

# Replication

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This document describes what was done to achieve the results presented in the report.

## 1. Ensure Consistent Settings for All Algorithms

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### RS.py

- `budget` set to 100.
- `runs` set to 30.

### SA.py

- `budget` set to 100.
- `runs` set to 30.
- `temperature` set to 1.
- `cooling_rate` set to 0.963.

### ISA.py

- `budget` set to 100.
- `runs` set to 30.
- `temperature` set to 1.
- `cooling_rate` set to 0.963.
- `initialisation_ratio` set to 0.3.

## 2. Running the Algorithms

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### Random search

Run the random search algorithm:

```
python RS.py
```

Because `runs` is set to 30, the algorithm will run 30 times on each system. At the end, a file named `best_performances.csv` will appear in `search_results` folder. Rename it and move the file to `data` folder. There you can already find my results file `RS.csv` for this algorithm.

### Simulated annealing

Run simulated annealing algorithm:

```
python SA.py
```

Because `runs` is set to 30, the algorithm will run 30 times on each system. At the end, a file named `best_performances.csv` will appear in `search_results` folder. Rename it and move the file to `data` folder. There you can already find my results file `ISA.csv` for this algorithm.

### Improved simulated annealing

Run improved simulated annealing algorithm:

```
python ISA.py
```

Because `runs` is set to 30, the algorithm will run 30 times on each system. At the end, a file named `best_performances.csv` will appear in `search_results` folder. Rename it and move the file to `data` folder. There you can already find my results file `ISA.csv` for this algorithm.

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In the report this is how the data in table 1 was obtained. Average and standard deviation were calculated using Excel functions.

## 3. Statistical Analysis

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Ensure these settings correspond to your data:

- `MAXIMISATION` : true for maximisation problem, false for minimisation problem.
- `system` : which system are you statistically analysing.
- `rs_df` and `isa_df` : ensure paths correspond to where your generated data is.

Once everything is correct, run statistical analysis:

```
python statistically_process_results.py
```

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The data presented in the report was generated in this way. Statistical analysis was done as described, on every available system for both random search and improved simulated annealing.