**Optimization Challenge**

Using any state-of-the-art meta-heuristics, create a solution with initial state. The solution must be:

1. Length of 14.
2. Only consist of alphabet.
3. Starting from a random initial solution.

You may use any programming language (Java, C++, Python) to create the algorithm.

Sample of random **initial** solution:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | D | F | Z | J | T | P | R | D | S | S | F | C | E |

Total cost function = 14.

The **goal state** will be as follow: **METAHEURISTICS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| M | E | T | A | H | E | U | R | I | S | T | I | C | S |

Total cost function = 0.

To evaluate the cost function, each element will be evaluated based on the goal state. For example,

1st element: goal is M, current solution is H. Cost function is 1.

2nd element: goal is E, current solution is D. Cost function is 1.

3rd element: goal is T, current solution is F. Cost function is 1.

8th element: goal is R, current solution is R. Cost function is 0.

Sum up the total cost function from the first element until the last element. This would be the total cost function.

**Sample Output**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | D | F | Z | J | T | P | R | D | S | S | F | C | E |

Iteration = 1. Total cost function = 14.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | D | F | Z | J | T | P | R | D | S | S | F | C | S |

Iteration = 2. Total cost function = 14.

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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| M | E | T | Z | J | U | U | R | I | S | T | I | C | S |

Iteration = 263. Total cost function = 3.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| M | E | T | A | H | E | U | R | I | S | T | I | C | S |

Iteration = 264. Total cost function = 0.