Optimal Database Design Problem

Defended by: Group 06

Magnani, Marchi, Moncada, Iaia,

Palmieri, Ondesca, Ombe

9, January 2019

Politecnico di Torino

Optimization Methods and Algorithms

Algorithm presentation

Genetic Algorithm

Main Features

Key points of our implementation:

- Scalability and adaptability
- Multistart and restart
- Multithreading
- Large Solution Space exploration

Main Features

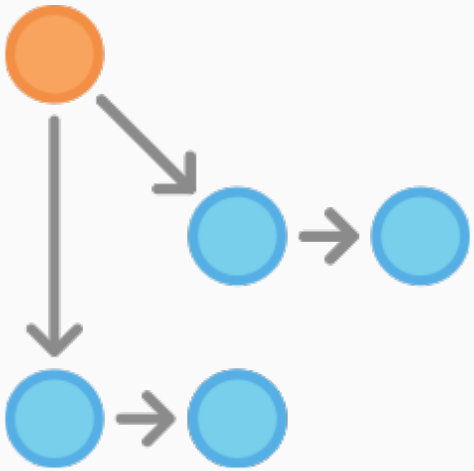
Key points of our implementation:

- Scalability and adaptability
- Multistart and restart
- Multithreading
- Large Solution Space exploration

Main Features

Key points of our implementation:

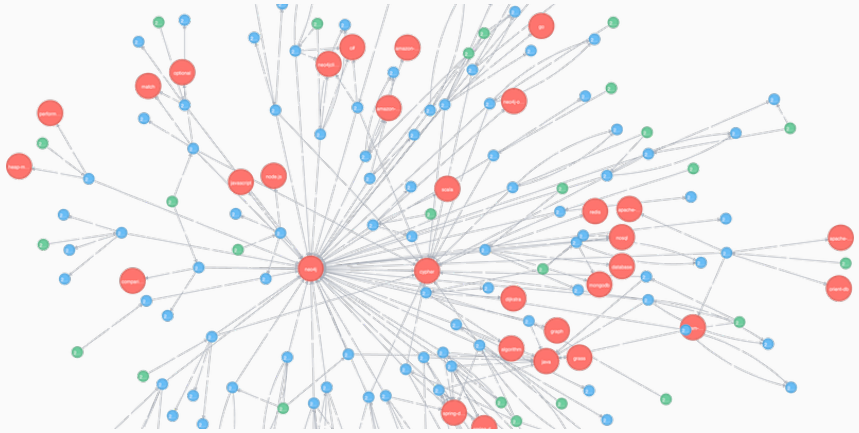
- Scalability and adaptability
- Multistart and restart
- Multithreading
- Large Solution Space exploration



Main Features

Key points of our implementation:

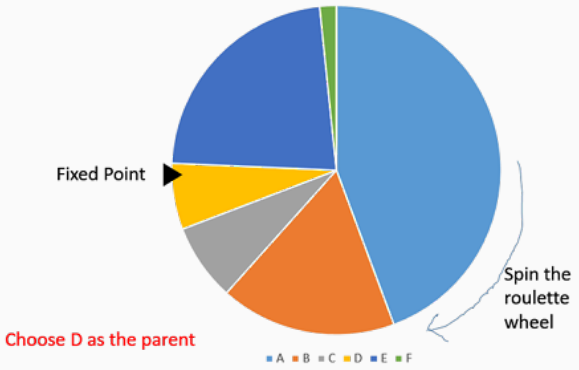
- Scalability and adaptability
- Multistart and restart
- Multithreading
- Large Solution Space exploration



Solution Set Selection procedures

Solution Set Selection procedures implemented:

- Roulette
- Tournament
- Random

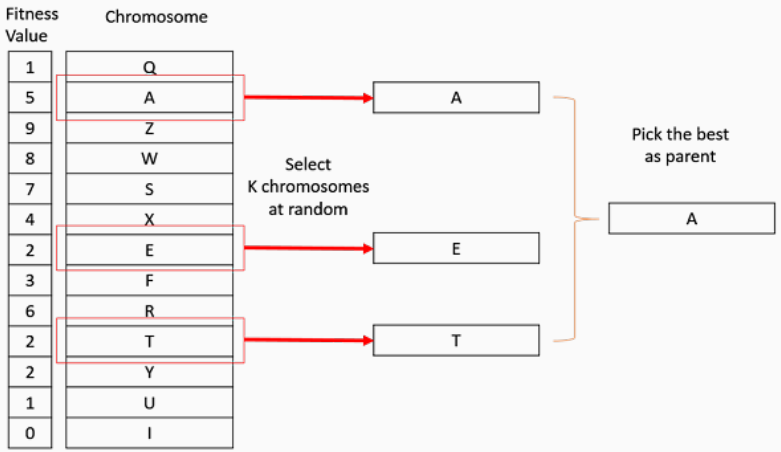


Chromosome	Fitness Value
A	8.2
B	3.2
C	1.4
D	1.2
E	4.2
F	0.3

Solution Set Selection procedures

Solution Set Selection procedures implemented:

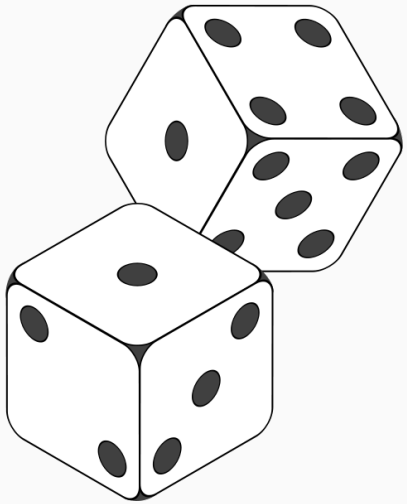
- Roulette
- Tournament
- Random



Solution Set Selection procedures

Solution Set Selection procedures implemented:

- Roulette
- Tournament
- Random



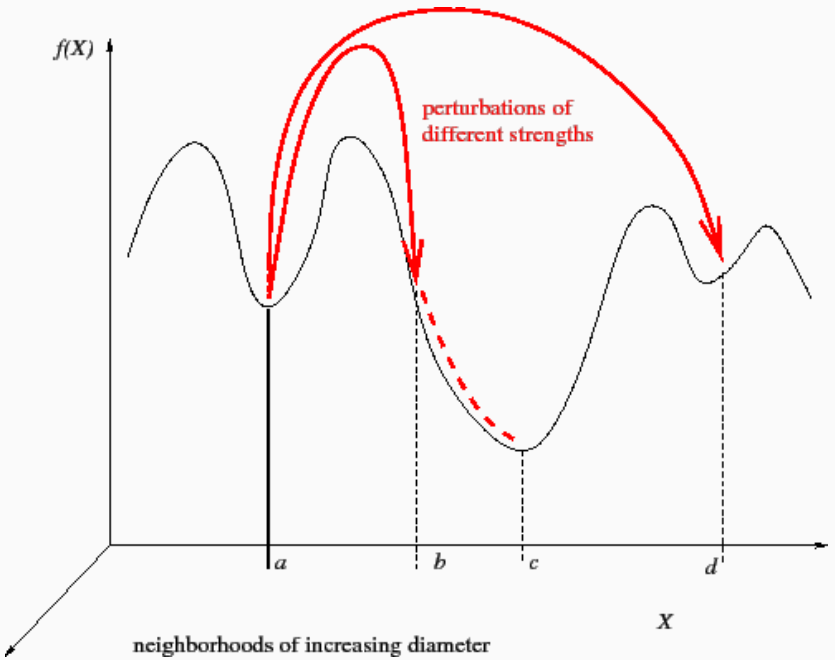
Children generation methods

Children generation methods implemented:

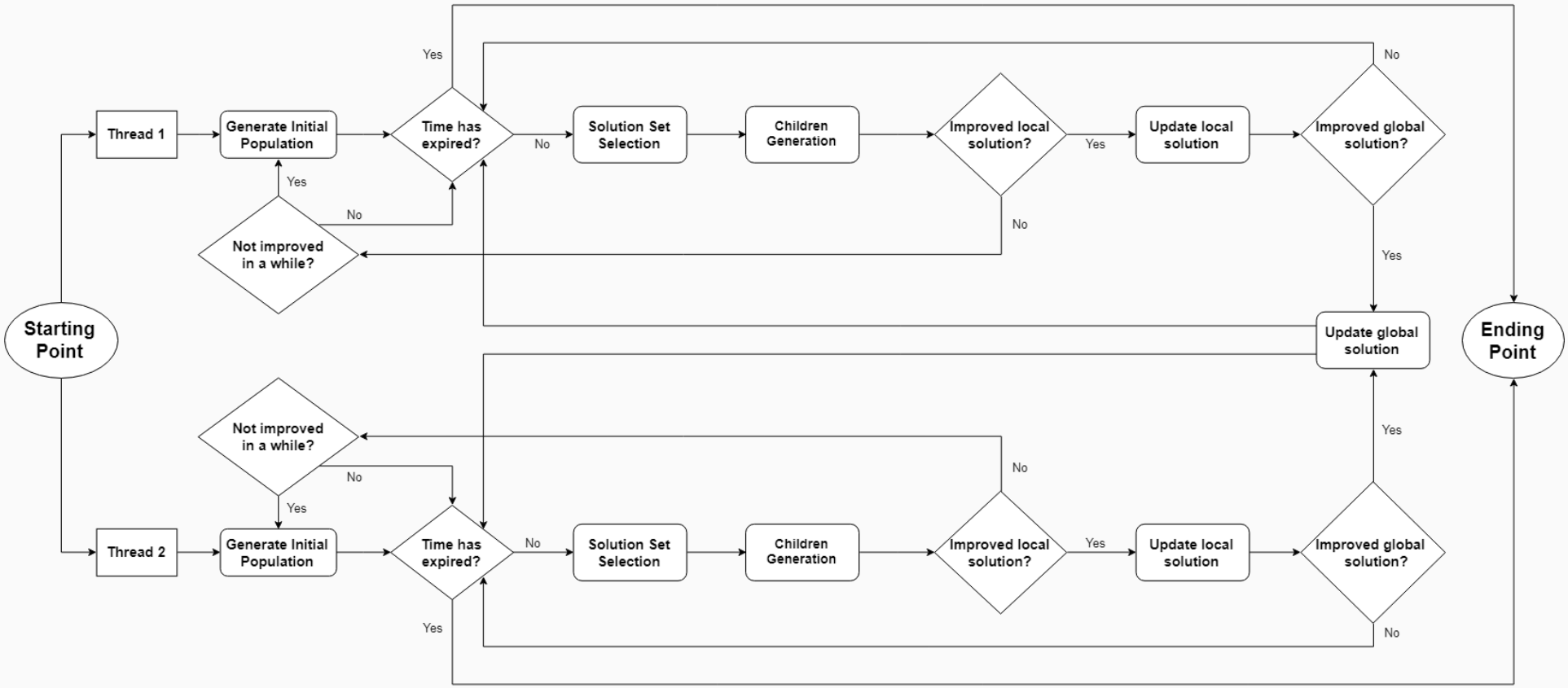
- Mutation
  - 2-bit instead of 1
  - 70% chance to be chosen
- Inversion
  - traditional approach adapted to the instance dimension
  - 15% chance to be chosen
- Crossover
  - traditional approach
  - 15% chance to be chosen

Children generation methods

An our 'local search' is enhanced by replacing all the non-parent elements (which are supposed to be the worst ones) with the actual best solution.

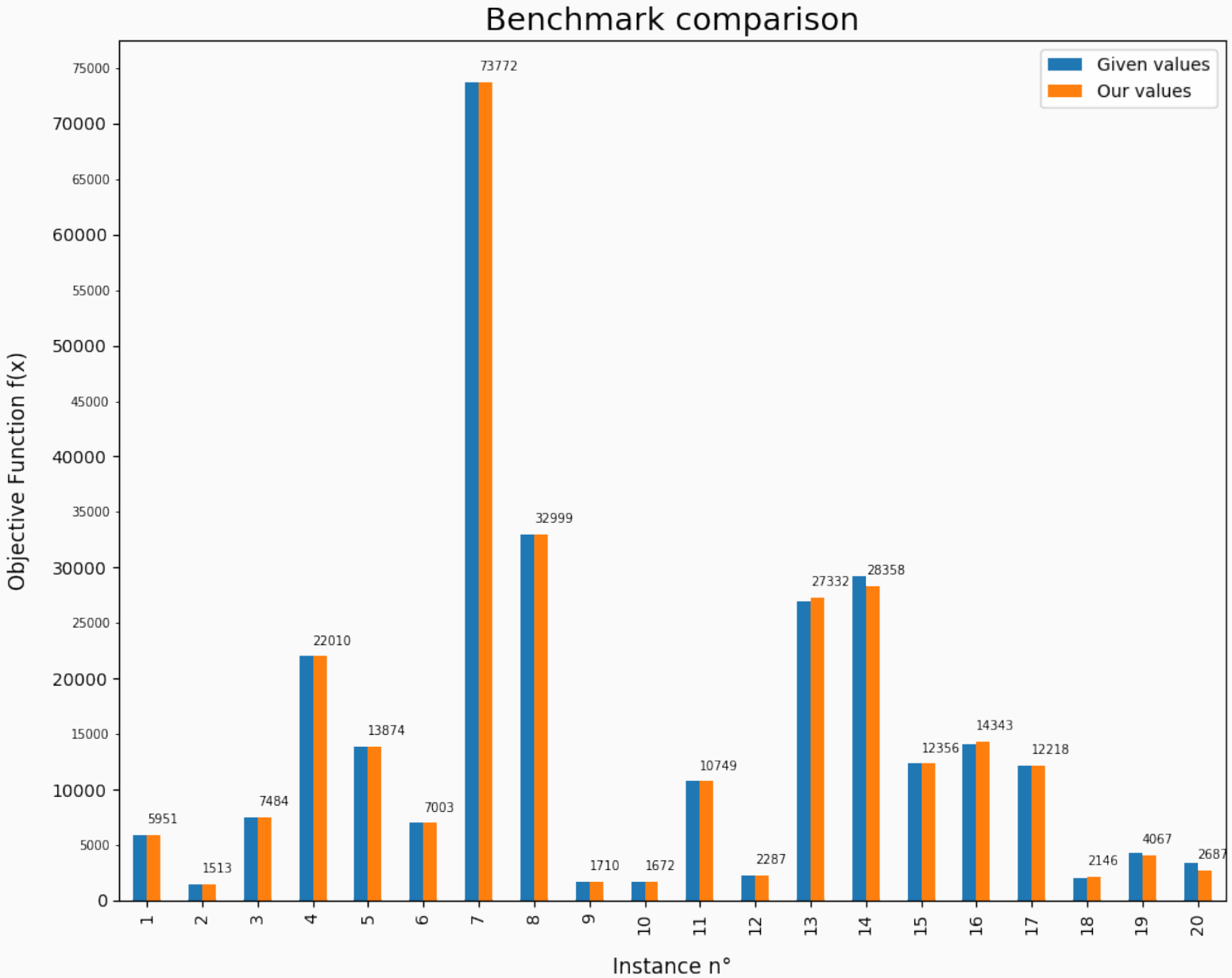


Algorithm steps



Results analysis

Result Analysis

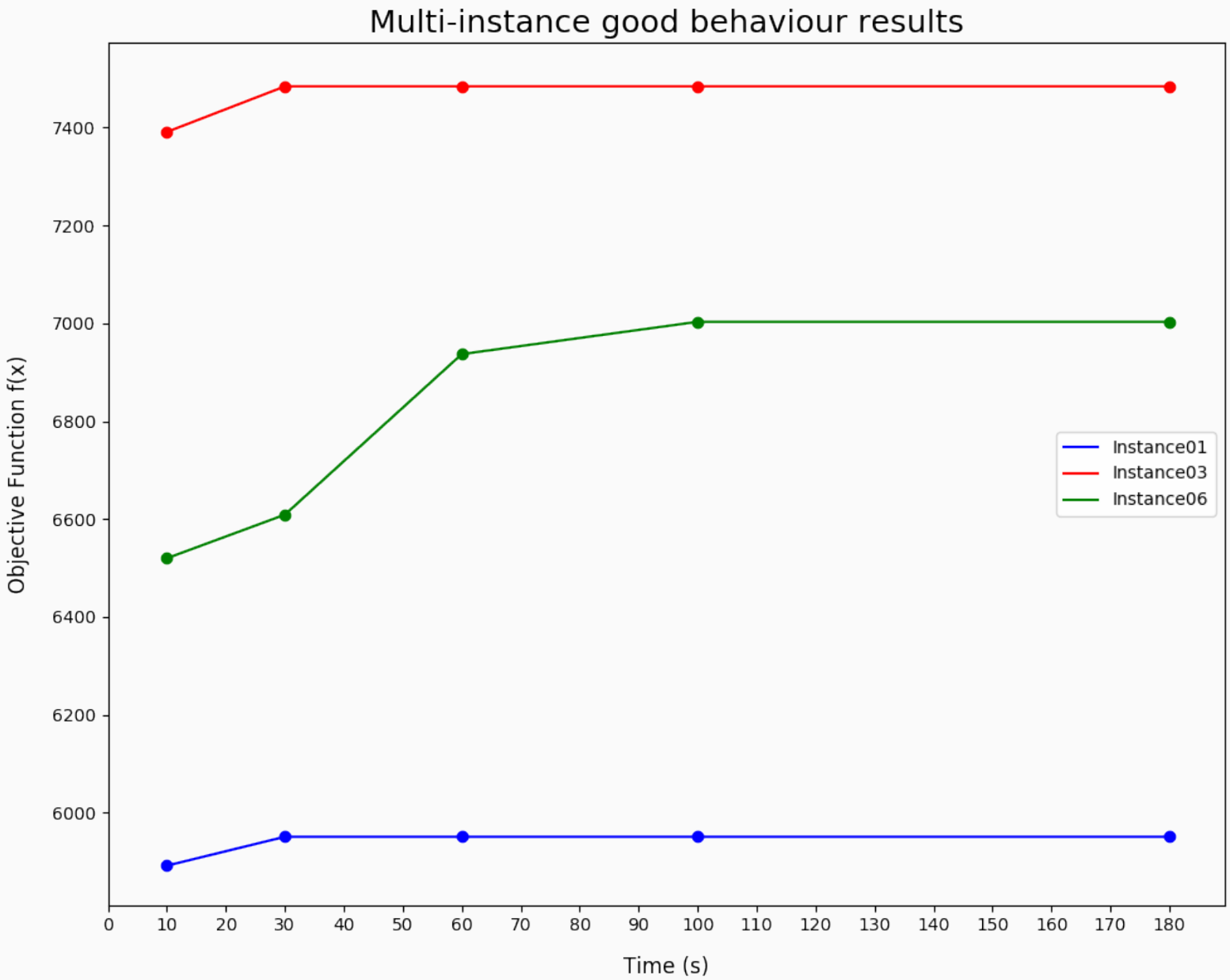


Benchmark Comparison

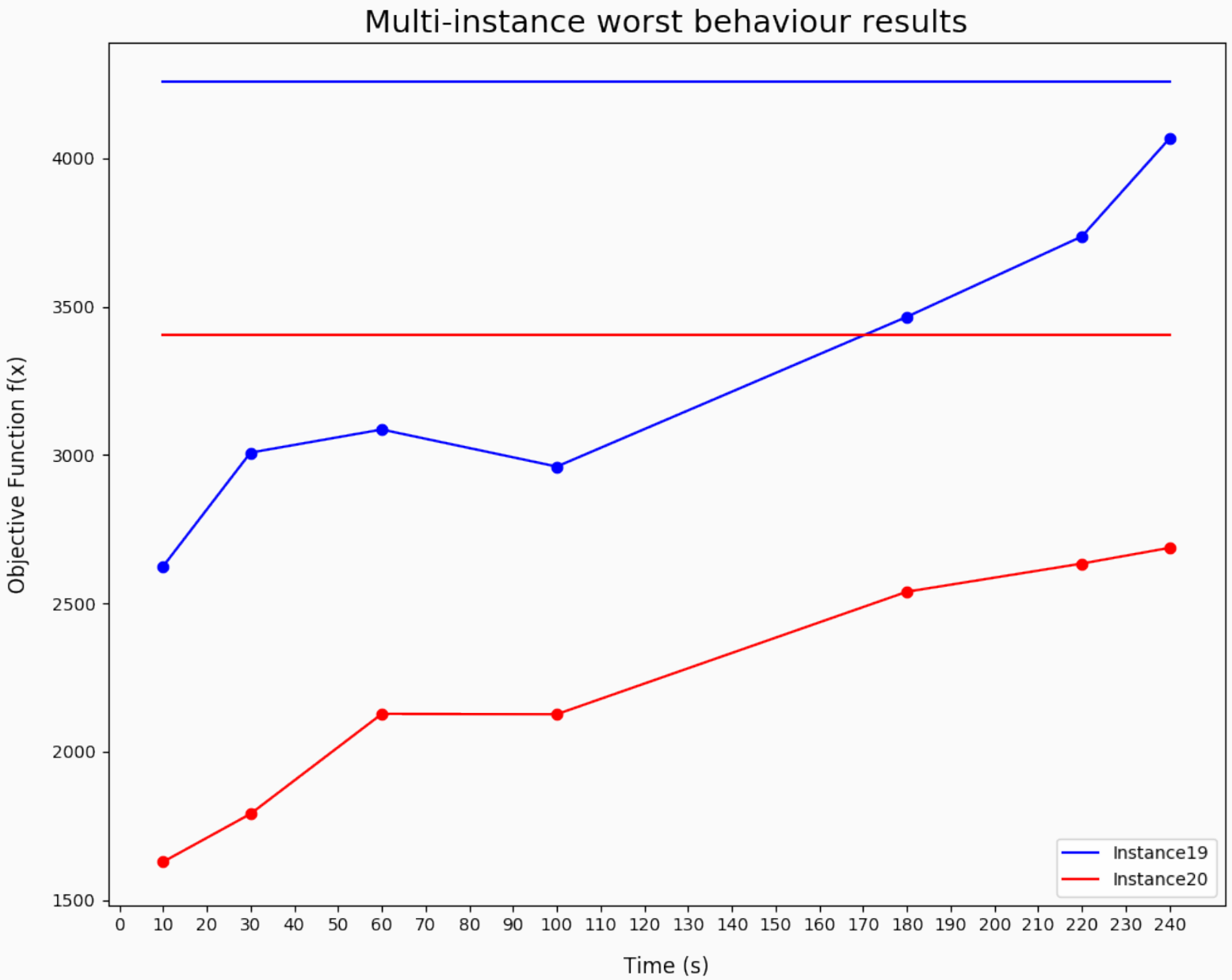
Instance	Given Results	Our Results	Gap(%)
instance01	5951	5951	0
instance02	1513	1513	0
instance03	7484	7484	0
instance04	22010	22010	0
instance05	13874	13874	0
instance06	7003	7003	0
instance07	73772	73772	0
instance08	32999	32999	0
instance09	1710	1710	0
instance10	1672	1672	0
instance11	10749	10749	0
instance12	2287	2287	0
instance13	26938	27332	-1.46
instance14	29280	28358	3.15
instance15	12351	12356	-0.04
instance16	14110	14343	-1.65
instance17	12218	12218	0
instance18	2081	2146	-3.12
instance19	4257	4067	4.46
instance20	3406	2687	21.11

	Gap(%)
Best	-3.12
Worst	21.11
Avg	1.12

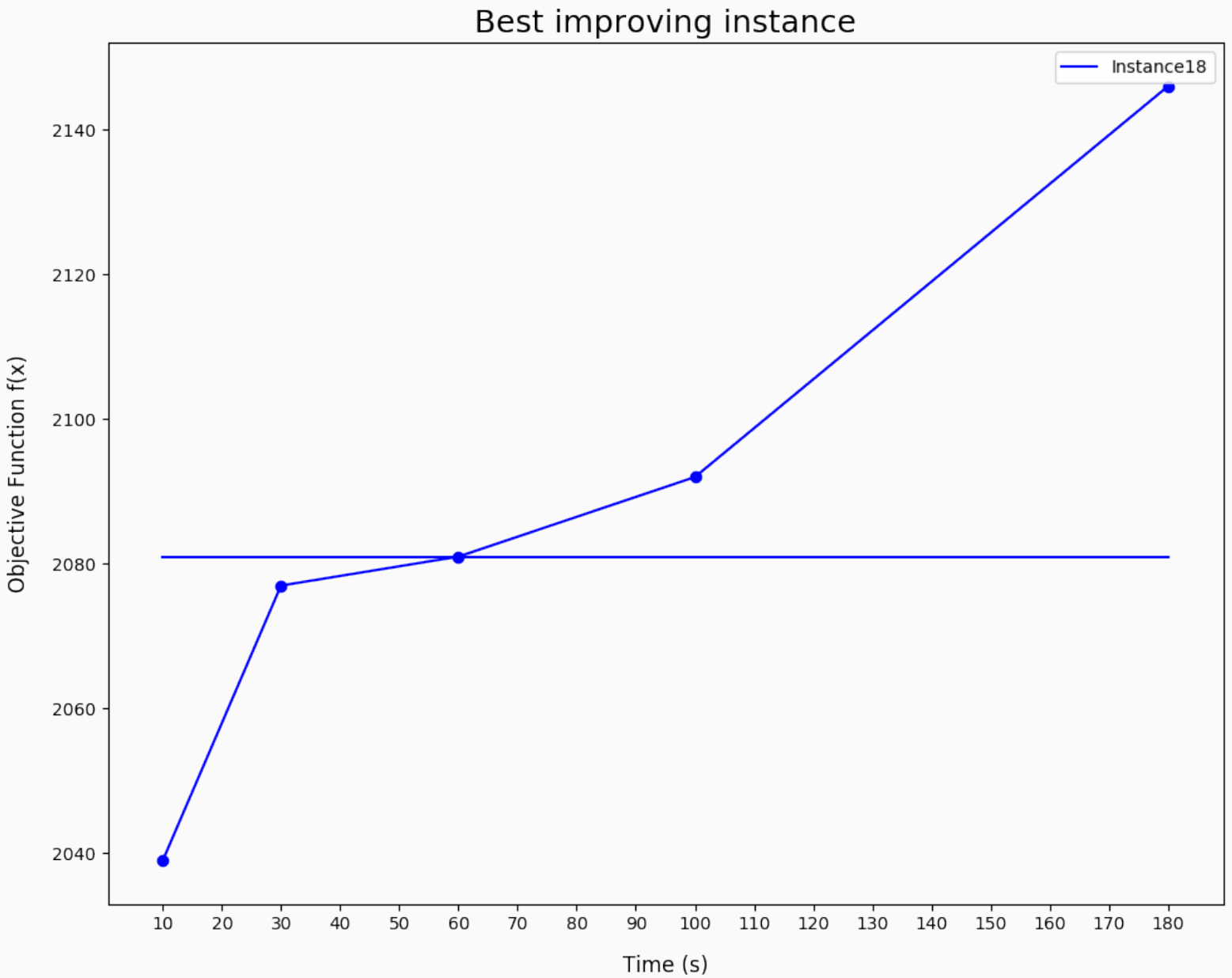
Result Analysis



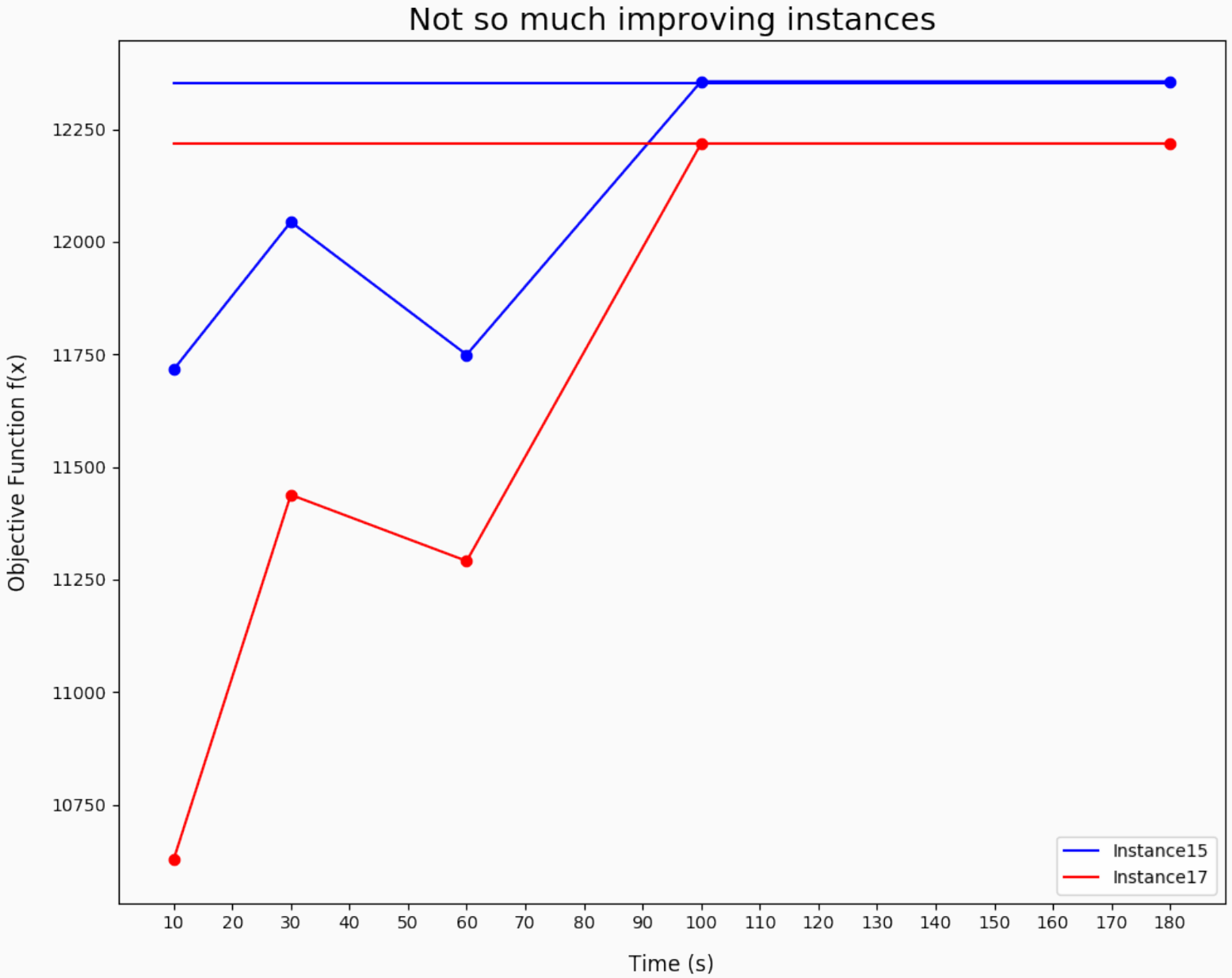
Result Analysis



Result Analysis



Result Analysis



THE END