CS250 - ARTIFICIAL INTELLIGENCE LAB

Assignment-9: Genetic Algorithm

Short URL: shorturl.at/jsAU8

(Read all the instructions carefully & adhere to them.)

Date: 29th March 2023

Total Credit: 10 (Implementation: 5 Explanation: 5)

Instructions:

- Markings will be based on the correctness and soundness of the outputs.
- Marks will be deducted in case of plagiarism.
- Proper indentation and appropriate comments are mandatory.
- Comments/explanations/intuitions should be provided in a separate text/word etc. document and not the code file.

Problem: Implement a genetic algorithm to solve the Knapsack problem. In this problem, the goal is to maximize the value of items that can be placed in a knapsack with a limited weight capacity. You can use the fitness function to calculate the total value of a candidate solution and use selection, crossover, and mutation to generate new candidate solutions.

Input:

K (knapsack's capacity)

n (no. of Item)

W_1, W_2, W_3, ... W_n (weights)

V_1, V_2, V_3, ….. .V_n (values)

Output

P (total possible maximum value)

[1, 0, 0, … n] (i^{th} item considered or not)

Knapsack problem: The Knapsack problem is a well-known optimization problem in computer science. It involves finding the maximum value of items that can be packed into a knapsack with a limited weight capacity.

E.g.:

Input: N = 3, W = 4, profit[] = {1, 2, 3}, weight[] = {4, 5, 1}

Output: 3