# Comparison

August 18, 2024

## 1 Example of all algorhitms and comparisson

### 1.1 Simmulated annealing

```python
[2]: # python
     pMoveTSP = TspArraySwap(size)
     pEvalTSP = TspEvaluationFunction(distance_matrix, pMoveTSP)
     pProblemArray = ArrayProblem(pEvalTSP, pMoveTSP, size)
     pTerminationTemp = MinTemperatureTerminationCriterion(100)
     pCool = GeometricCoolingFunction(0.95)
     pTemp = CnstIterationsTempFunction(1500)
     pSimAnn = SimulatedAnnealing(pProblemArray, pTerminationTemp,
     pCool, pTemp,logging=False, benchmarking=True)
     pResSimAnn = pSimAnn.run()

     # Rust
     rMoveTSP = lclRust.MoveType.swap_tsp()
     rEvalTSP = lclRust.Evaluation.tsp_from_dist_matrix("../data/distanceMatrix")
     rProblemArray = lclRust.Problem.array_problem(rMoveTSP,rEvalTSP)

     rTerminationTemp = lclRust.Termination.min_temp(100)
     rCool = lclRust.Cooling.geometric_cooling(0.95)
     rTemp = lclRust.IterationsPerTemp.cnst_iter_temp(1500)

     rSimAnn = lclRust.LocalSearch.
       ↪simulated_annealing(2000,True,rProblemArray,rTerminationTemp,rCool,rTemp)
     rResSimAnn = rSimAnn.run()
```
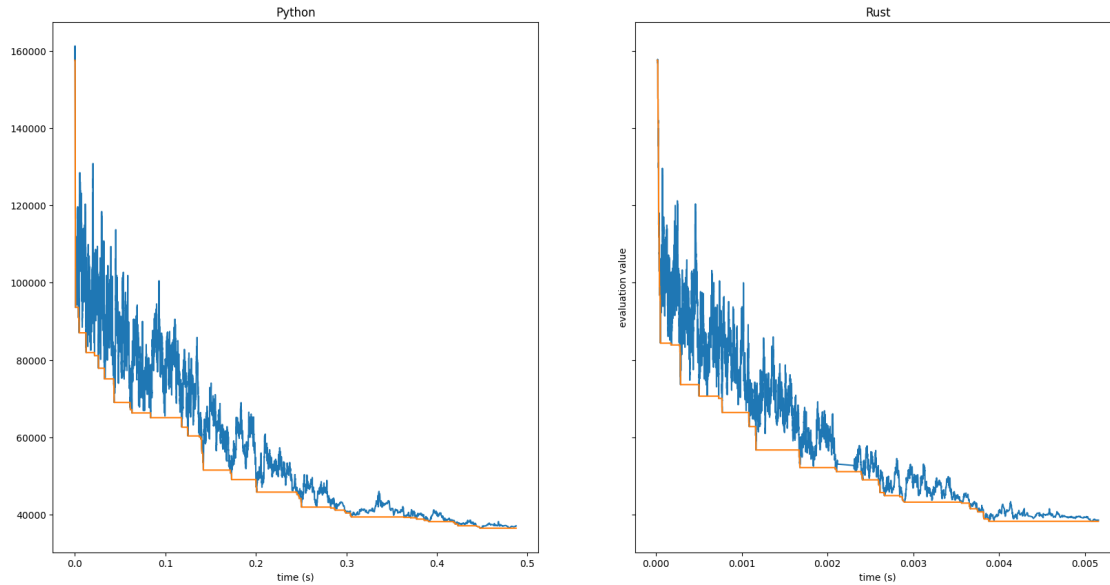
```python
[3]: plotPythonRust(pResSimAnn.data,rResSimAnn)
```
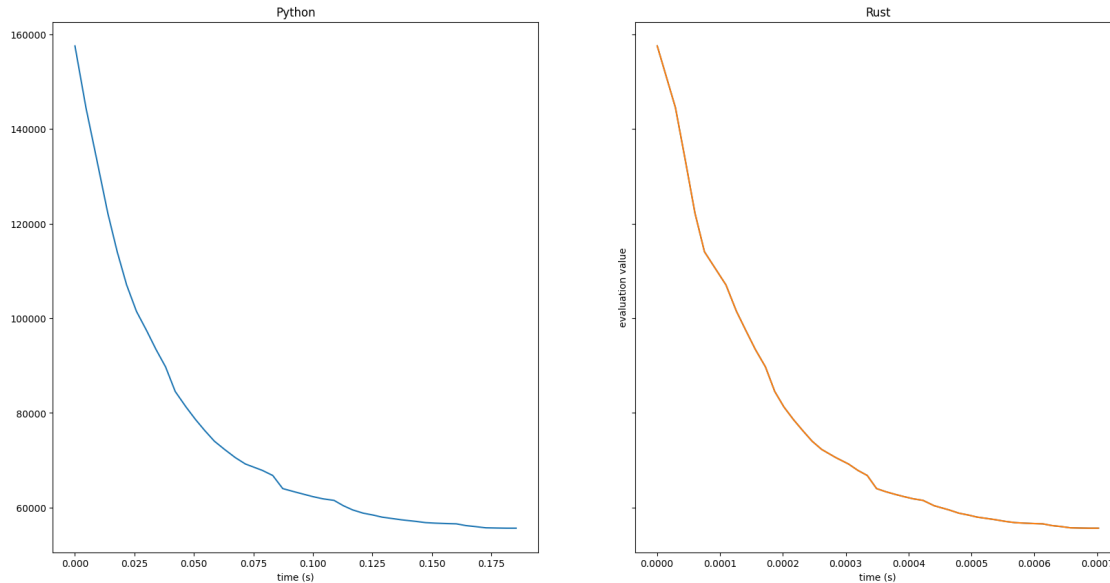
## 1.2 steepest descent

```
[4]: # python
pMoveTSP2 = TspArraySwap(size)
pEvalTSP2 = TspEvaluationFunction(distance_matrix, pMoveTSP2)
pProblemArray2 = ArrayProblem(pEvalTSP2, pMoveTSP2, size)

pSteepDe = SteepestDescent(pProblemArray2,logging=False, benchmarking=True)
pResSteepDe = pSteepDe.run()

# Rust
rMoveTSP2 = lclRust.MoveType.swap_tsp()
rEvalTSP2 = lclRust.Evaluation.tsp_from_dist_matrix("../data/distanceMatrix")
rProblemArray2 = lclRust.Problem.array_problem(rMoveTSP2,rEvalTSP2)
rTermTrue = lclRust.Termination.always_true()
rSteepDe = lclRust.LocalSearch.steepest_descent(True,rProblemArray2,rTermTrue)
rResSteepDe = rSteepDe.run()
```

```
[5]: plotPythonRust(pResSteepDe.data,rResSteepDe)
```

## 1.3 Tabu Search

```python
[6]: # python
pMoveTSP3 = TspArraySwap(size)
pEvalTSP3 = TspEvaluationFunction(distance_matrix, pMoveTSP3)
pProblemArray3 = ArrayProblem(pEvalTSP3, pMoveTSP3, size)
termination3 = MaxSecondsTerminationCriterion(10)
pDiff=SumDiffState()
pTabu = TabuSearch(pProblemArray3,termination3,pDiff,10, logging=False,␣
 ↪benchmarking=True)
pResTabu = pTabu.run()

# Rust
rMoveTSP3 = lclRust.MoveType.swap_tsp()
rEvalTSP3 = lclRust.Evaluation.tsp_from_dist_matrix("../data/distanceMatrix")
rProblemArray3 = lclRust.Problem.array_problem(rMoveTSP3,rEvalTSP3)
rTermMax10 = lclRust.Termination.max_sec(10)
rTabu = lclRust.LocalSearch.tabu_search(True,rProblemArray3,rTermMax10,10)
rResTabu = rTabu.run()
```

```python
[7]: plotPythonRust(pResTabu.data,rResTabu)
```

Python — Rust
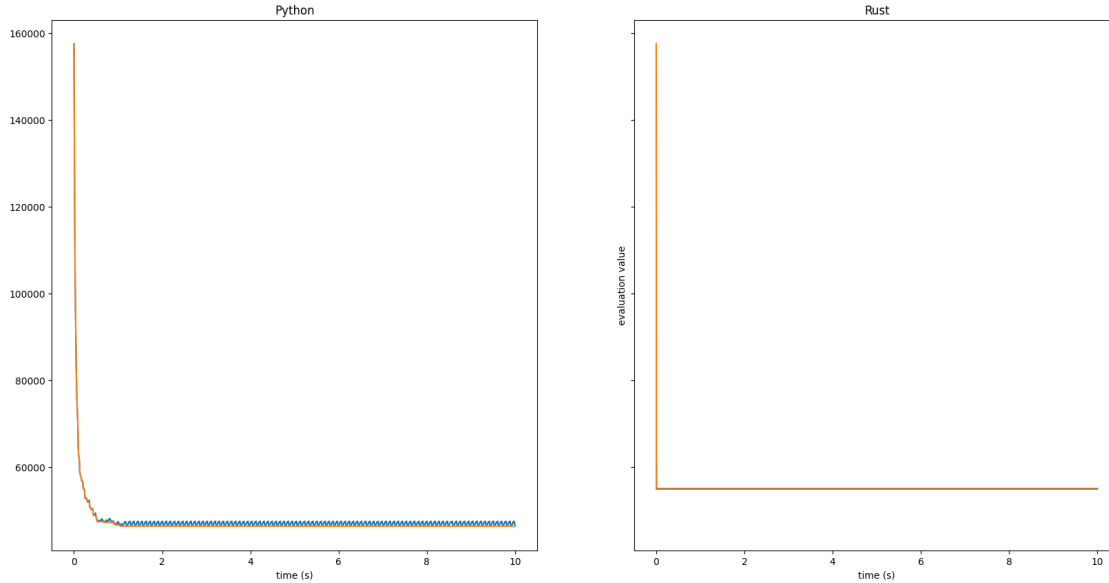
## 1.4 VNS

```python
[8]: # python
     pMoveTSP4 = TspArraySwap(size)
     pMoveReverse4 = ArrayReverseOrder(size)
     pMoveVNS4=MultiNeighbourhood([pMoveTSP4,pMoveReverse4])

     pEvalTSP4 = TspEvaluationFunction(distance_matrix, pMoveVNS4)
     pProblemArray4 = ArrayProblem(pEvalTSP4, pMoveVNS4, size)

     pVNS = VariableNeighbourhood(pProblemArray4, logging=False, benchmarking=True)
     pResVNS = pVNS.run()

     # Rust
     rMoveTSP4 = lclRust.MoveType.swap_tsp()
     rMoveReverse4 = lclRust.MoveType.reverse()
     rMoveVNS4= lclRust.MoveType.multi_neighbor([rMoveTSP4,rMoveReverse4])
     rEvalTSP4 = lclRust.Evaluation.tsp_from_dist_matrix("../data/distanceMatrix")
     rProblemArray4 = lclRust.Problem.array_problem(rMoveVNS4,rEvalTSP4)

     rTermTrue = lclRust.Termination.always_true()
     rVNS = lclRust.LocalSearch.vns(True,rProblemArray4,rTermTrue)
     rResVNS = rVNS.run()
```

```python
[9]: plotPythonRust(pResVNS.data, rResVNS)
```