Academic year 2021-2022

Johannes Kepler Universität Linz

Programming for Business Tasks

Block 2 — Project : part 2
GRASP metaheuristic for the set packing problem

Prof. Dr. Xavier Gandibleux

1 Objectives

This second part of the project aims to implement in Julia a metaheuristic solver for set packing problems (SPP). The mains steps are:

1. starting from the construction heuristic implemented, derivate a new construction function following the definition given by GRASP. This heuristic returns x_0 a feasible solution;
2. reuse the improvement heuristic studied based on the k-p exchange from x_0;
3. embed the construction and the improvement functions into the GRASP framework;
4. select 5 others numerical instances of weighted SPP from the `https://www.emse.fr/~delorme/SetPacking.html`
5. conduct a numerical experiment of your algorithms on the 10 numerical instances;
6. summarize your work and results in your report.

2 Material provided

The material is available online on github (`https://github.com/xgandibleux/Linz2021-2022`).

2.1 Instances

Two didactic instances and 5 test instances from `https://www.emse.fr/~delorme/SetPacking.html` are already provided.

2.2 Parser

A parser compliant with the format of the given instances is provided on gitHub.

2.3 Plot

A function specially fitted for plotting the behavior of GRASP is provided on gitHub.

2.4 Run

A minimal main program on how to run your code is provided on gitHub.

2.5 Results

Table 1 reports the trace of activity for the app on an instance.

```
julia> include("codePart2/project2.jl")
Programming for Business Tasks (Project 2022)
Setting the required packages...

Instance to solve:
   didacticLinz.dat
 > pb_100rnd0100.dat
   pb_200rnd0100.dat
   pb_500rnd0100.dat
   pb_1000rnd0100.dat
   pb_2000rnd0100.dat

Instance : pb_100rnd0100.dat

 --- Greedy heuristics -------
  0.209900 seconds (230.33 k allocations: 26.802 MiB, 96.31% compilation time)
admissible : oui | som(x_i) = 24 ; z = 342
z(xInit) = 342

  0.192675 seconds (164.39 k allocations: 36.245 MiB, 95.45% compilation time)
admissible : oui | som(x_i) = 25 ; z = 351
z(xBest) = 351

 --- GRASP metaheuristic -----
  3.010378 seconds (2.93 M allocations: 5.907 GiB, 21.91% gc time, 7.66% compilation time)
z(xBest) = 370

 --- Plotting the results ----

that's all folk

julia>
```

Table 1: Activity of the app recorded on the instance `pb_100rnd0100.dat`

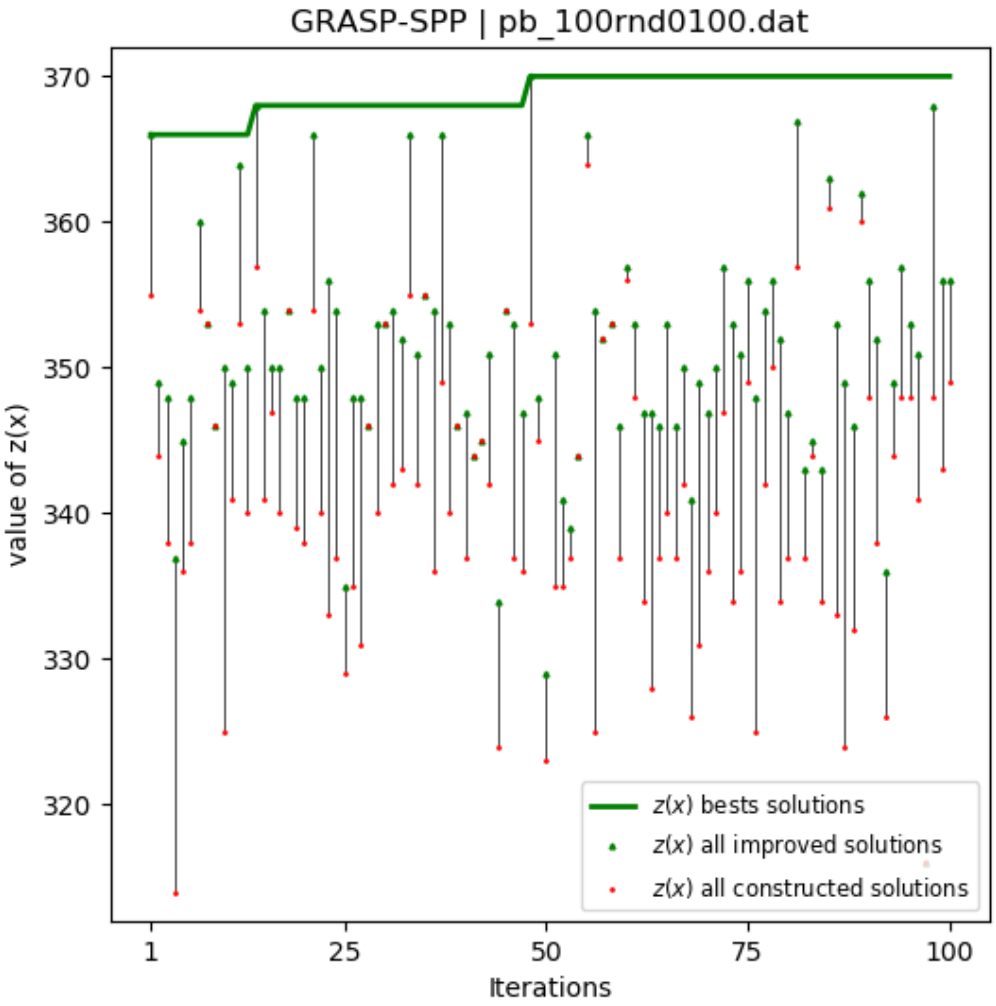

Figure 1: The plot obtained for the trace of activity reported in Table 1