



In [6]:

```

import qhea
import benchmark

cost_functions = benchmark.get_tsp_names()[ :2]
popsize = 100
generations = 10000
executions = 10
params = [
    qhea.Parameters(
        population_size=popsize,
        generation_count=generations,
        crossover_strategy=qhea.Crossover.Half
    ),
    qhea.Parameters(
        population_size=popsize,
        generation_count=generations,
        crossover_strategy=qhea.Crossover.Nodes
    ),
    qhea.Parameters(
        population_size=popsize,
        generation_count=generations,
        crossover_strategy=qhea.Crossover.Random
    ),
]
names = ['Crossover Half', 'Crossover Nodes', 'Crossover Random',
        ]
benchmark.analyze_and_display(params, executions,[], cost_functions , names)

```

```

Executing parameter 1 of 3 ...
Executing cost function 1 of 2 ...
Finished cost function 1 of 2 1517.169083599998 seconds.
Executing cost function 2 of 2 ...
Finished cost function 2 of 2 3021.343748899999 seconds.
Finished parameter 1 of 3 4538.513392599998 seconds.
Executing parameter 2 of 3 ...
Executing cost function 1 of 2 ...
Finished cost function 1 of 2 1522.1616992000054 seconds.
Executing cost function 2 of 2 ...
Finished cost function 2 of 2 3175.135833900007 seconds.
Finished parameter 2 of 3 4697.300256499999 seconds.
Executing parameter 3 of 3 ...
Executing cost function 1 of 2 ...
Finished cost function 1 of 2 1553.9191763999916 seconds.
Executing cost function 2 of 2 ...
Finished cost function 2 of 2 3165.597485399994 seconds.
Finished parameter 3 of 3 4719.517347400004 seconds.
=====
=====
Algorithm was tested with 3 different parameter configurations
For each parameter configuration, the algorithm was tested against these problems:
['distances-10-3-100', 'distances-15-1-100']
For each problem, the algorithm was executed 10 times to collect data.
-----
-----

```

Tested Parameter Configuration: Crossover Half

Population Size: 100
Generation Count: 10000
Mutation Rate: 0.05
Crossover Rate: 1
Selection Pressure: 1.9
Optimization Rate: 1
Adjust Parameters: False
Annealing Size: 5
Sub Problems: [[]]
Init Strategy: Random
Selection Strategy: Fittest
Local Optimization: LocalOptimization.OptimizationNone
Replacement Strategy: Replacement.ParentAndOffSpring

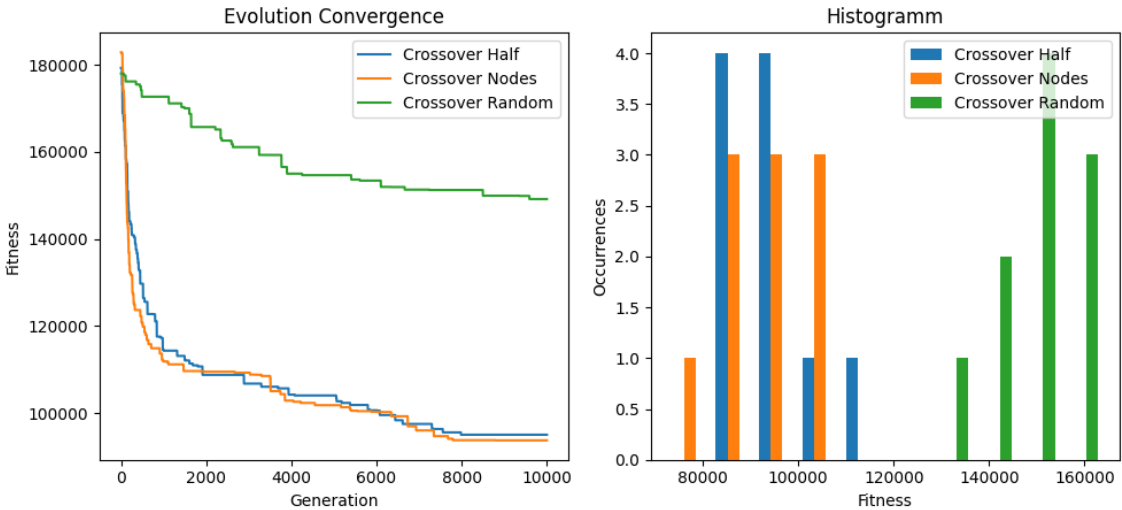
Tested Parameter Configuration: Crossover Nodes

Population Size: 100
Generation Count: 10000
Mutation Rate: 0.05
Crossover Rate: 1
Selection Pressure: 1.9
Optimization Rate: 1
Adjust Parameters: False
Annealing Size: 5
Sub Problems: [[]]
Init Strategy: Random
Selection Strategy: Fittest
Local Optimization: LocalOptimization.OptimizationNone
Replacement Strategy: Replacement.ParentAndOffSpring

Tested Parameter Configuration: Crossover Random

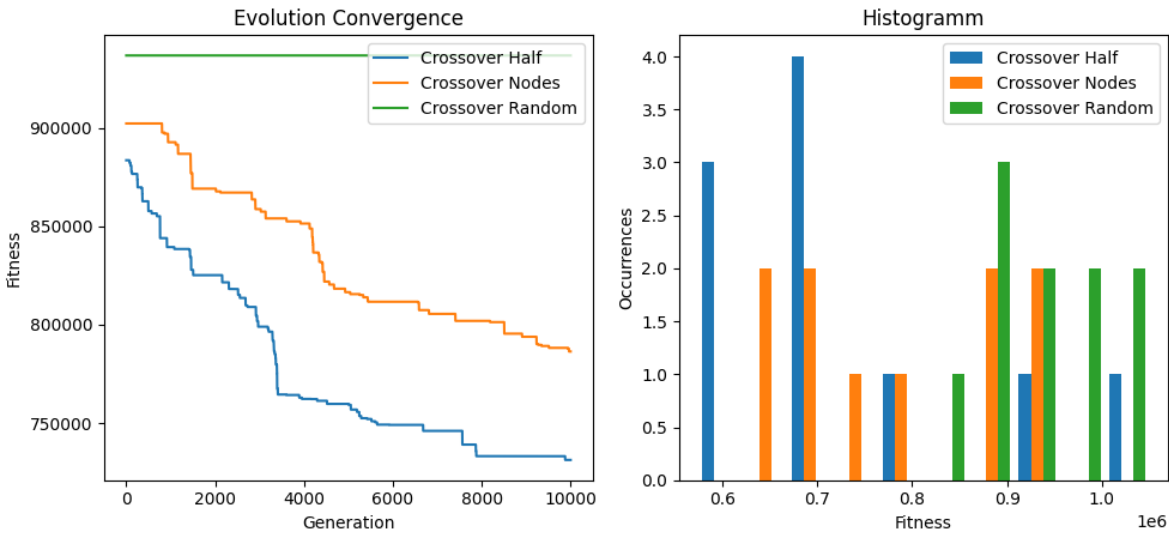
Population Size: 100
Generation Count: 10000
Mutation Rate: 0.05
Crossover Rate: 1
Selection Pressure: 1.9
Optimization Rate: 1
Adjust Parameters: False
Annealing Size: 5
Sub Problems: [[]]
Init Strategy: Random
Selection Strategy: Fittest
Local Optimization: LocalOptimization.OptimizationNone
Replacement Strategy: Replacement.ParentAndOffSpring

Problem distances-10-3-100



| | Parameters | Accuracy | Average | Best Result | Worst |
|---|------------------|----------|----------|-------------|----------|
| 0 | Crossover Half | 0.0 | 95013.7 | 84149.0 | 115632.0 |
| 1 | Crossover Nodes | 0.0 | 93724.9 | 72710.0 | 106654.0 |
| 2 | Crossover Random | 0.0 | 149135.5 | 133732.0 | 163785.0 |

Problem distances-15-1-100



| | Parameters | Accuracy | Average | Best Result | Worst |
|---|------------------|----------|----------|-------------|-----------|
| 0 | Crossover Half | 0.0 | 731264.3 | 573189.0 | 1050903.0 |
| 1 | Crossover Nodes | 0.0 | 786376.1 | 622161.0 | 955227.0 |
| 2 | Crossover Random | 0.0 | 936795.9 | 831595.0 | 1046763.0 |

In []:

