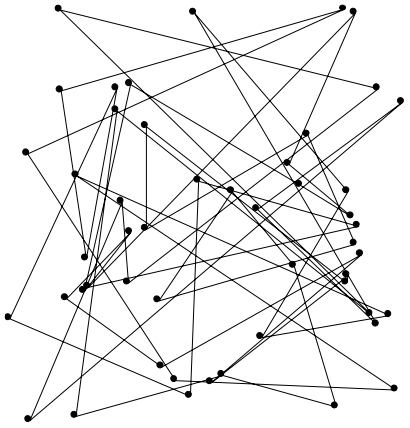
Assignment #1
TSP

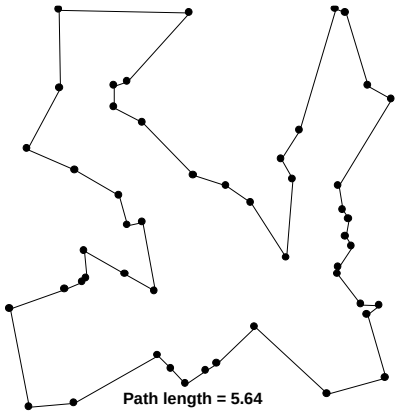
MECS 4510

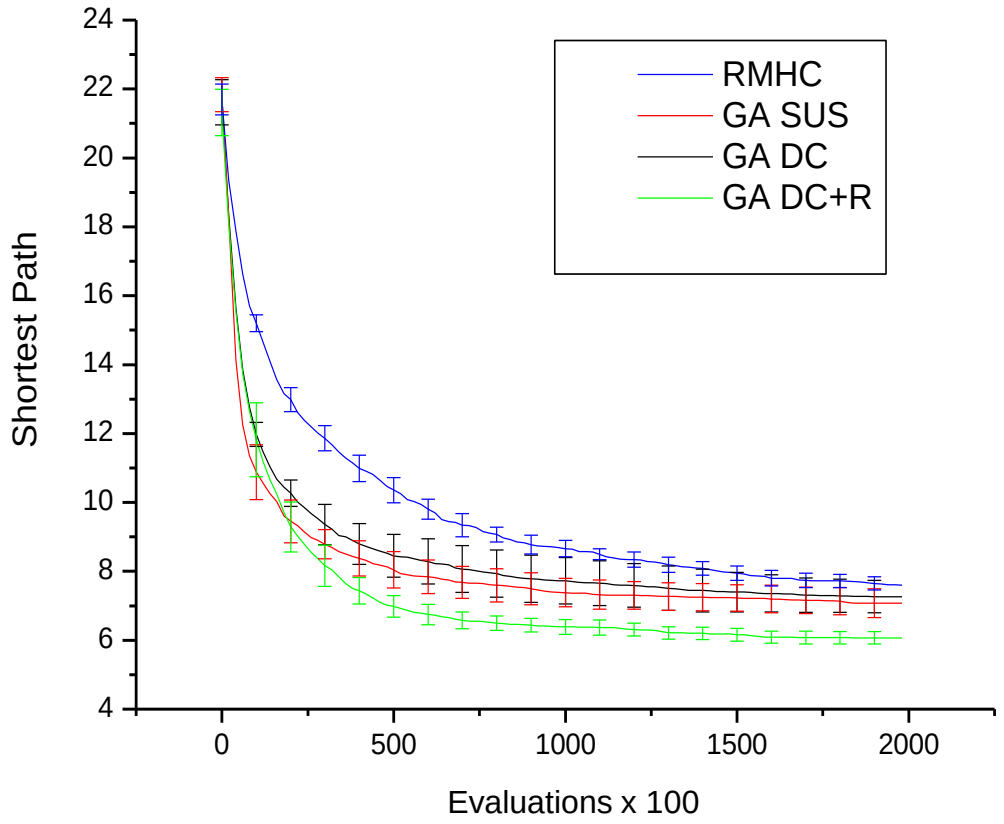
Evolutionary Computation

Hod Lipson

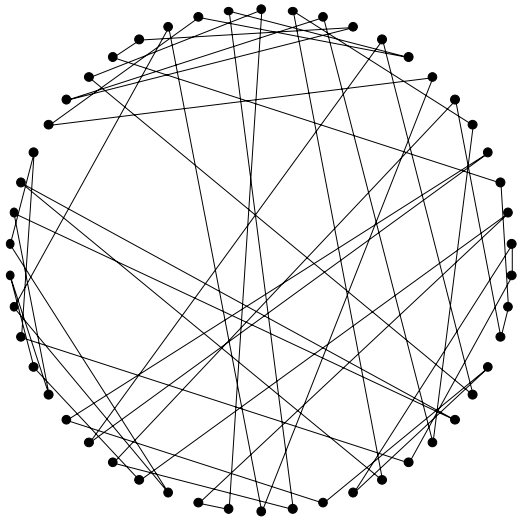
TSP: Example 1



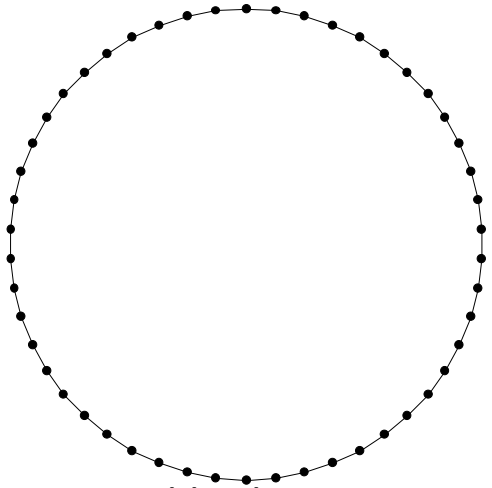




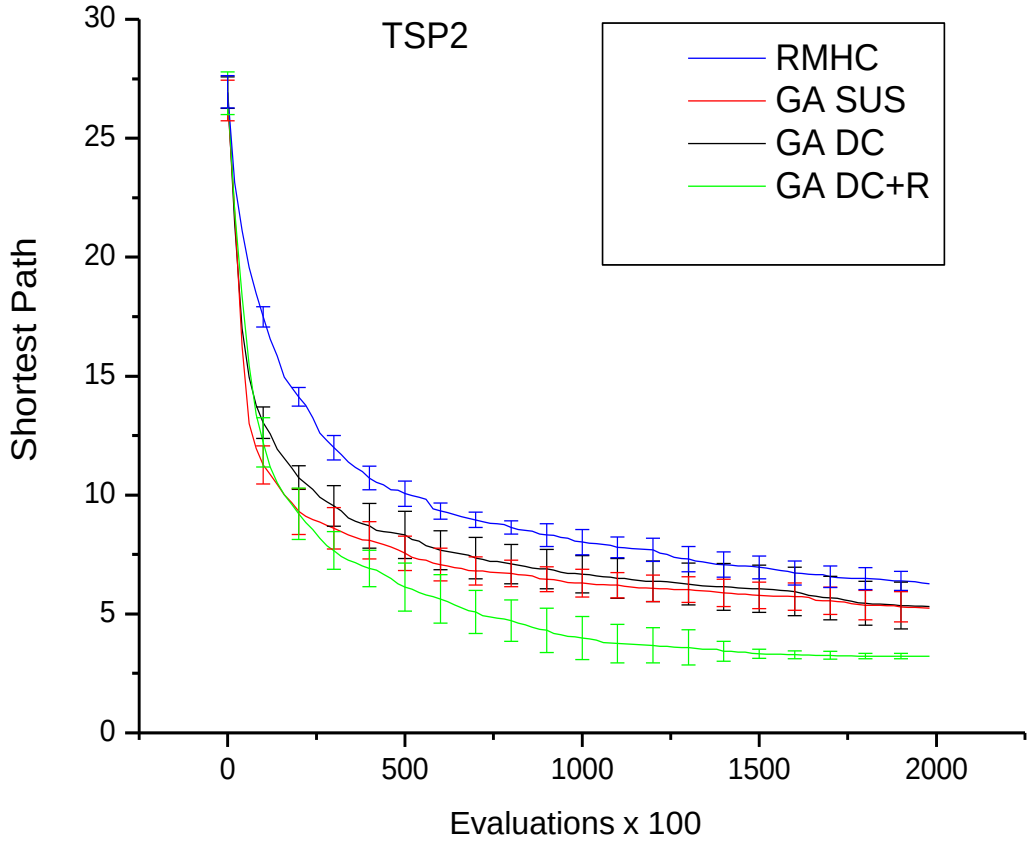
TSP: Example 2



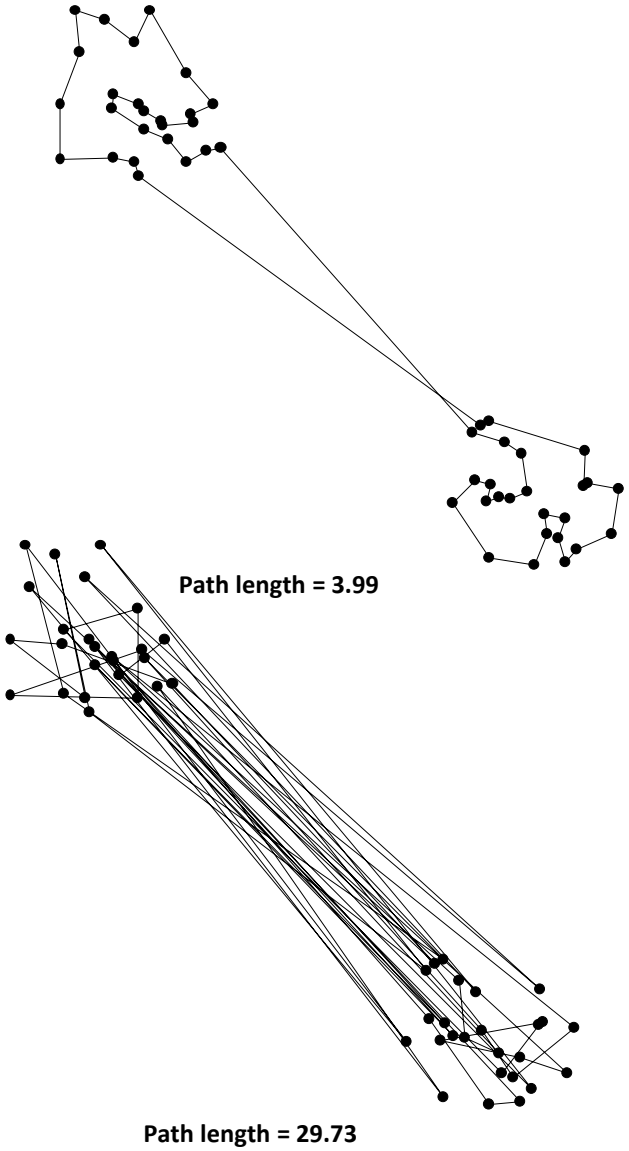
Path length = 29.65

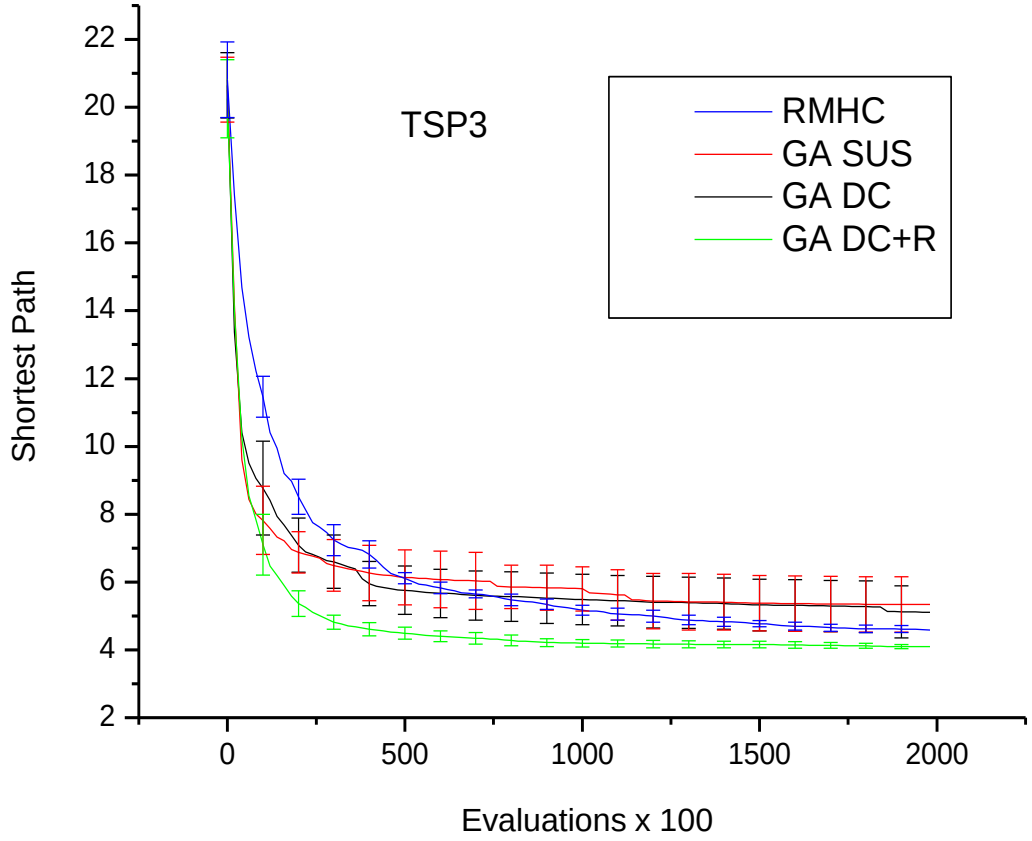


Path length = 3.14



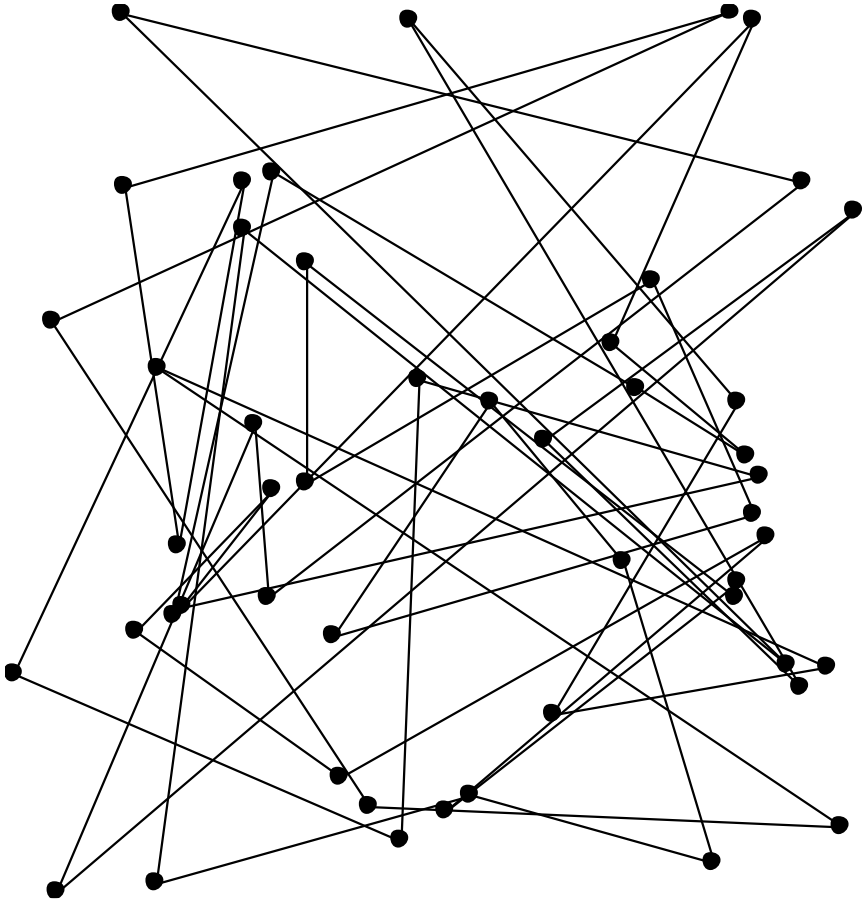
TSP: Example 3



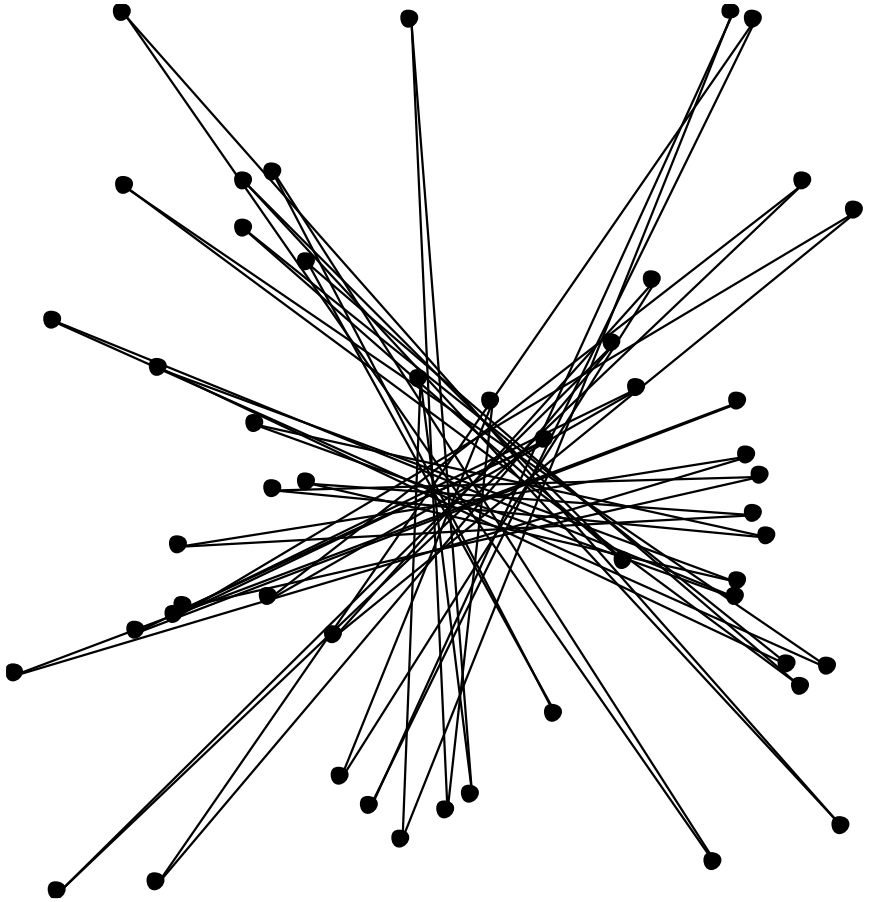


Traveling Salesman Problem*

*With Frequent-Flyer Benefits



Path Length 25.19



Path Length 36.97

Run

1. Cover page, with Your name, UNI, Course name and number, instructor, Date Submitted, Grace hours used and grace hours remaining.
2. Page 2: Results summary table with four figures (two per dataset)
    a. Shortest path found (plot path and write total distance and # evals)
    b. Longest path found (plot path and write total distance and # evals)
3. Methods (2 pages max)
    a. A brief description of the representation, variation operators and selection process you used for your implementation.
    b. Analysis of what worked and what didn't, and why
4. Performance plots: One page for each of the two test problems
    a. Learning curves (fitness vs. evaluations) averaged on at least four runs, with error of the mean, for each approach tested
    b. Baseline curves for comparison
    c. Dot plot for the best method (sample points)
5. Appendix: Listing of all the code you wrote (do not include code you did not author yourself, for example external libraries or auto-generated code)
    a. Use Courier font, size 8, single line spacing, highlight function declarations

General

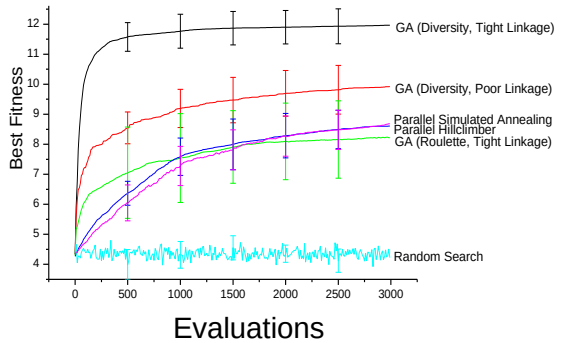
- 5 Points: Cover page includes all information
- 5 Points: Result table showing all information requested
- 5 Points: Dot plot for any one of the methods (not all required)
- 5 Points: Convergence plot for any one of some methods (not all)
- 5 Points: General quality of the report (grammar, layout)
- 5 Points: Code included (8pt courier single spacing)
- 5 Points: Theoretical shortest path for problem 2 using **Christofides' algorithm**

Methods

- 5 Points description of representation used
- 5 Points description of random search
- 5 Points description of hill climber
- 5 Points description of EA variation and selection methods used
- 5 Points analysis of performance

Performance plots

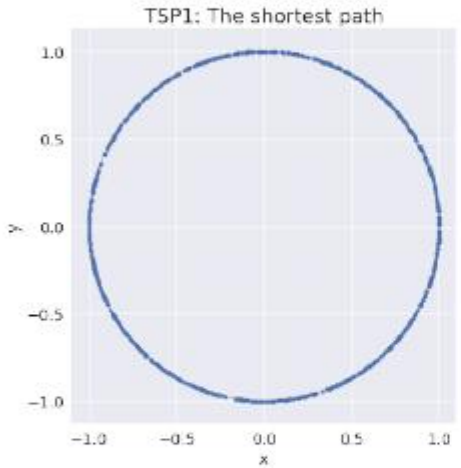
- 5 Points: Learning curve of random search, hill climber, EA, variation
- 5 Points: learning curves clearly labeled, have error bars, labeled axes
- 5 Points: Overall performance (Pareto layer of distance and evaluations)

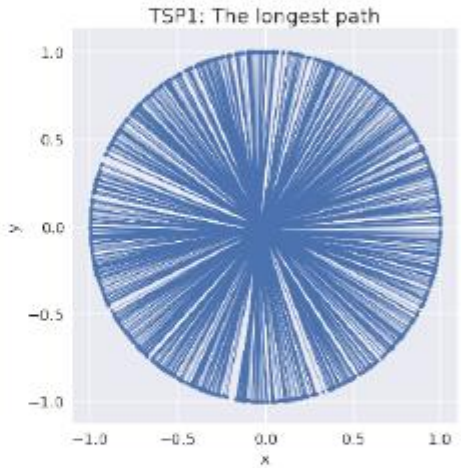


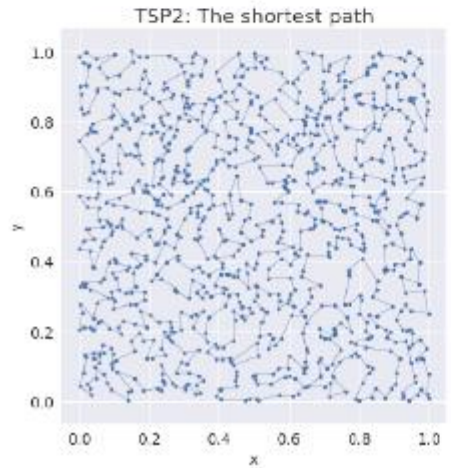
Results summary

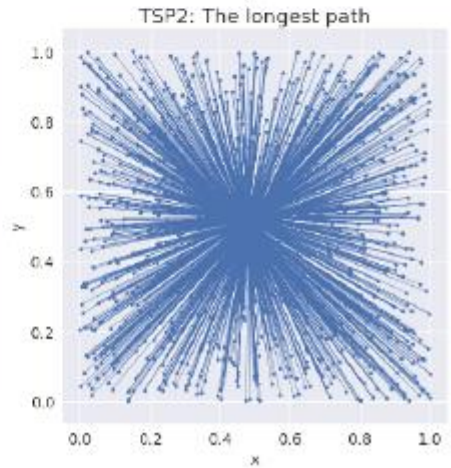
Table 1: Results summary

		Evaluations	Length
TSP1	The shortest path	15,668,800	6.2836
	The longest path	3,540,300	1999.56
TSP2	The shortest path	15,113,100	26.308
	The longest path	5,140,000	764.767









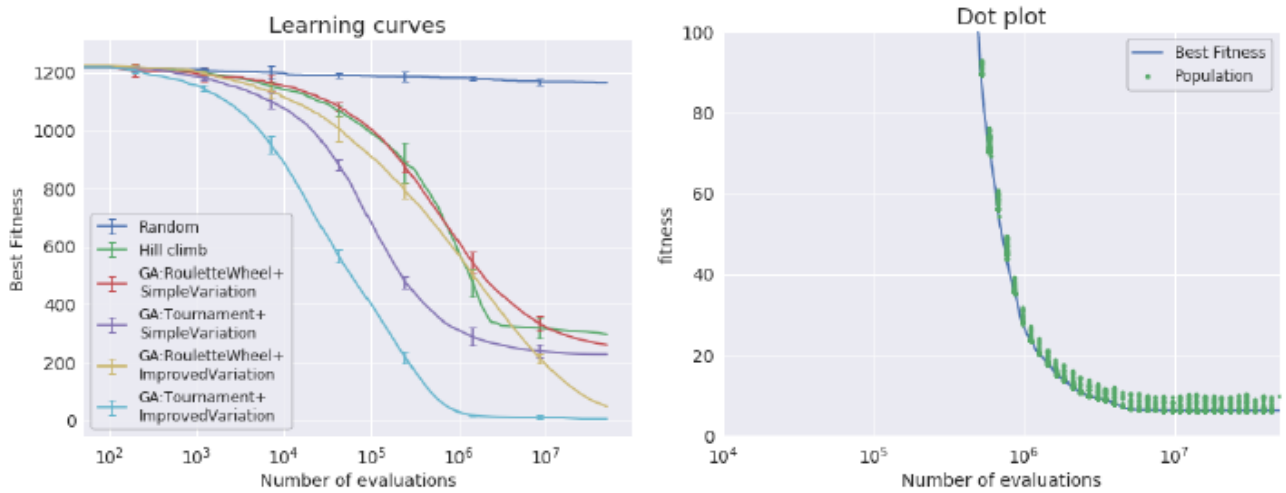


Figure 2: TSP1: The shortest path

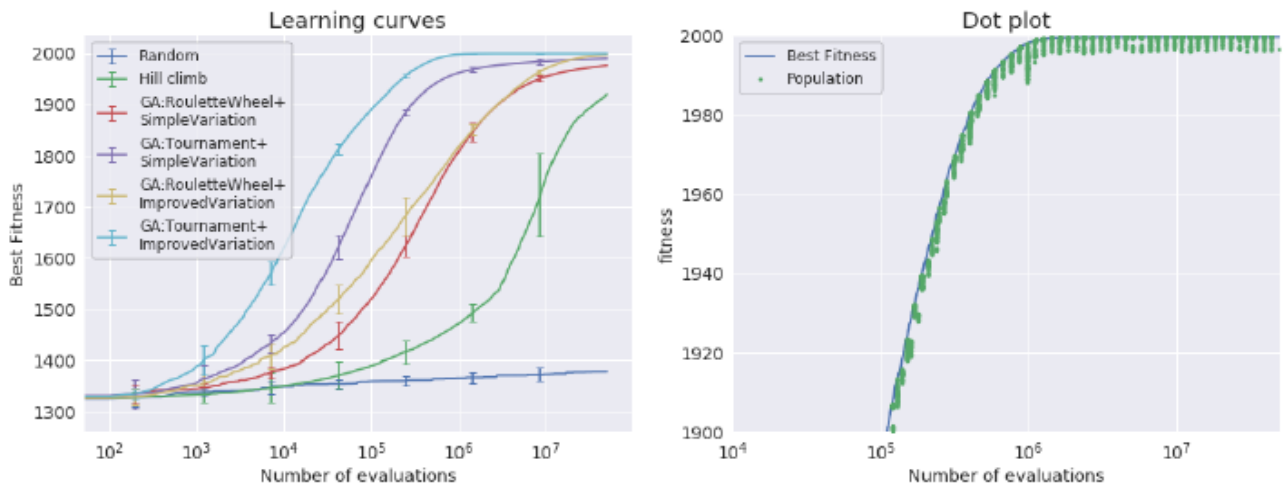
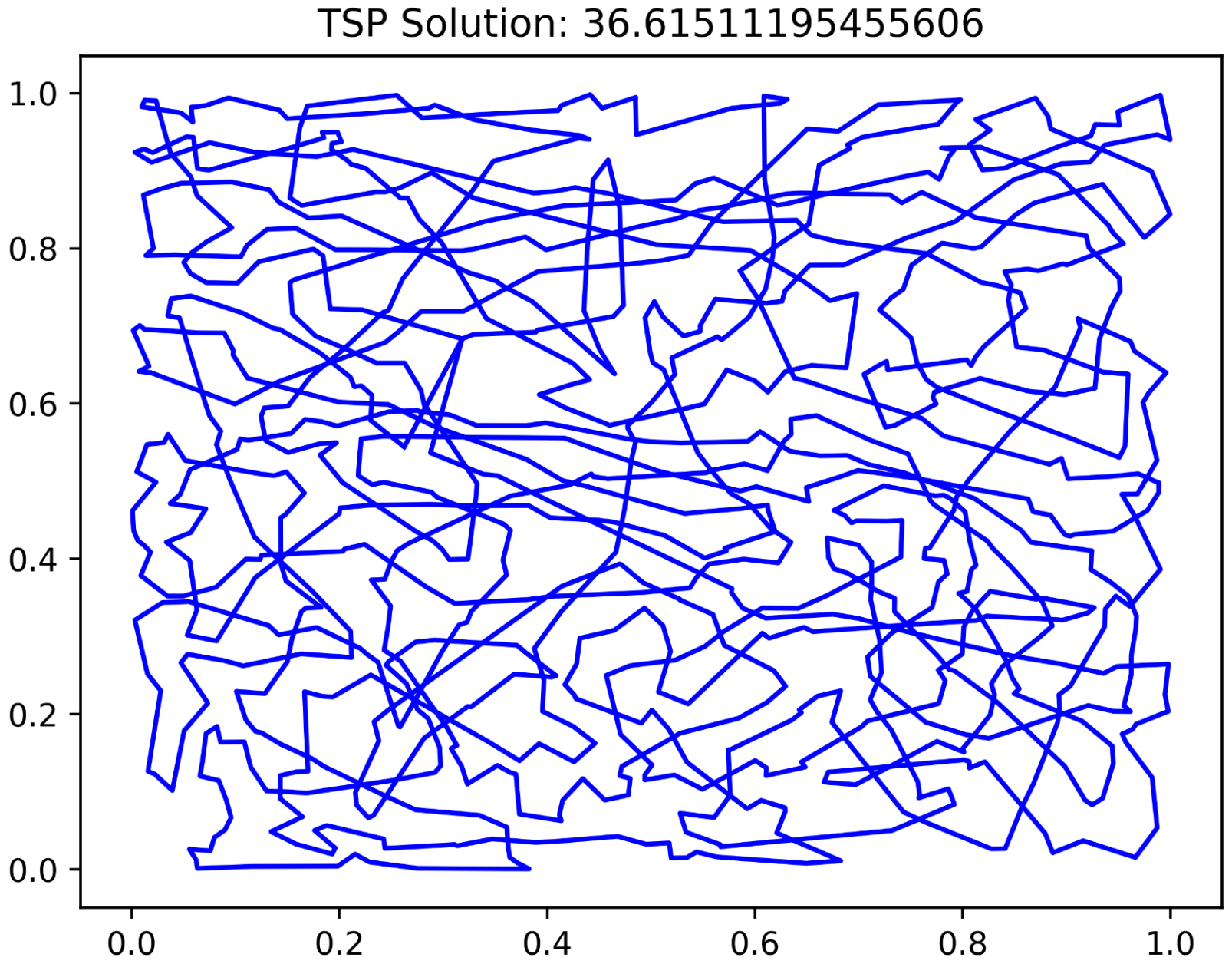


Figure 3: TSP1: The longest path



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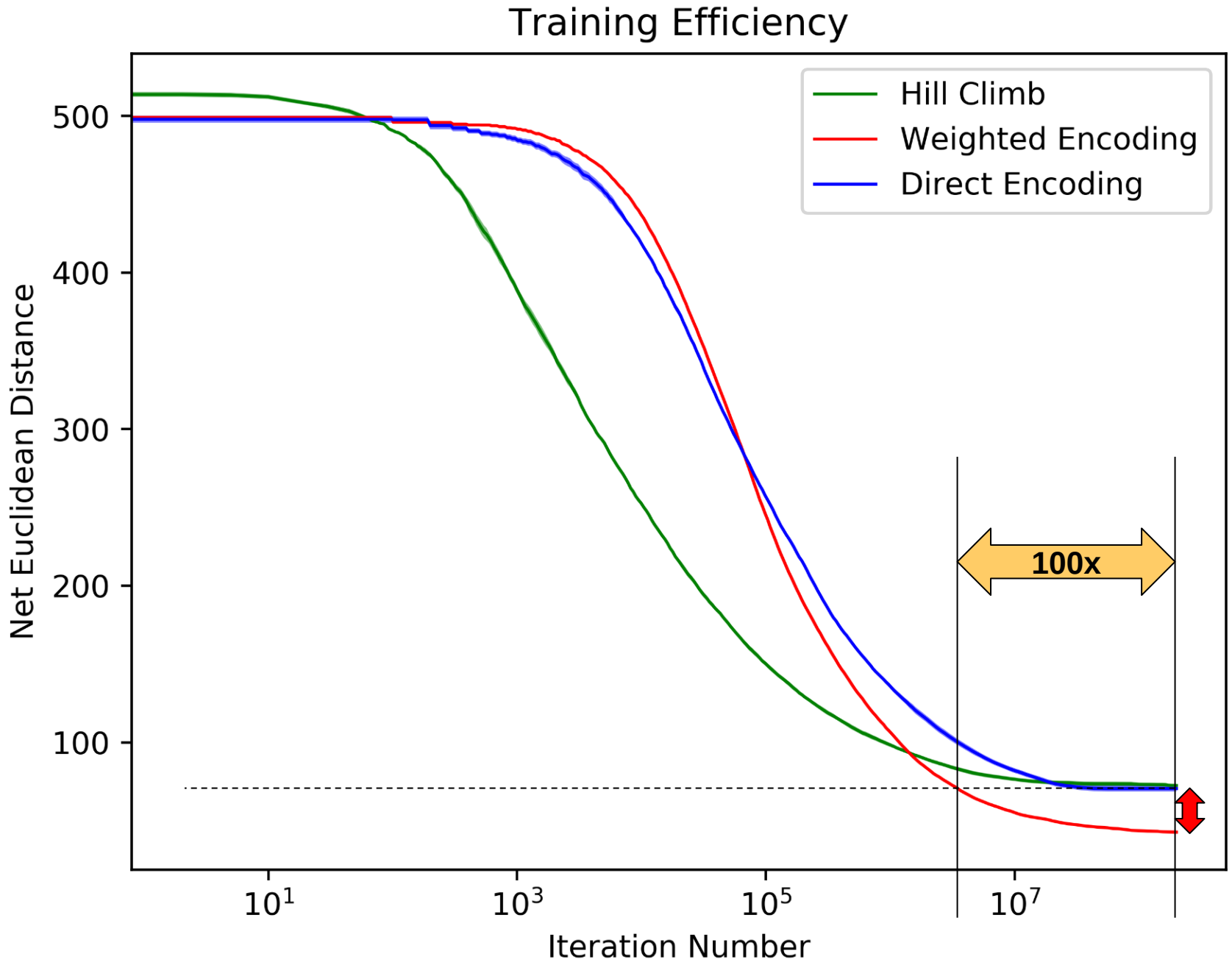
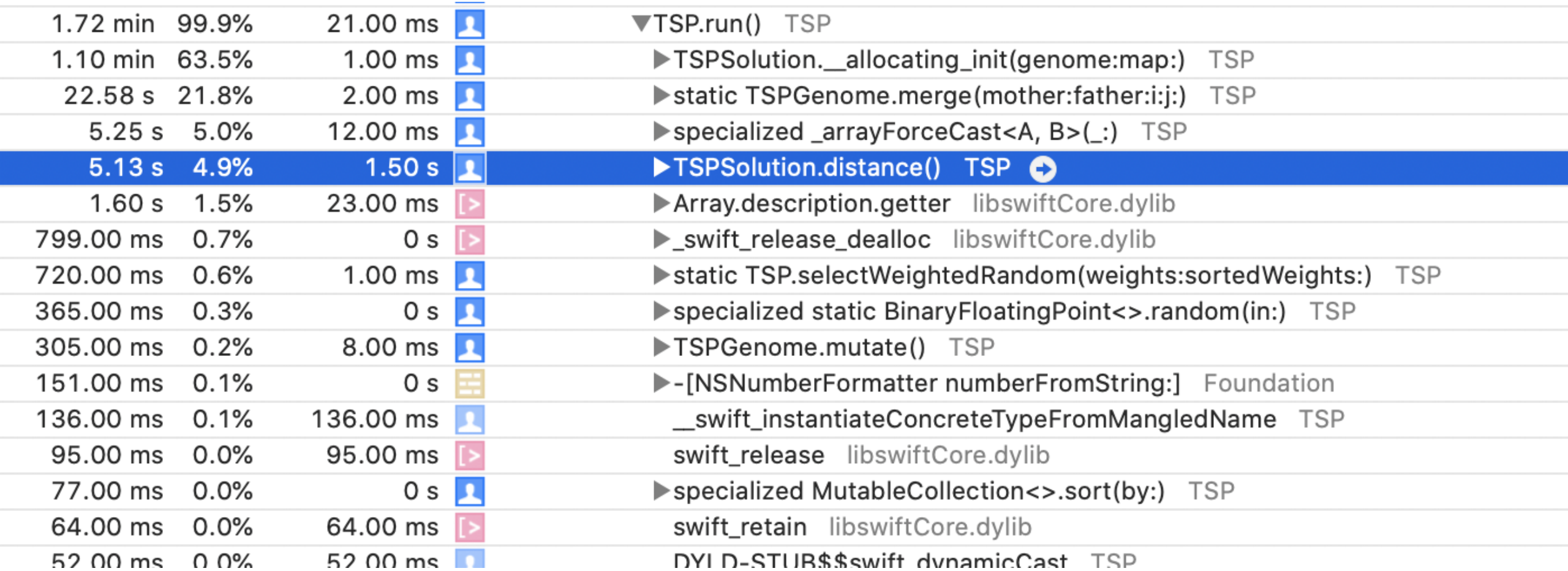

Training Efficiency
Hill Climb
Weighted Encoding
Direct Encoding
Net Euclidean Distance
500
400
300
200
100
100x
10^1
10^3
10^5
10^7
Iteration Number



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