CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Metaheuristic Optimization

Lab (Zero Marks) - GSAT
Week 9

Algorithm 1 describes a traditional local search algorithm for SAT solving. It starts with a random truth assignment for the variables in F, and the the local search algorithm is depicted in lines (3-9) here the algorithm flips the most appropriate variable candidate until a solution is found or a given number of flips is reached (MaxFlips), after this process the algorithm restarts itself with a new (fresh) random assignment for the variables.

As one may expect, a critical part of the algorithm is the variable selection function (select-variable) which indicates the next variable to be flipped in the current iteration of the algorithm. The GSAT algorithm selects the best variable (minimizing the number unsatisfied clauses), breaking ties uniformly at random.

Algorithm 1 Local Search For SAT (CNF formula F, Max-Flips, Max-Tries)

```
1: for try := 1 to Max-Tries do
2:     A := initial-configuration(F).
3:     for flip := 1 to Max-Flips do
4:         if  A satisfies F then
5:             return A
6:         end if
7:         x := select-variable(A)
8:         A := A with x flipped
9:     end for
10: end for
11: return 'No solution found'
```

Write a program implementing the GSAT algorithm. Please refer to previous lab for the input and output details of your program.