

Artificial Intelligence and Expert System

Assignment - Summer 23-24

Assignment Requirements

There are five problems. You need to solve these problems. The assignment must be handwritten. The last assignment submission date is Thursday, September 26, 2024.

Problems

1. You are planning a picnic today, but the morning is cloudy.
Oh no! 50% of all rainy days start off cloudy!
But, cloudy mornings are common (about 40% of days start cloudy).
And this is usually a dry month (only 3 of 30 days tend to be rainy, or 10%).
What is the chance of rain during the day if it's a cloudy day?
2. A person uses his car 30% of the time, walks 30% of the time and rides the bus 40% of the time as he goes to work. He is late 10% of the time when he walks; he is late 3% of the time when he drives; and he is late 7% of the time he takes the bus.
(i) What is the probability he took the bus if he was late?
(ii) What is the probability he walked if he is on time?
3. It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain software brand claims it can detect 99% of spam emails, and the probability of a false positive (a non-spam email detected as spam) is 5%.
 A = event that an email is detected as spam,
 B = event that an email is spam
Now, if an email is detected as spam, then what is the probability that it is, in fact, a non-spam email?
4. Maximize the function $f(x) = x^2 + x - 2$ over the range of integers from 0 to 15 (x is between 0 and 15).
Assume that the population size is 4.
Perform one-point crossover
Always mutate the 2nd last bit
Start with a random initial population.
Apply GA for two iterations.
Whether the new generation has improved after two iterations or not?
5. Maximize the function $f(x) = 2x - 10$ over the range of integers from 15 to 63 (x is between 15 and 63).
Assume that the population size is 4.
Perform two-point crossover
Always mutate the first bit
Start with a random initial population.
Apply GA for one iteration.
Whether the new generation has improved after the first iteration or not?