1. **Complexity:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | **NLOC** | **Complexity** | **Token #** | **Parameter #** |
| \_\_init\_\_ | 3 | 1 | 19 |  |
| Bounded\_Knapsack | 24 | 8 | 189 |  |
| Unbounded\_Knapsack | 23 | 8 | 183 |  |

**-Absolute running time: 0.14 sec, cpu time: 0.11 sec, memory peak: 6 Mb, absolute service time: 0,15 sec**

**-Complexity: O(N2)**

1. **Compare the complexity of the algorithm with another:**

|  |  |  |
| --- | --- | --- |
| **Indicator** | **GA** | **PSO** |
| **Complexity** | **Ο(N2)** | **Ο(N)** |
| **Accuracy** | **feasible solutions that are near optimal** | **Resolution produces the optimal solution** |
| **Iterate** | **The more variables,the more iterations ,it takes much more than the PSO** | **The more variables,the more iterations , it takes fewer iterations of the GA** |
| **Additional techniques used** | **It takes the addition of chromosome extermination** | **No additional techniques** |

1. **Expirements:**

|  |  |
| --- | --- |
| **INPUT** | **OUTPUT** |
| items = [Item(5,800) ,Item(5,700),Item(60,100)  ,Item(2,300),Item(10,400),Item(100,200)  ,Item(20,500) ,Item(15,400),Item(5,620)]  capacity = 50 | Bounded knapsack  weight: 5 value: 800  weight: 5 value: 700  weight: 2 value: 300  weight: 10 value: 400  weight: 20 value: 500  weight: 5 value: 620  Total Allocated Weight: 47  Max Value 3320  Unbounded knapsack  weight: 5 value: 620  weight: 10 value: 800  weight: 5 value: 700  weight: 5 value: 700  weight: 5 value: 700  weight: 5 value: 700  weight: 10 value: 800  Total Allocated Weight: 45  Max Value 5020 |
| items=[  Item(5,10)  ,Item(4,40)  ,Item(6,30)  ,Item(3,50)  ]  capacity=10 | Bounded knapsack  weight: 4 value: 40  weight: 3 value: 50  Total Allocated Weight: 7  Max Value 90  Unbounded knapsack  weight: 4 value: 40  weight: 3 value: 50  weight: 3 value: 50  Total Allocated Weight: 10  Max Value 140 |
| items = [  Item(20,30)  ,Item(10,55)  ,Item(35,20)  ,Item(45,30)  ,Item(30,35)  ,Item(20,15)  ,Item(15,15)  ]  capacity = 85 | Bounded knapsack  weight: 20 value: 30  weight: 10 value: 55  weight: 35 value: 20  weight: 20 value: 15  Total Allocated Weight: 85  Max Value 120  Unbounded knapsack  weight: 20 value: 30  weight: 10 value: 55  weight: 10 value: 55  weight: 10 value: 55  weight: 20 value: 30  Total Allocated Weight: 70  Max Value 225 |