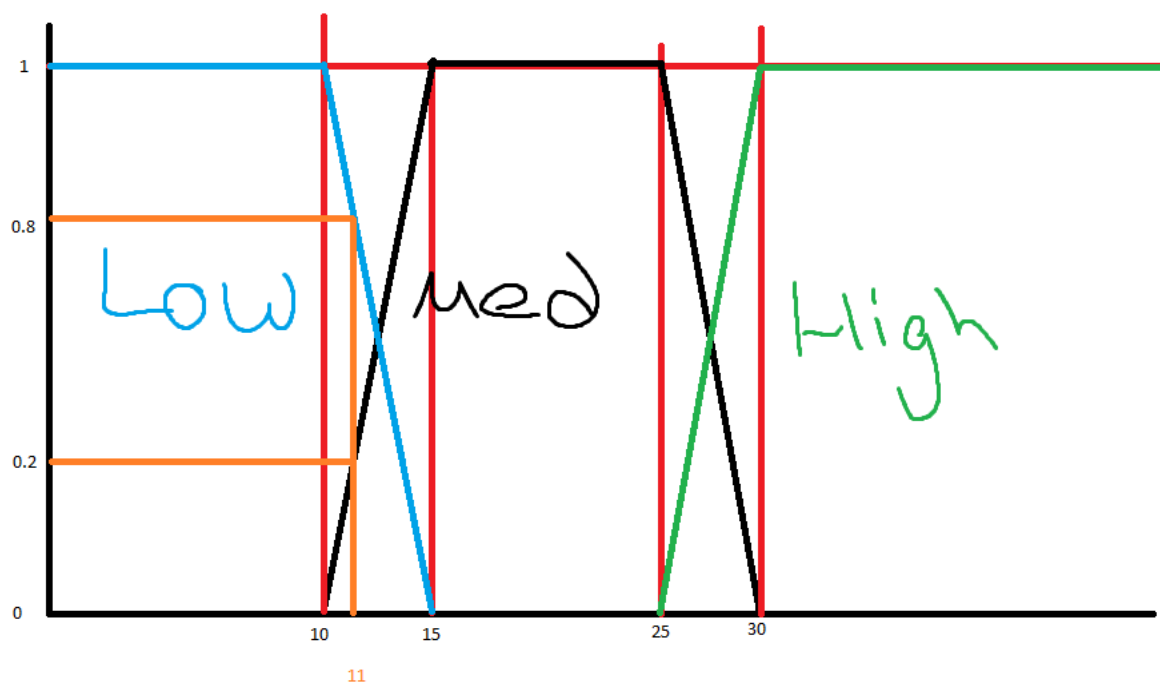
While Boolean Logic operates on a zero-or-one basis, Fuzzy Logic instead operates on a spectrum of values, ranging **from** zero **to** one. Every “jump” between values (usually in increments of 0.1) is called a degree of membership. A degree of zero means the variable is not a member, while a degree of one means it is a member. Anything in between is part member.

Part B

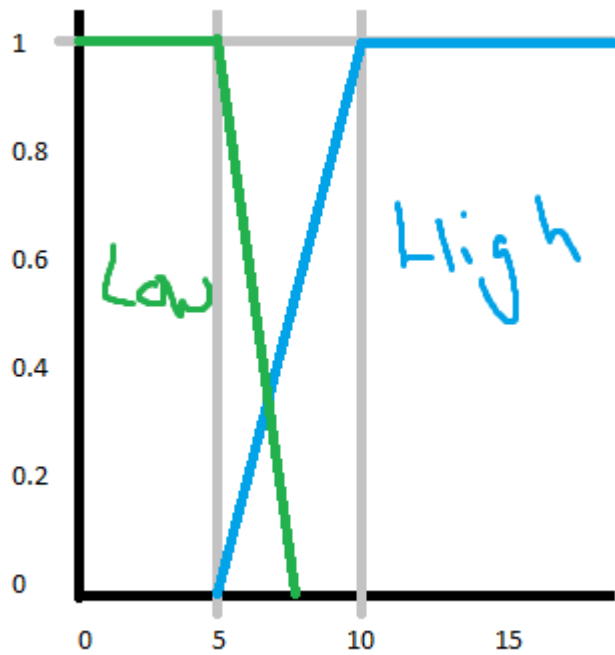
There are two defuzzification techniques: Centroid and “Sugeno Fuzzy Interference”.

Centroid defuzzification works by finding the “centre of gravity” (COG) value.

Part C



Relative Power is **LOW**



Relative power = 11

Damage value = 6

Medium Power: x is more than or equal to 10 and less than 15, so membership is $(11-10)/5 = \mathbf{0.2}$

Low Power: x is more than or equal to 10 and less than 15 so membership is $(15-11)/5 = \mathbf{0.8}$

High Power: x is less than 25 so membership is $\mathbf{0}$

Relative Power is **LOW**

High Damage: x is more than or equal to 5 and less than 10 so membership is $(6-5)/5 = \mathbf{0.2}$

Low Damage: x is more than or equal to 5 and less than 7.5 so membership is $(7.5 - 6)/2.5 = \mathbf{0.6}$

Damage Value is **LOW**