Experiment - 5

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Track: - AI

Aim:

Program to implement Heuristic search: Hill climbing

Software Required:

PyCharm

Theory:

Hill climbing is a mathematical optimization heuristic used for finding the maximum or minimum of a function. The fundamental idea is to start at a particular point and move in the direction that maximizes or minimizes the objective function, thus "climbing" the "hill" or "descending" the "valley" in the function landscape.

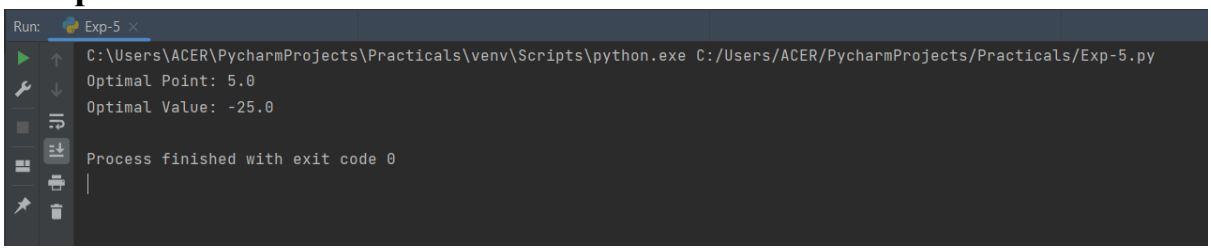
Algorithm:

```python
def objective_function(x):
    return -x ** 2


def hill_climbing(starting_point, iterations, step_size):
    current_point = starting_point
    for i in range(iterations):
        next_point = current_point + step_size
        if objective_function(next_point) > objective_function(current_point):
            current_point = next_point
        else:
            step_size /= 2
    return current_point

starting_point = 5.0
iterations = 100
step_size = 0.1

optimal_point = hill_climbing(starting_point, iterations, step_size)

print("Optimal Point:", optimal_point)
print("Optimal Value:", objective_function(optimal_point))
```

Applications:

It is a basic algorithmic technique widely employed in various domains to iteratively improve a solution by making incremental changes. Overall, hill climbing serves as a foundation for various optimization techniques and is a fundamental concept in the field of artificial intelligence and search algorithms.

Output:


Run:
Exp-5
C:\Users\ACER\PycharmProjects\Practicals\venv\Scripts\python.exe C:/Users/ACER/PycharmProjects/Practicals/Exp-5.py
Optimal Point: 5.0
Optimal Value: -25.0
Process finished with exit code 0