MAI First Assignment

Artificial Intelligence, December 2019

1) Please write the high-level code for a genetic algorithm, which is formed by a single individual of length *n* which is a probability vector P[i] with *i*=1 to *n*.

   Each gene P[i] is a real number between 0 and 1 and corresponds to the probability to have 1 in the corresponding position. P[i] is initialized to 0.5.
   The algorithm in each generation produces a given *k* number of traditional 0-1 individuals (solution_vectors[j] with *j*=1 to k) each of them of length *n* by sampling gene by gene with the probabilistic vector.
   Each Individual is evaluated by using the function Evaluate(solution_vectors[j]) that calculates its fitness.
   At the end of each generation, the best *m* individuals are used to update the probabilistic vector.
   The update procedure works like this: for each individual j of the best m chosen, the probabilistic vector is updated using a learning rate *LR* parameter (that is a real number between 0 and 1) in the following way:

   P[i] = P[i] * (1.0 - LR) + solution_vectors[j][i]* (LR);

   with i=1 to n and j=1 to m.

   Please use as given the following procedures
   ind=select_parent(population) it returns an individual from the population with a probabilistic selection based on the fitness.
   ch1, ch2 = crossover(ind1,ind2) returns two individuals ch1 ch2 after applying the crossover algorithm to ind1 and ind1
   ind=mutate(ind) mutates the genes of a single individual

2) Please, execute the Alpha-Beta pruning on this tree, specifying the path that corresponds to final choices of the players (do not indicate values of α, β, v for every node).