Local search algorithms

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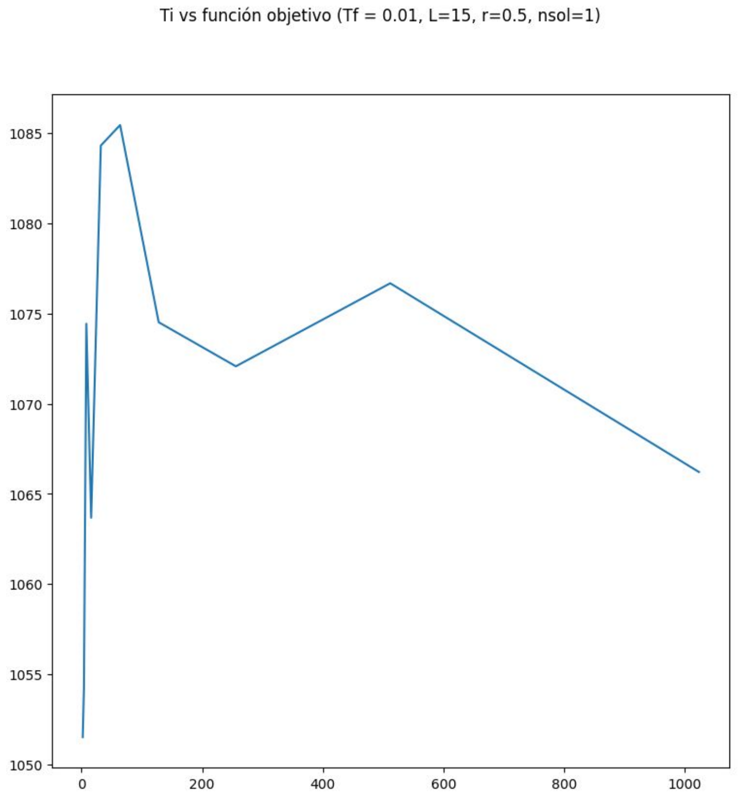
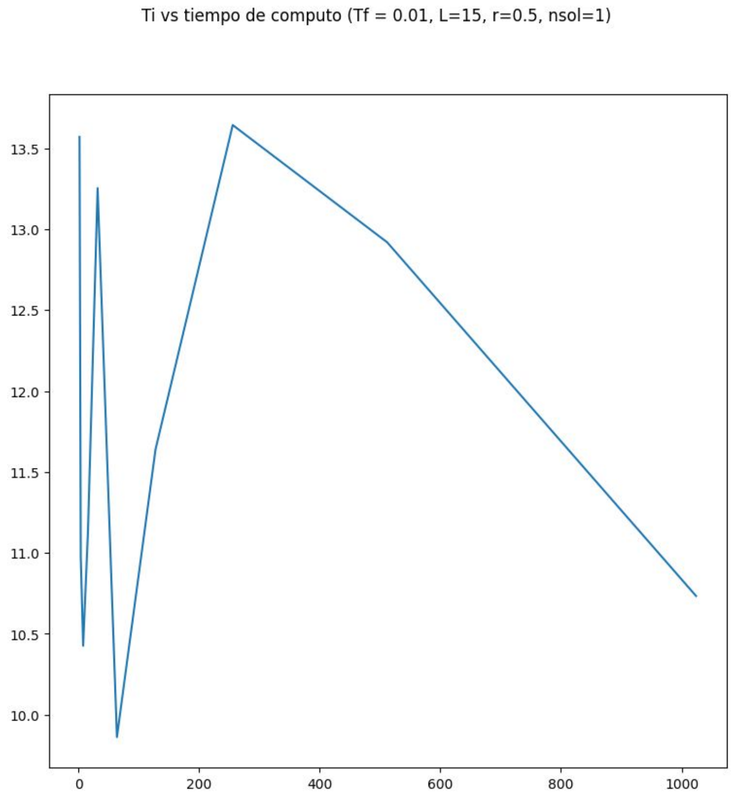
Recocido simulado multistart con perturbación

```
enhancedSolution = None
for i in range(nsol):
      comparativeSolution = Grasp(a=0.07)
      bestLocalSolution = comparativeSolution
      comparativeSolution = perturbe(comparativeSolution)
      T = Ti
      iter = 0
      while T > Tf:
            if iter == L;
                  T = T*r
                        iter = 0
            newSolution = GetNeighbourgh(bestLocalSolution, T)
            comparativeSolution = newSolution
            if dist(comparativeSolution) < dist(bestLocalSolution):
                  bestLocalSolution = comparativeSolution
      if enhancedSolution == None or dist(bestLocalSolution) < dist(enhancedSolution):
            enhancedSolution = bestLocalSolution
return enhancedSolution
```

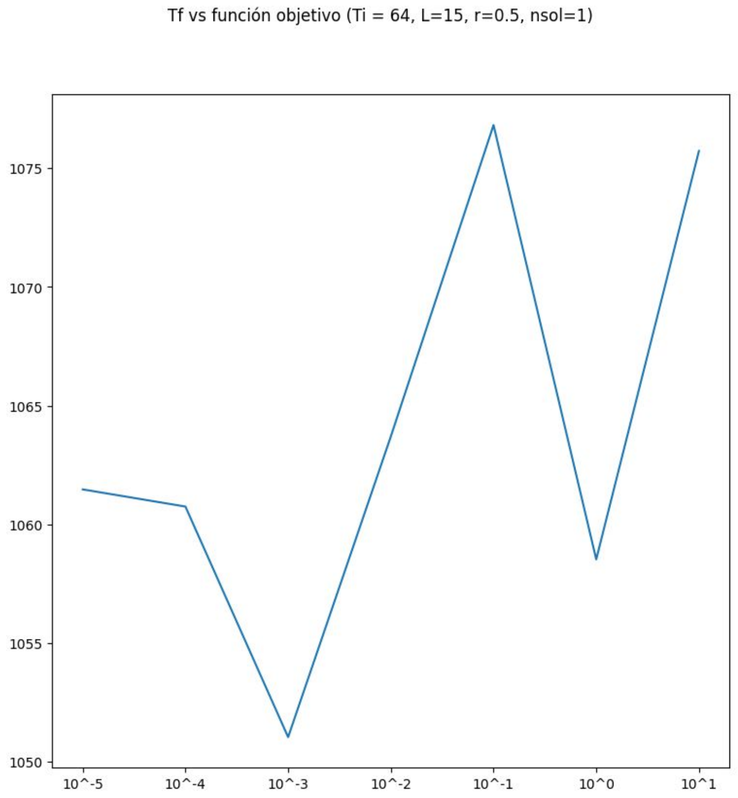
Recocido simulado multistart con perturbación

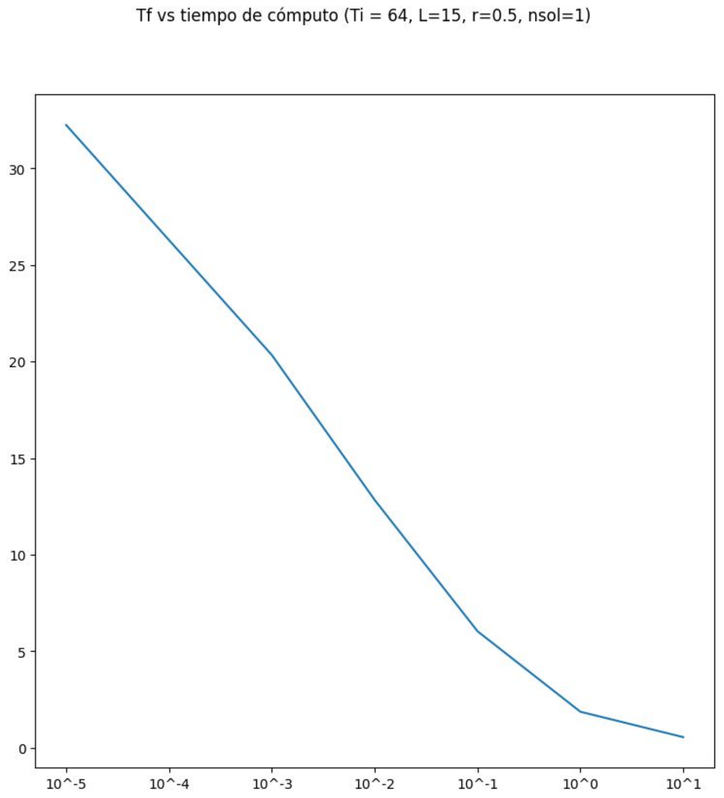




mtvrp4, a=0.07

Recocido simulado multistart con perturbación

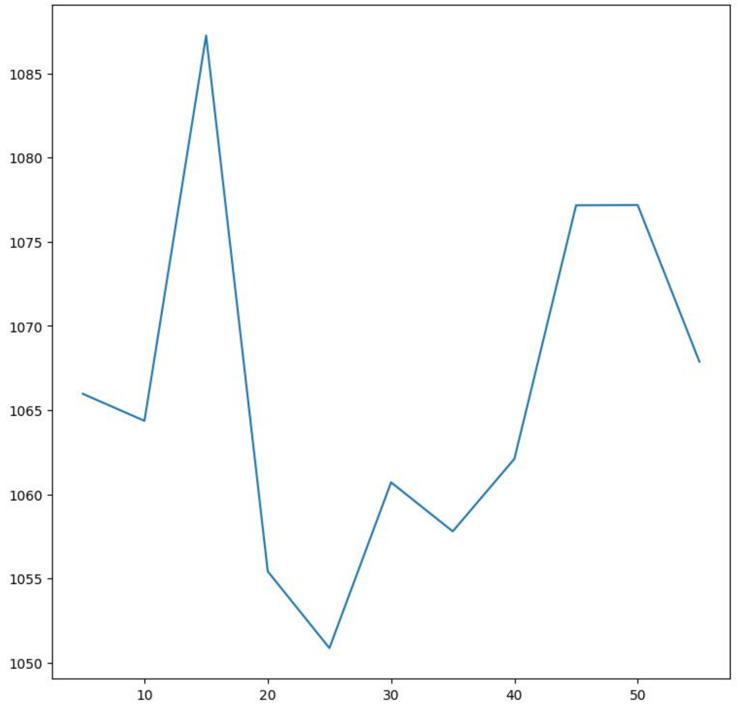




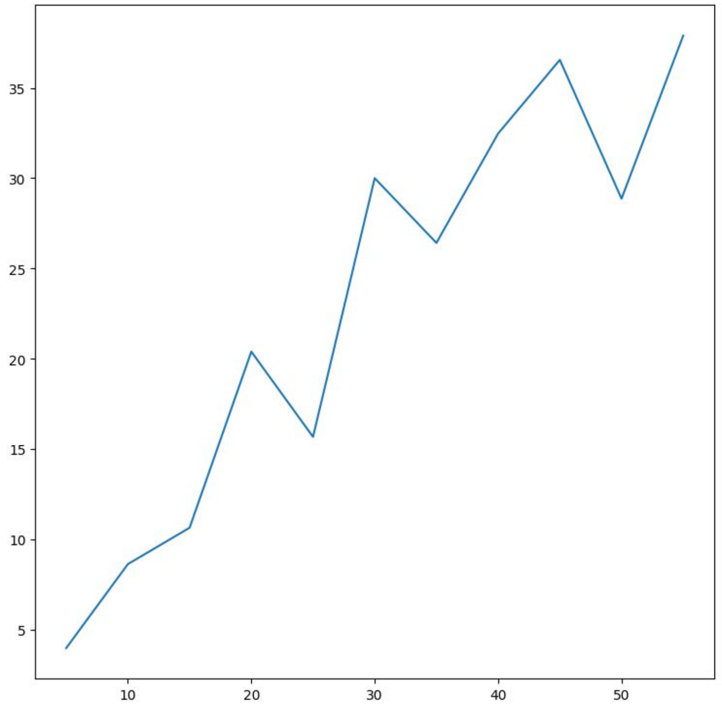
mtvrp4, a=0.07

Recocido simulado multistart con perturbación

L vs función objetivo (Ti= 1024, Tf = 0.01, r=0.5, nsol=1)

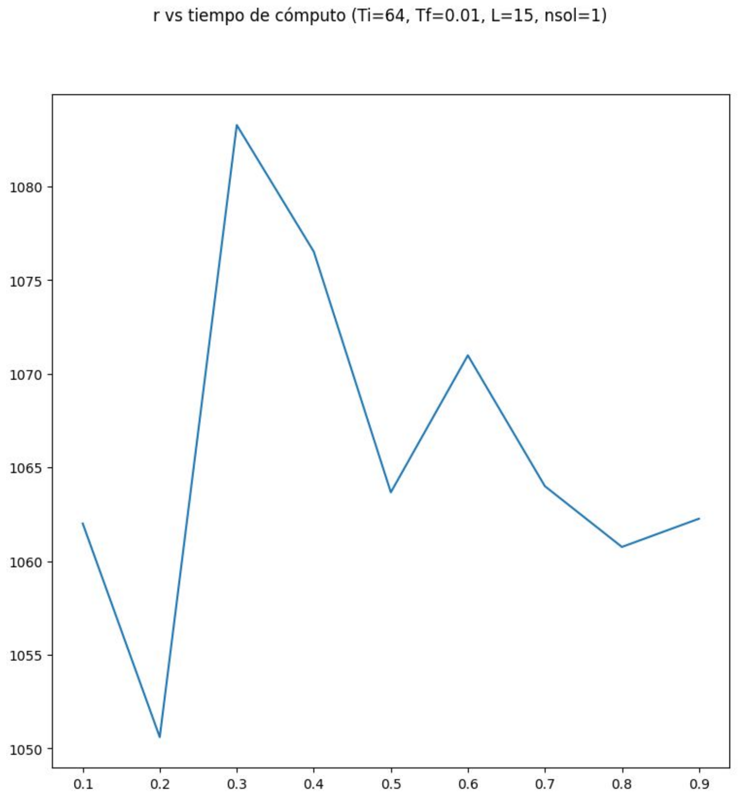


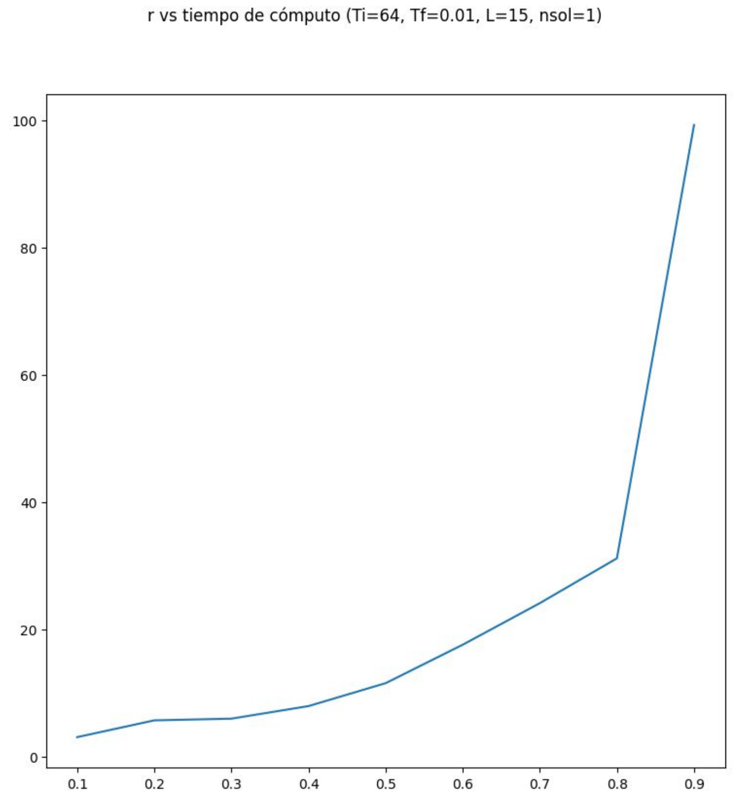
L vs tiempo de computo (Ti= 1024, Tf = 0.01, r=0.5, nsol=1)



mtvrp4, a=0.07

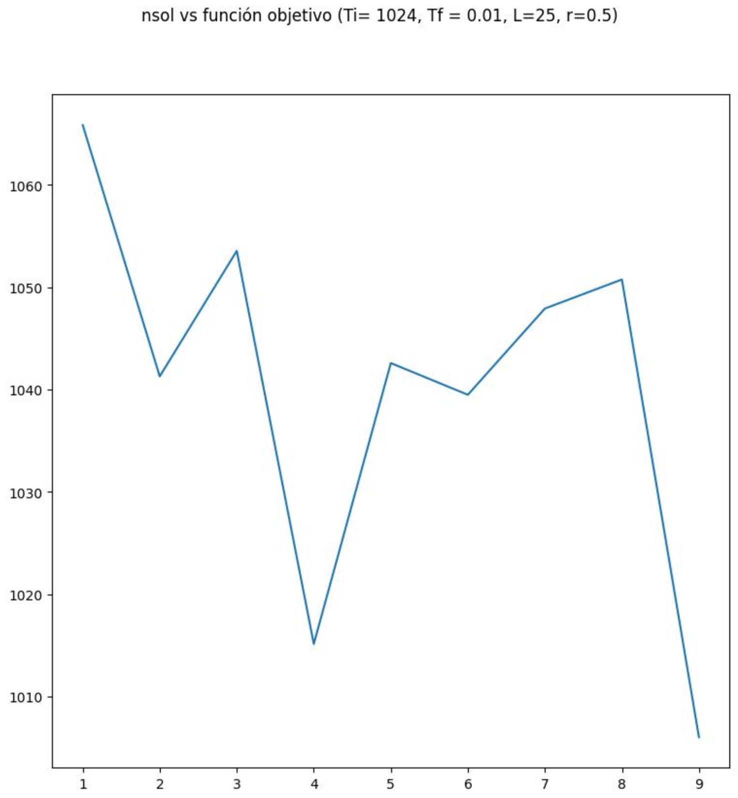
Recocido simulado multistart con perturbación



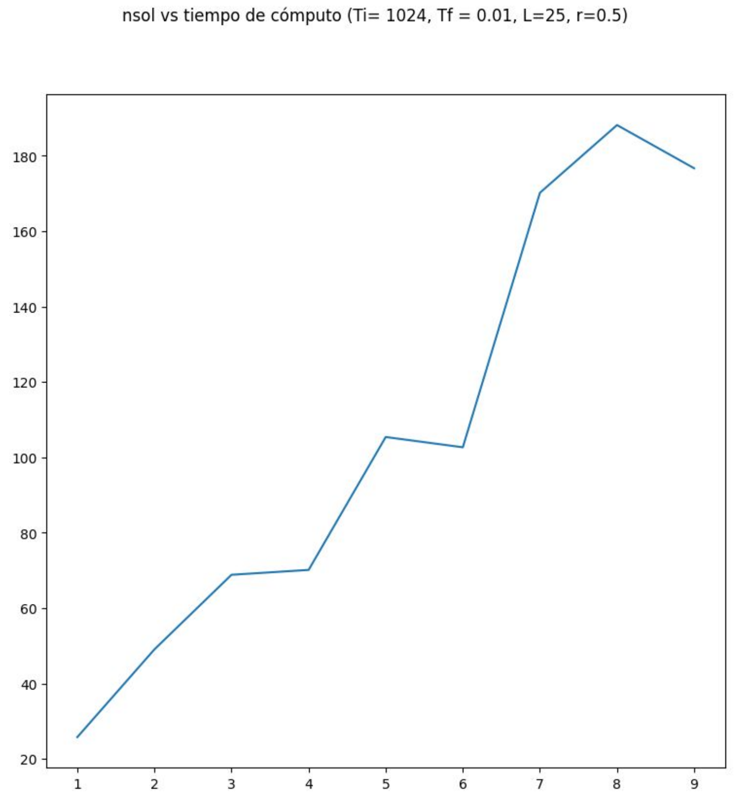


mtvrp4, a=0.07

Recocido simulado multistart con perturbación



mtvrp4, a=0.07



VNS

```
bestSolution = initialSolution
algorithmIndex = 0
while algorithmIndex < length(neighbourghoodAlgorithms):
      newSolution = neighbourghoodAlgorithms[algorithmIndex](bestSolution)
      if newSolution != None and dist(newSolution) < dist(bestSolution)
            bestSolution = newSolution
            algorithmIndex = 0
      else:
            algorithmIndex += 1
return bestSolution
```

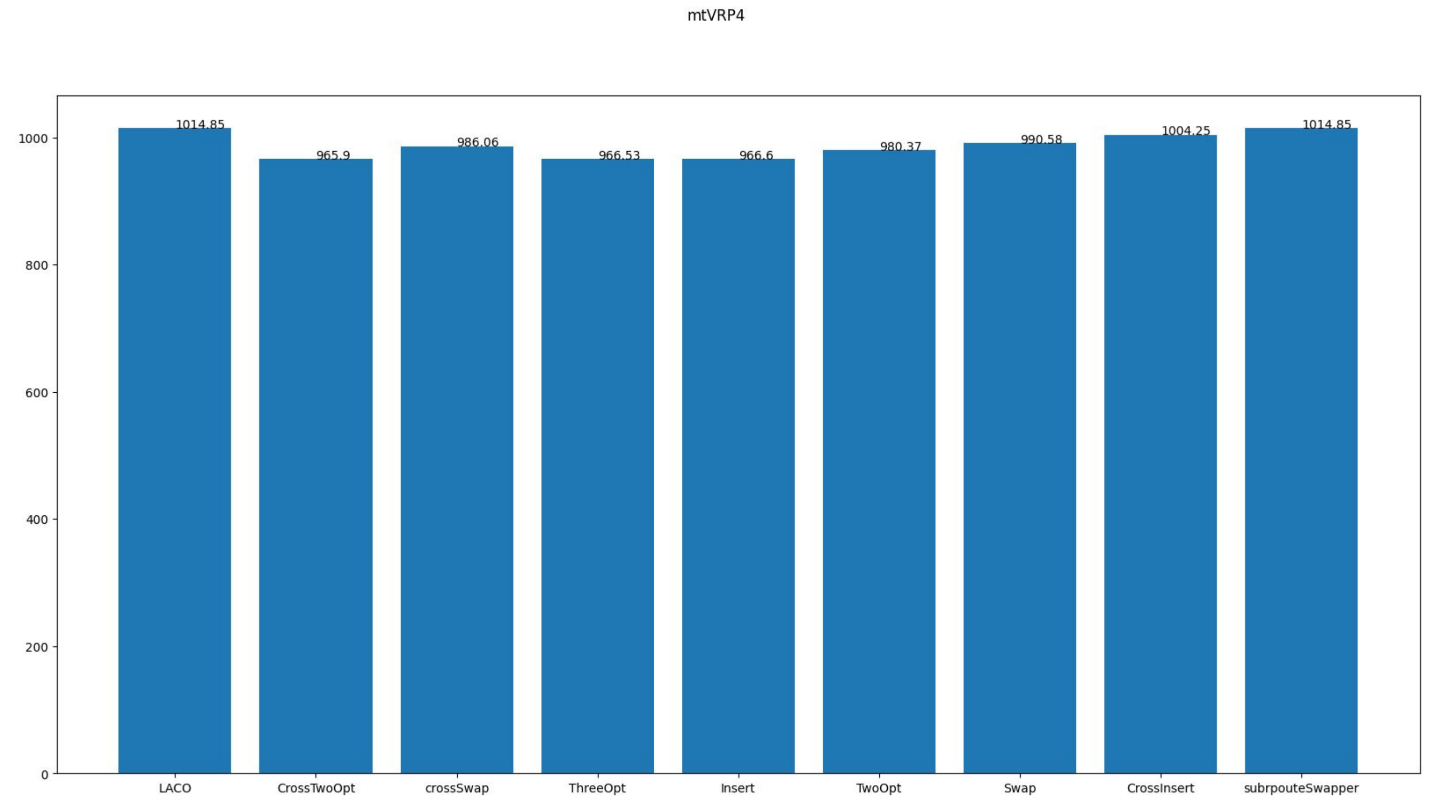
VNS local neighbourhoods

- Insert
- Swap
- TwoOpt
- ThreeOpt

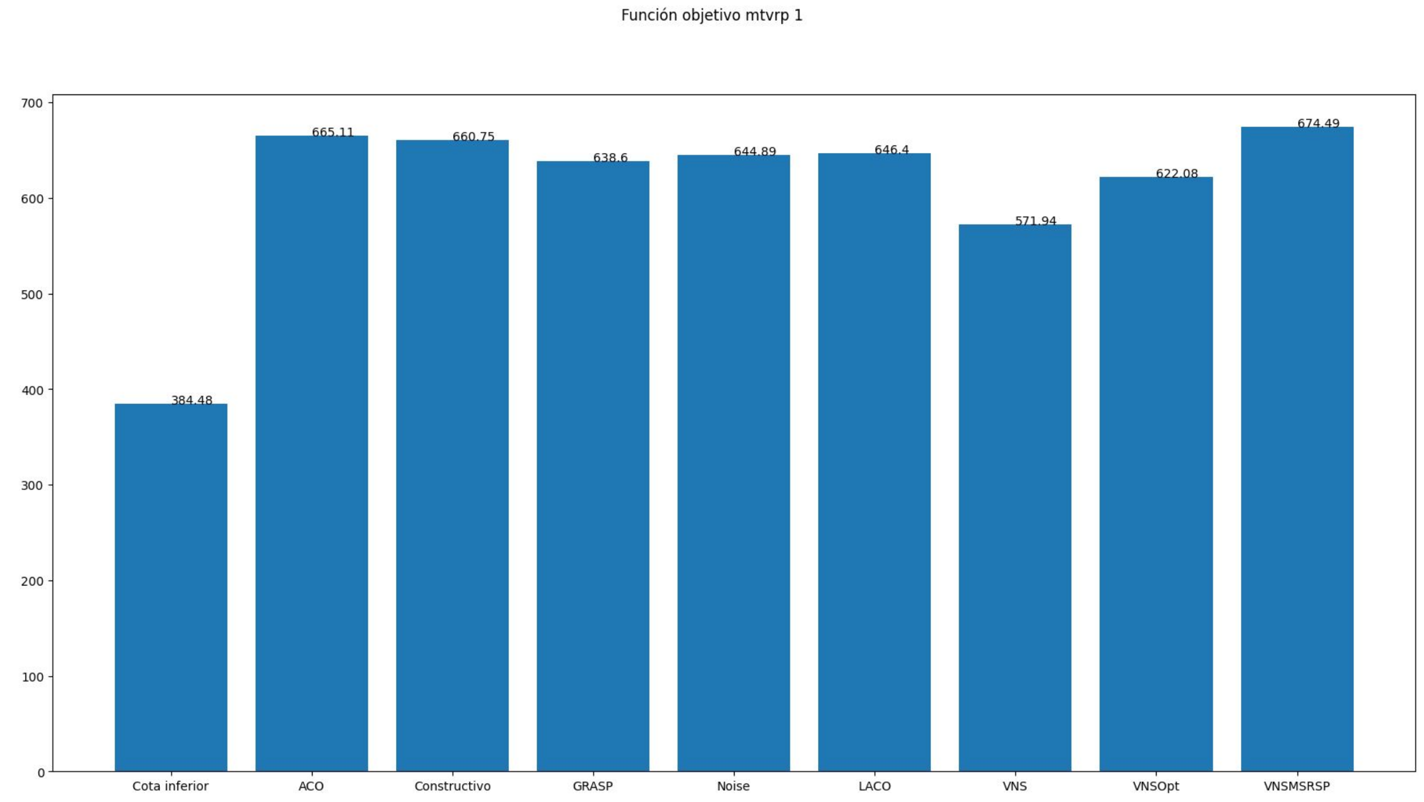
VNS cross neighbourhoods

- crossInsert
- crossSwap
- crossTwoOpt
- SubrouteSwapper

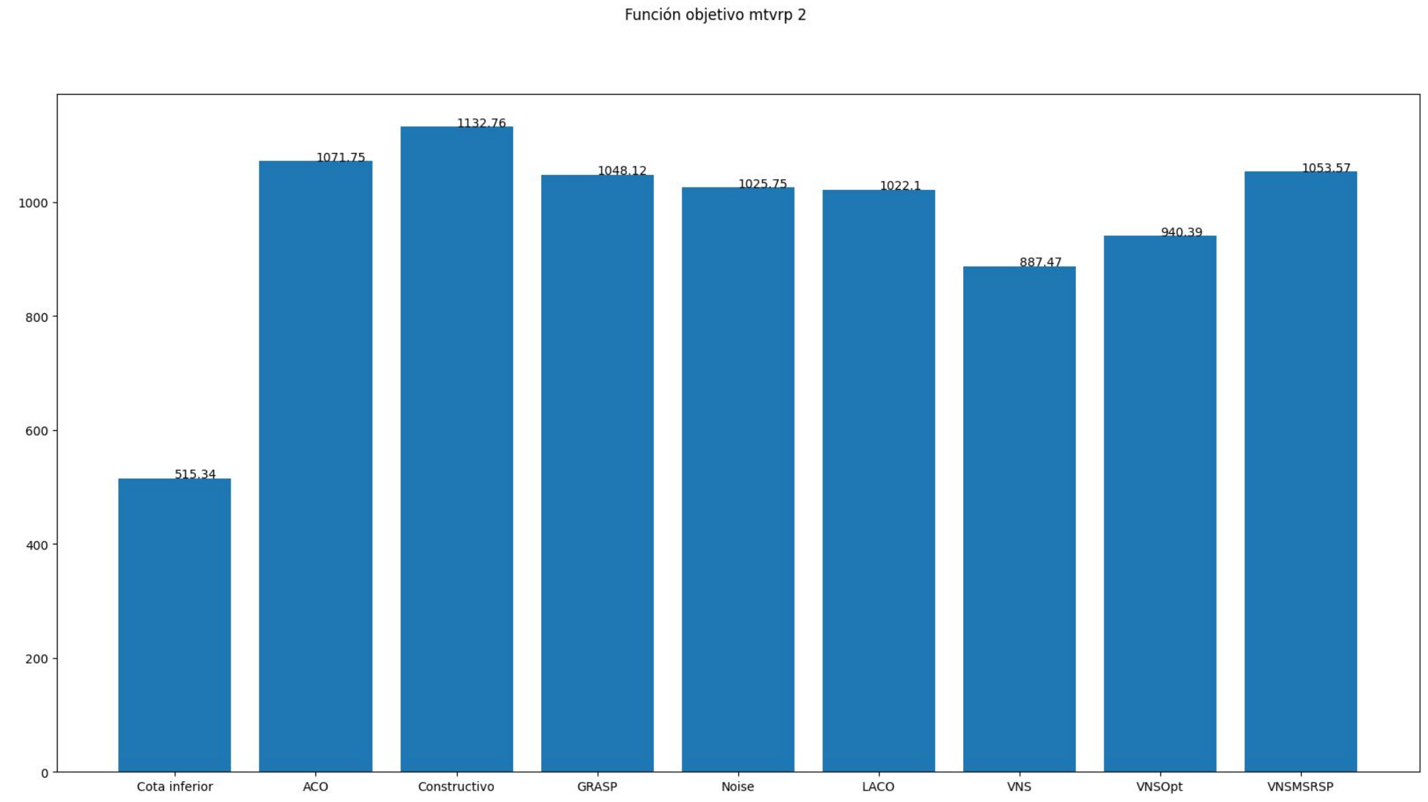
VNS


mtVRP4
1014.85
965.9
986.06
966.53
966.6
980.37
990.58
1004.25
1014.85
0
200
400
600
800
1000
LACO
CrossTwoOpt
crossSwap
ThreeOpt
Insert
TwoOpt
Swap
CrossInsert
subrpouteSwapper

Comparación de algoritmos



Comparación de algoritmos



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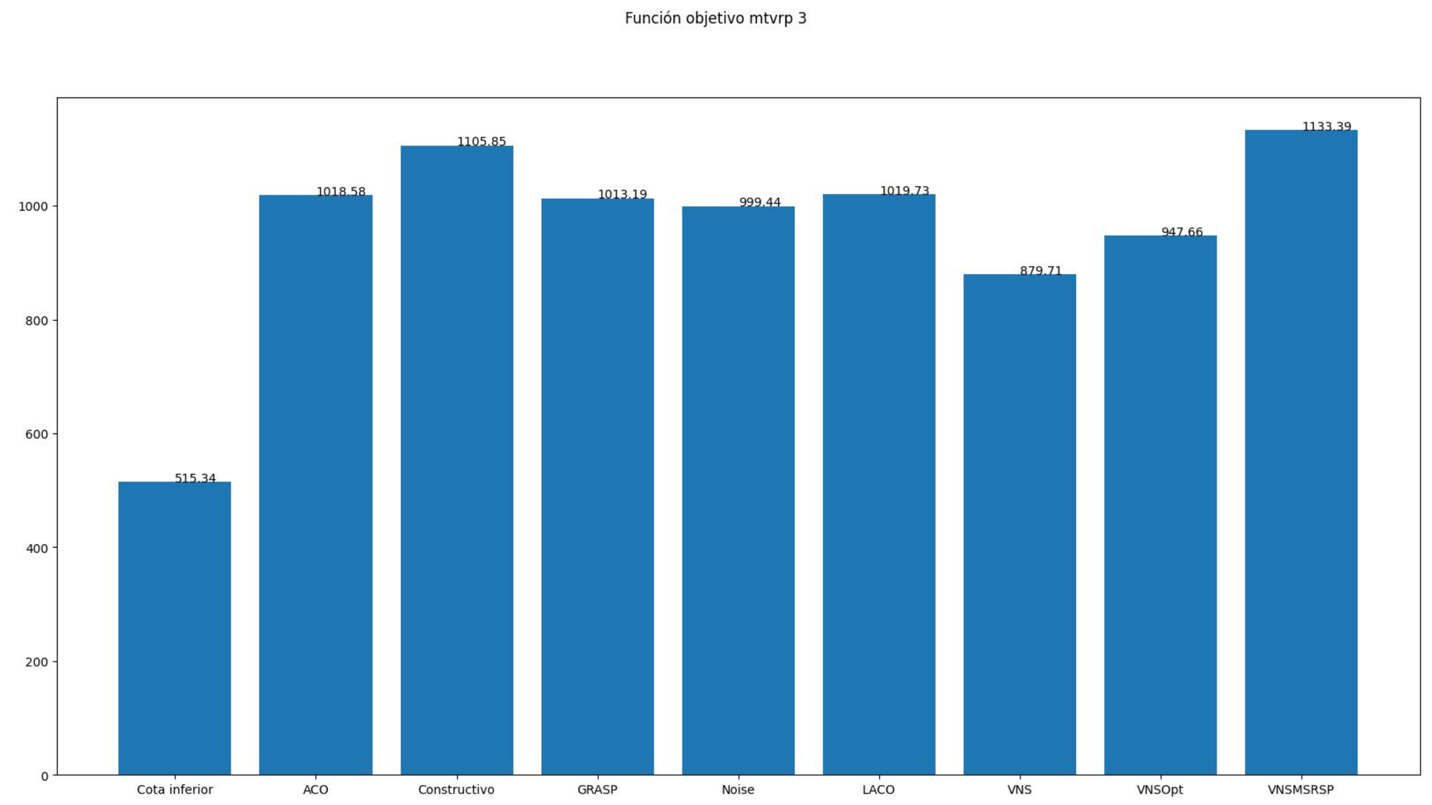

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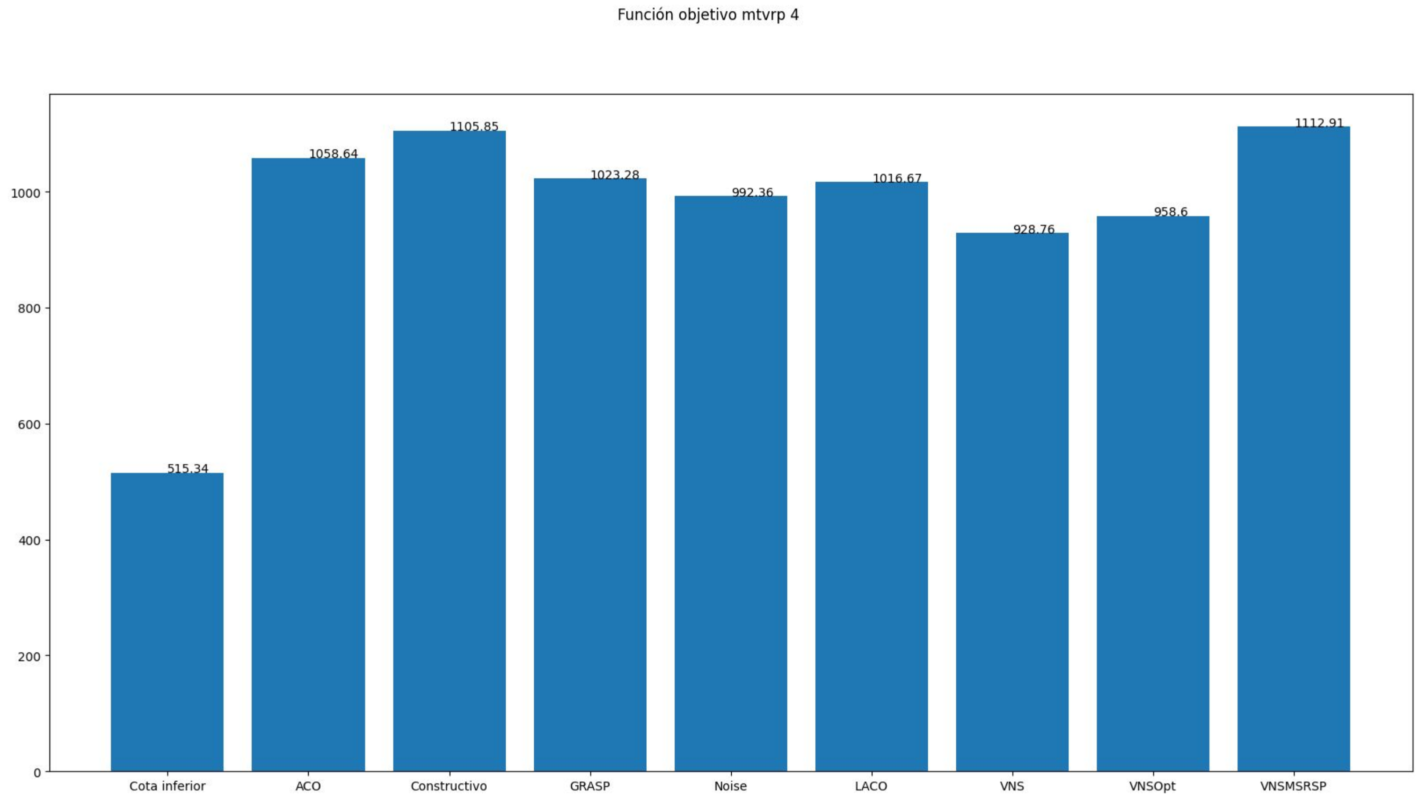

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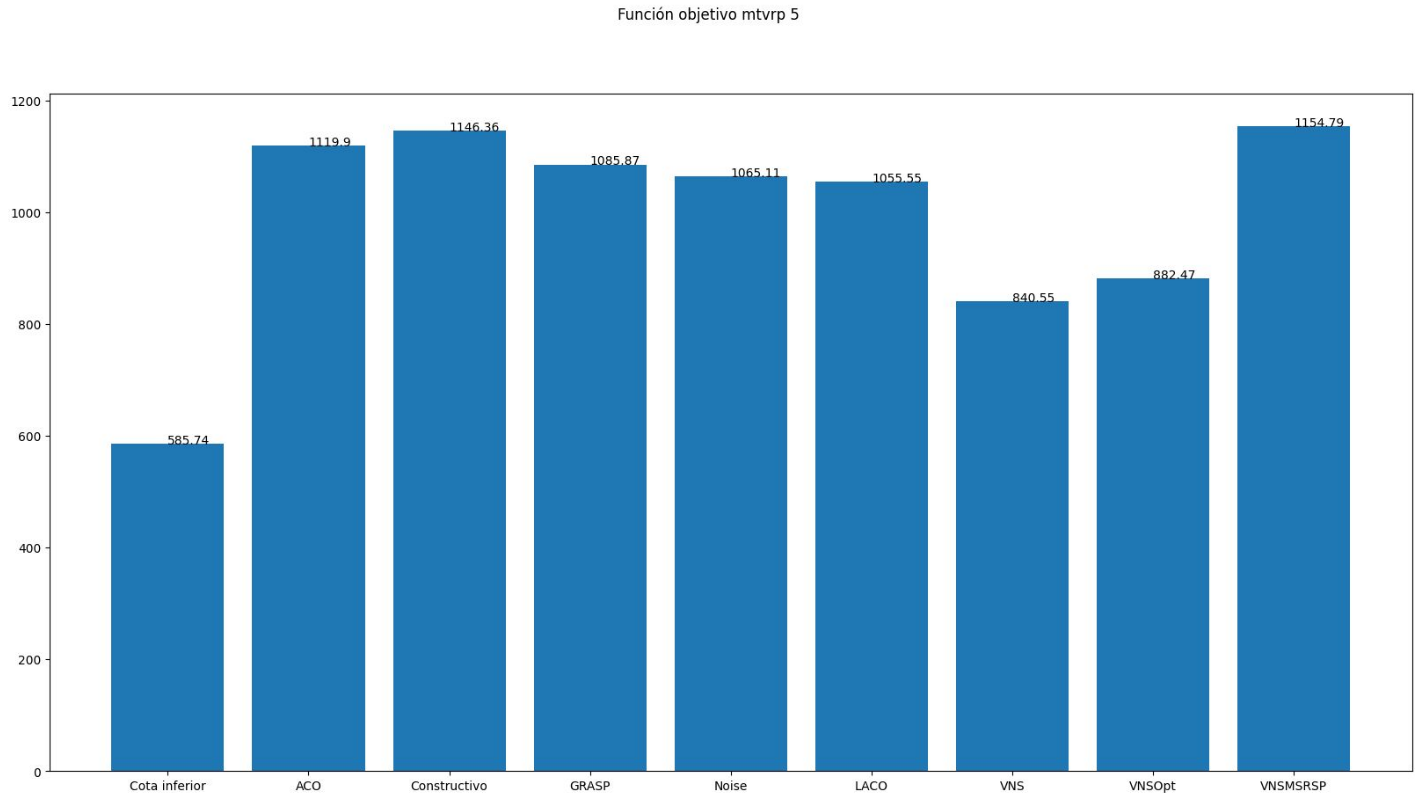

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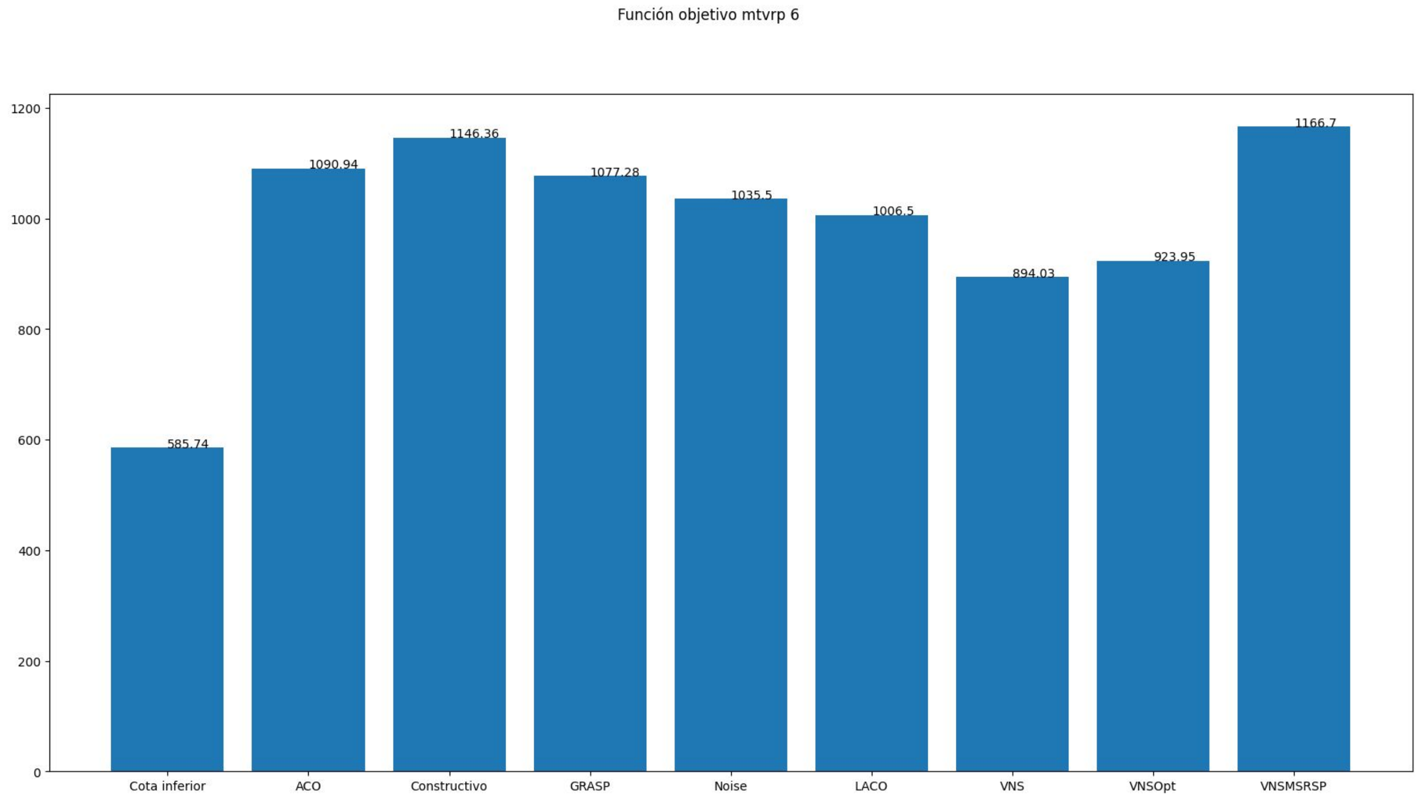
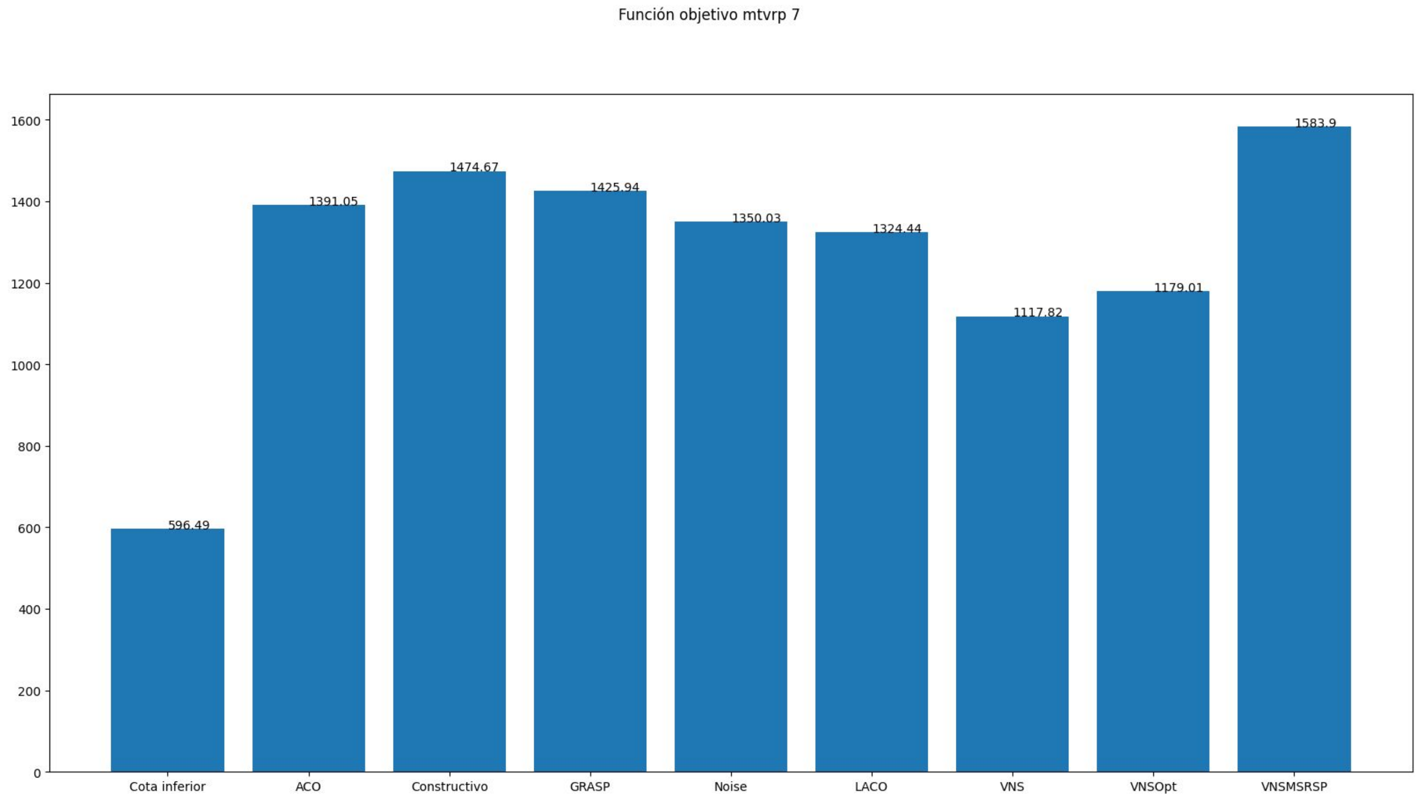


Comparación de algoritmos



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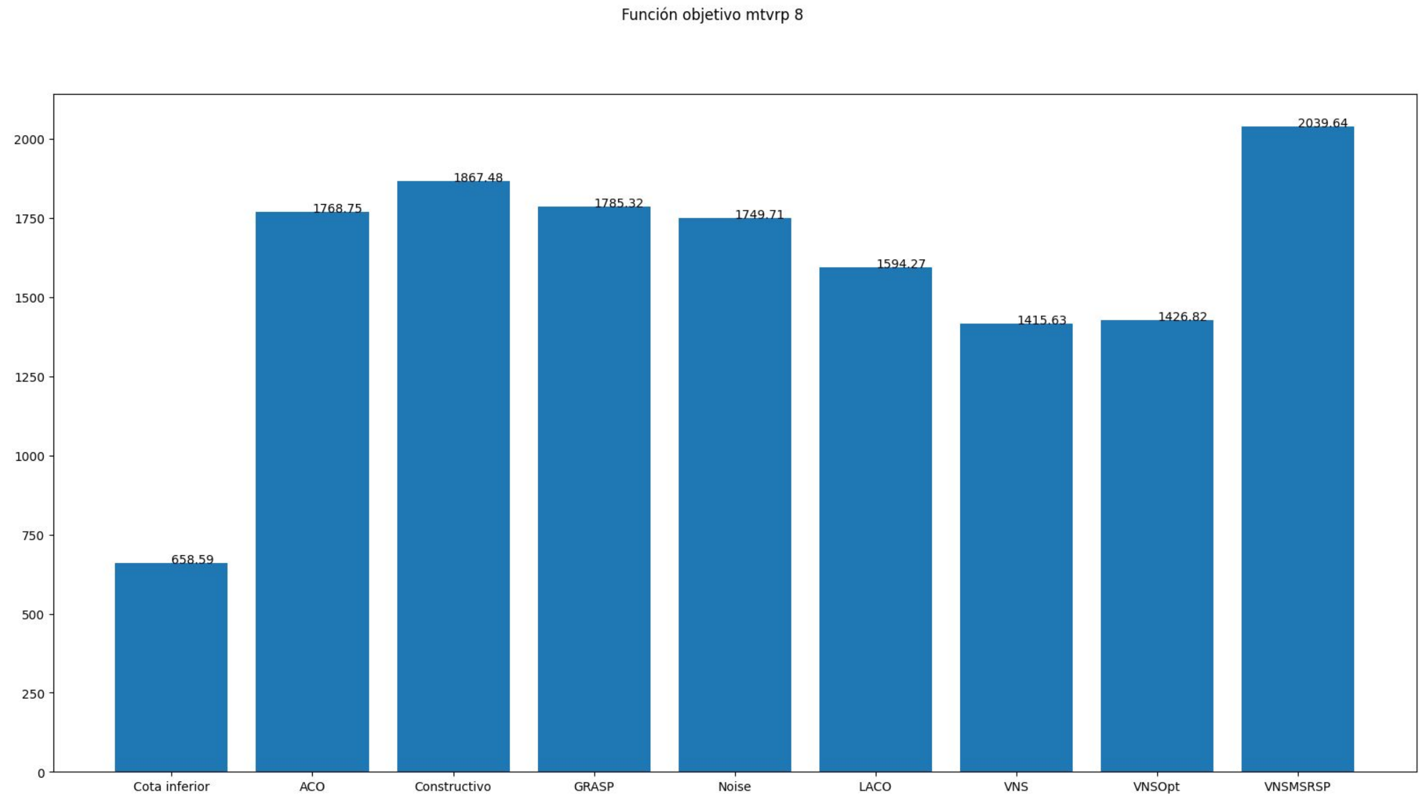
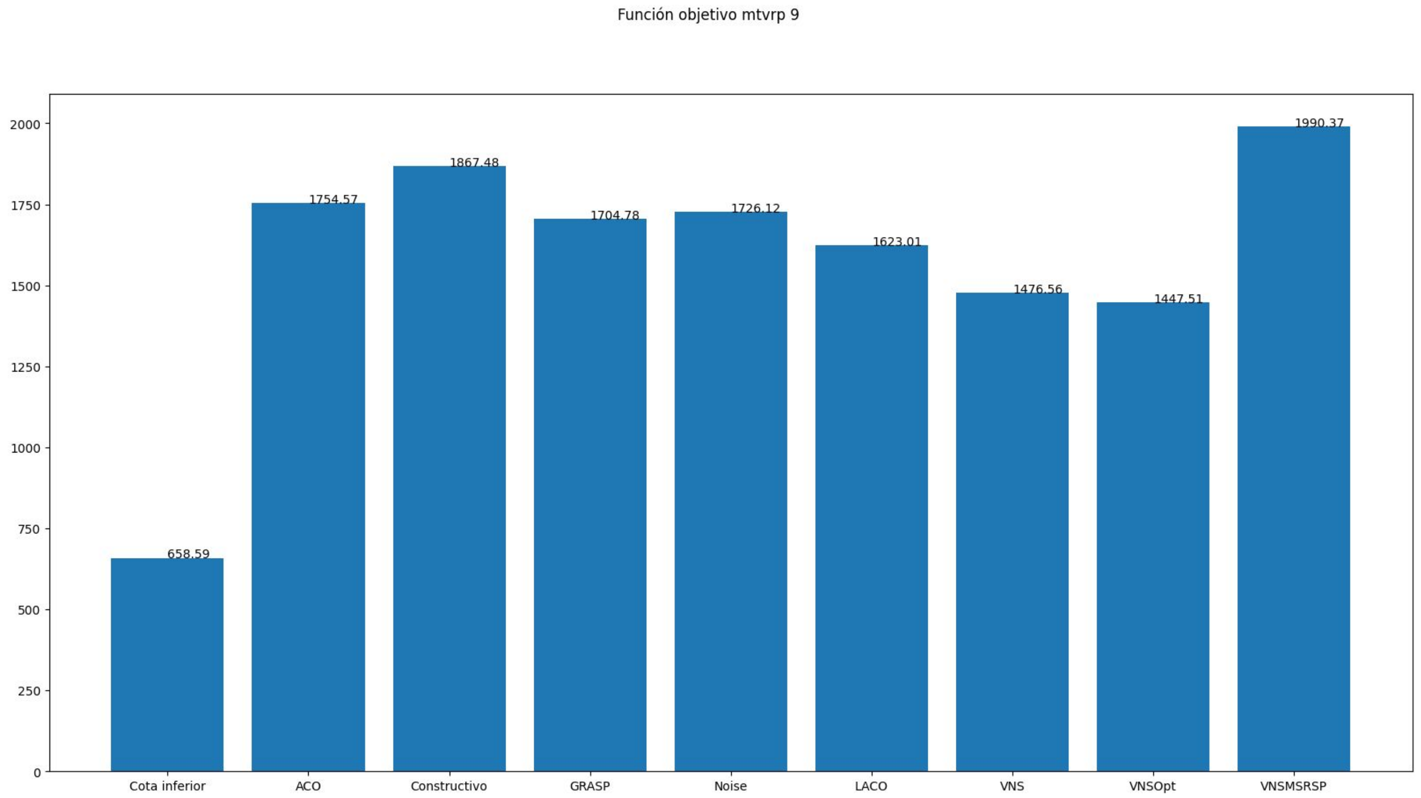


Comparación de algoritmos



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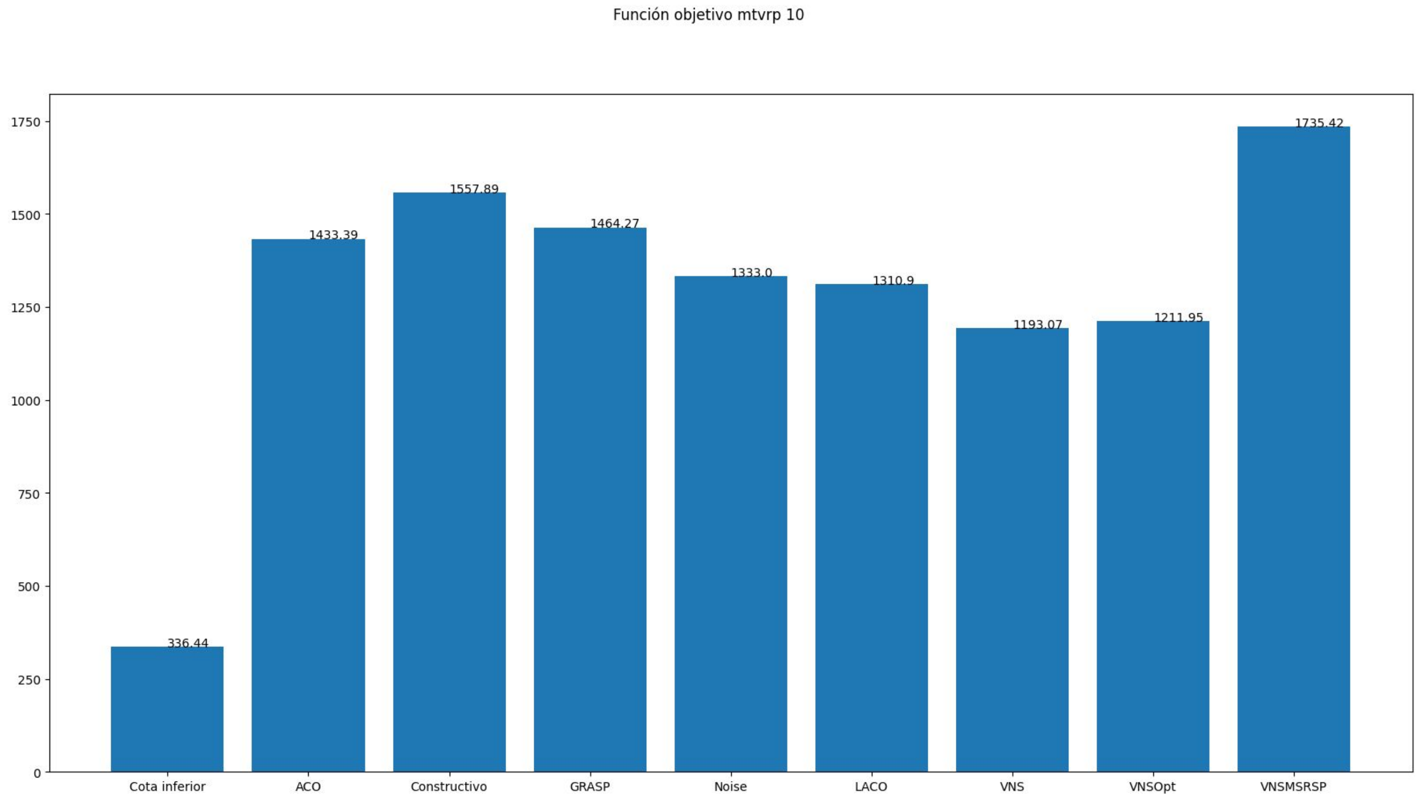

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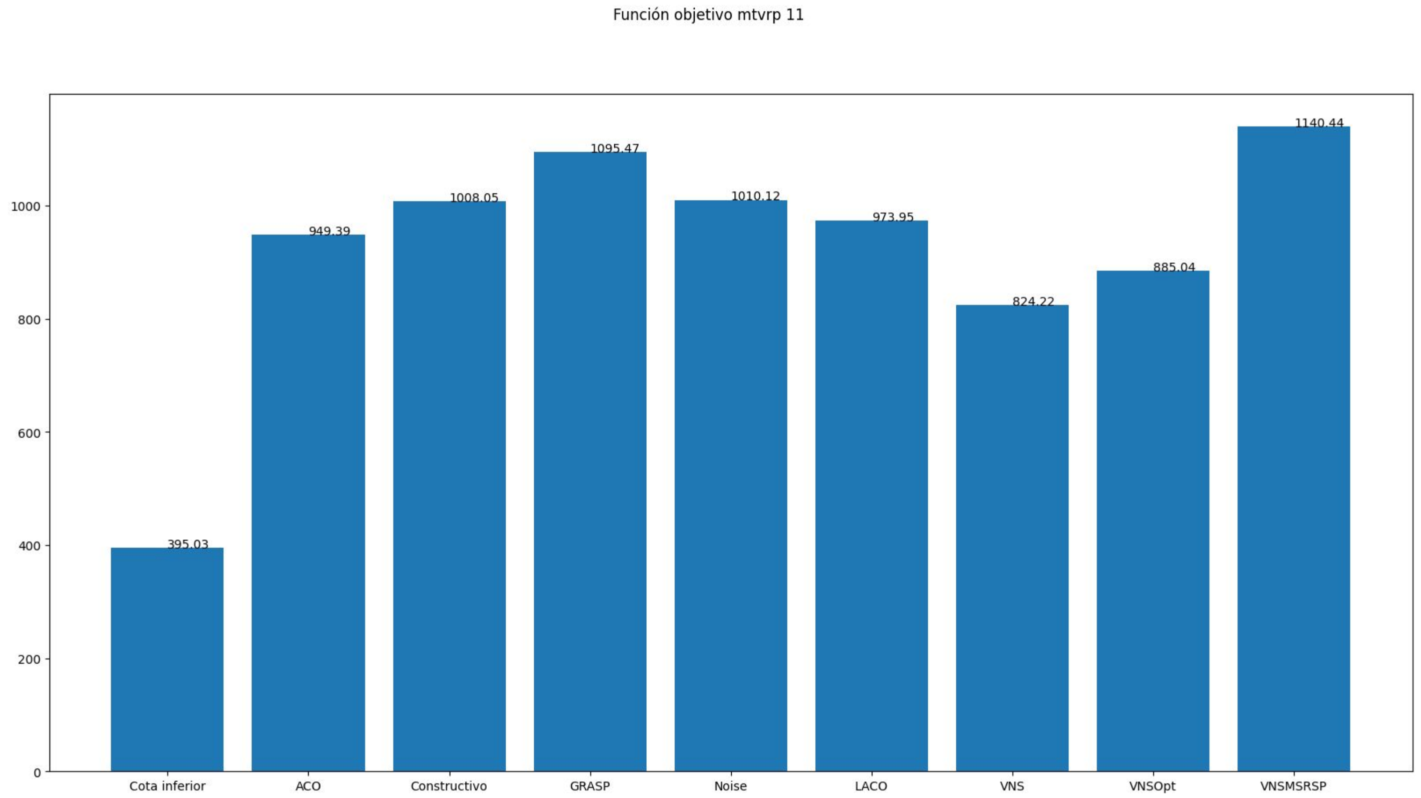

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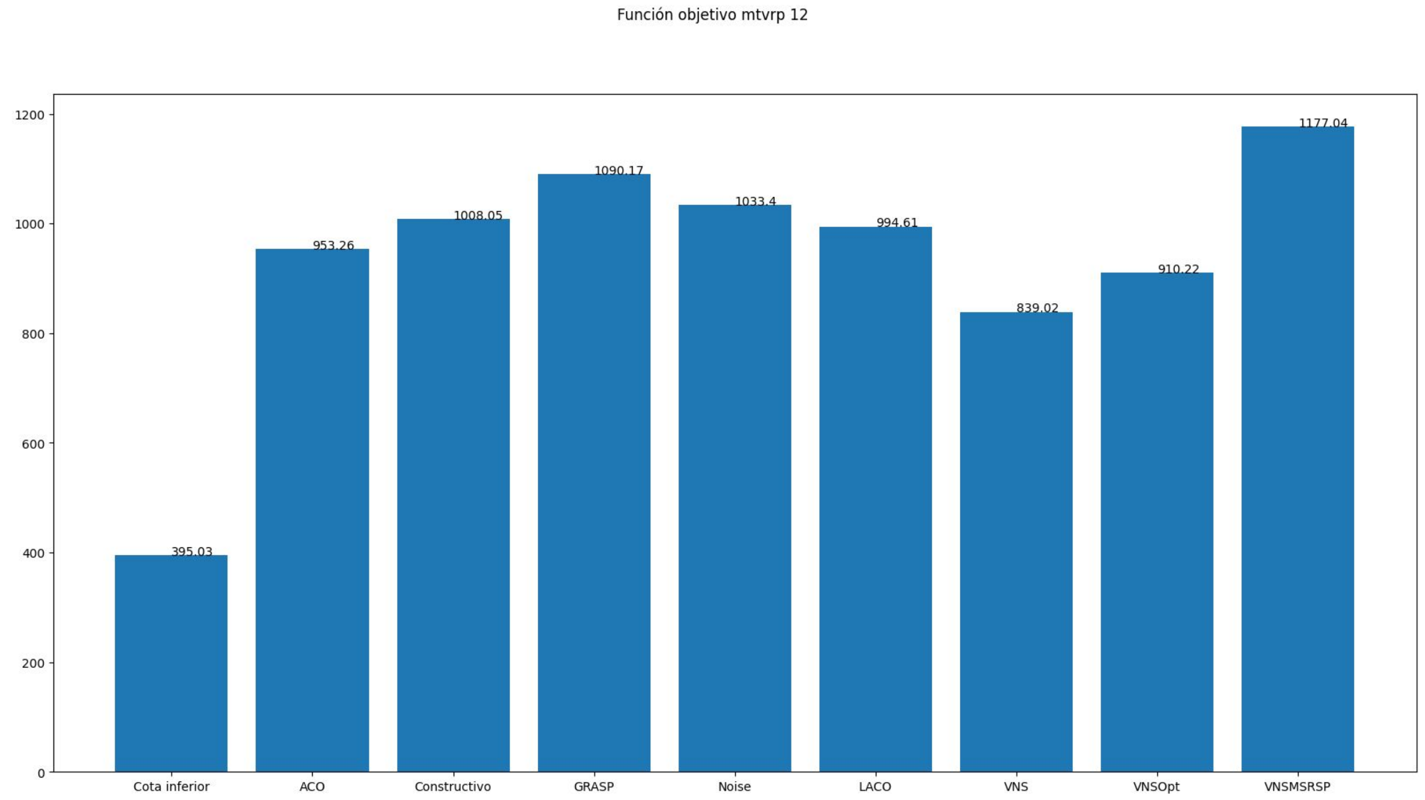
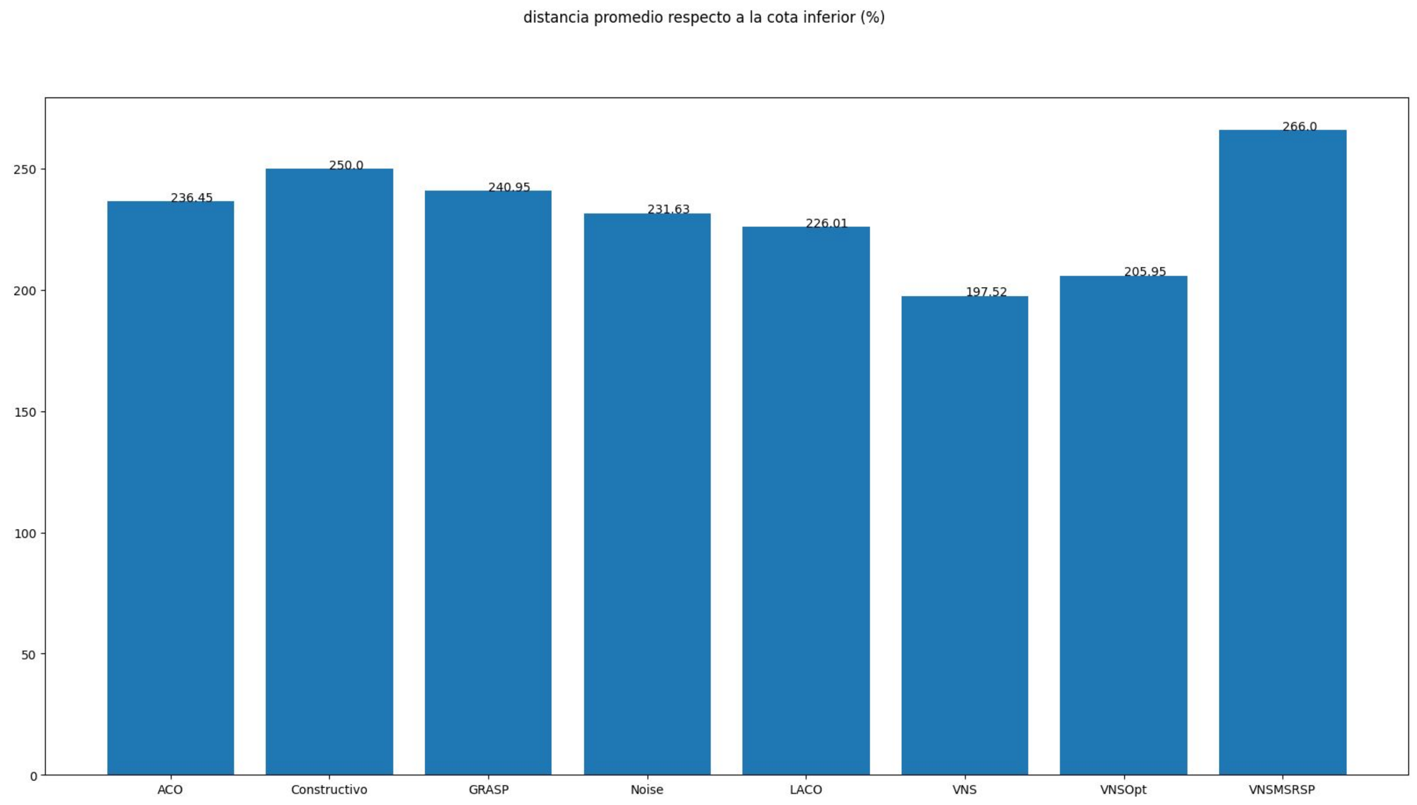


Comparación respecto a la cota inferior


distancia promedio respecto a la cota inferior (%)
ACO
Constructivo
GRASP
Noise
LACO
VNS
VNSOpt
VNSMSRSP