paulpm / Paul Philip Mitchell

TDT4136 Assignment 4 – Simulated Annealing

General information

Solutions to the given boards are below. My implementation is not complete, as it does not solve the problems properly. The main problems are:

1) The program sometimes outputs an entirely wrong solution, where the *k* constraint is violated. I have not yet identified the reason behind this.

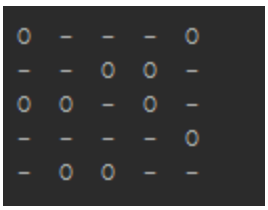
2) Sometimes, for reasons unknown as of yet, the program produces an AttributeError on the current_node in sa.py. Somehow the current_node is set to None in some cases.

3) Often, for reasons unknown as of yet, the Node object passed to the simulated_annealing() method in main.py is not iterable.

As you can see when you try to run the program, it mostly produces an error during execution, but sometimes it does terminate. However, I do think I am close to a solution, there are just some minor logic implementation details missing.

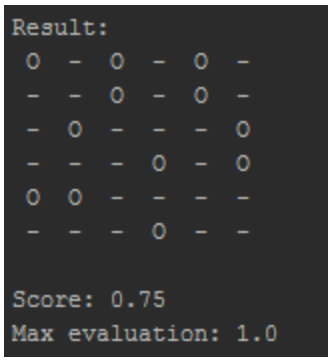
Descriptions of representation, objective function and neighbor generation is found as comments in source code.

PUZZLE VARIANT A.1.1: M=N=5 AND K=2



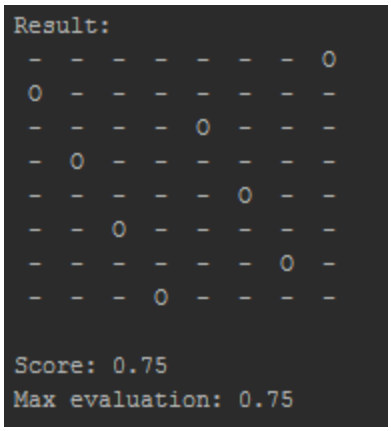
When I ran the program just now, this was the last printed state before terminating with a "'Node' object not iterable" error. I have failed to produce any proper solution to this puzzle variant.

PUZZLE VARIANT A.1.1: M=N=6 AND K=2



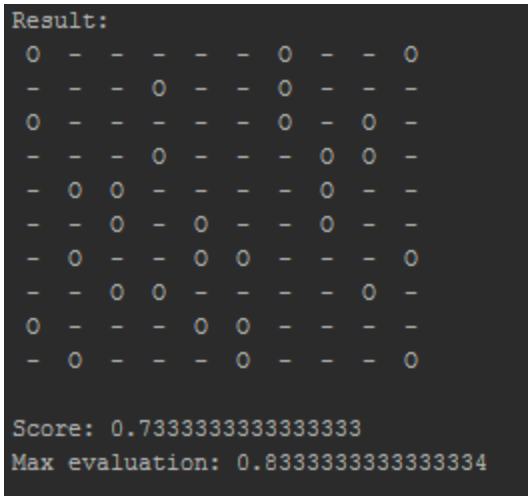
This is the best solution my program could find after running it several times.

PUZZLE VARIANT A.1.1: M=N=8 AND K=1



This is the best solution my program could find after running it several times. This is the N-Queens problems.

PUZZLE VARIANT A.1.1: M=N=10 AND K=3



This is the best solution my program could find after running it several times. Strangely, none of the errors explained on page 1 occur on this board configuration. Therefore, I expect there must be some minor implementation error somewhere.

DISCUSS THE SIMILARITIES AND DIFFERENCES BETWEEN HEURISTICS AND OBJECTIVE FUNCTIONS

The purpose of heuristics is to describe how far our current state is from a goal state – heuristics works for complete solutions because you need to know what the actual goal is. On the other hand, objective functions only perceives the current state and describes if this state is satisfactory or not and how good it really is. Objective functions work for partial solutions. Heuristics are problem-dependent, objective functions are problem-independent.