# I best improvement

bazin extractie, relief evolutiv, pct. mare

- generate bits: 4069

1. 01001, 9, [illegible] → neigh
   - 11001, 25, 725
   - 00001, 1, 941
   - 01101, 13, 3857
   - 01011, 11, 4071
   - 01000, 8, 3972

01011, 11, 4071 neigh (1)
- 11011, 27, 343
- 00011, 3, 2287
- 01111, 15, 3475
- 01001, 9, 4069
- 01010, 10, 4100

01010, 10, 4100 neigh
- 11010, 26, 516
- 00010, 2, 1668
- 01110, 14, 3684
- 01000, 8, 3972
- 01011, 11, 4071

(2)

⇓ local optimum

- generate bitstring

2. 00100, 4, 2804 neigh
   - 10100, 20, 2100
   - 01100, 12, 3988
   - 00000, 0, 100
   - 00110, 6, 3556
   - 00101, 5, 3225

01100, 12, 3988 neigh
- 11100, 28, 212
- 00100, 4, 2804
- 01000, 8, 3972
- 01110, 14, 3684
- 01101, 13, 3857

(3)

⇓ local optimum

- generate bitstring

3. 11011, 27, 374 neigh
   - 01011, 11, 4071
   - 10011, 19, 2399
   - 11111, 31, 131
   - 11001, 25, 725
   - 11010, 26, 516

01011, 11, 4071 — see (1) ⇒ 10 optim local (2)

- generate bitstring

4. 10001, 17, 2973 neigh
   - 00001, 1, 941
   - 11001, 25, 725
   - 10101, 21, 1801
   - 10011, 19, 2399
   - 10000, 16, 3236

$f(x) = x^3 - 60x^2 + 900x + 100$

$N = (b-a) \cdot 10^p$ ) $p = 0$

$n = \lceil \log_2 N \rceil$

$x = 0 + d \cdot 31/31 = d$

tuple (bit string, fitness, d)

10000, 16, 3236 neigh
- 00000, 0, 100
- 11000, 24, 964
- 10100, 20, 2100
- 10010, 18, 2692
- 10001, 17, 2973

⇓ local optimum

- generate bitstring

5. 00000, 0, 0100 neigh
   - 10000, 16, 3236
   - 01000, 8, 3972
   - 00100, 4, 2804
   - 00010, 2, 1668
   - 00001, 1, 941

01000, 8, 3972 neigh
- 11000, 24, 964
- 00000, 0, 100
- 01100, 12, 3988
- 01010, 10, 4100
- 01001, 9, 4069

10 = local optimum

(2)

- 1 → 9 → 11 → 10 (941, 4069, 4071, 4100)
- 2 → 10 (1668, 4100)
- 3 → 11 → 10 (2287, 4071, 4100)
- 4 → 12 (2804, 3988)
- 5 → 13 → 9 → 11 → 10 (3225, 2857, 4069, 4071, 4100)
- 6 → 7 (3556, 3803)
- 7 (3803)
- 8 → 10 (3972, 4100)
- 9 → 11 → 10 (4069, 4071, 4100)
- 10 (4100)
- 11 → 10
- 12 (3988) · 13 → 12 (3857, 3988)
- 14 → 10 (3684, 4100)
- 15 → 11 → 10 (3475)
- 16 (3236) · 18 → 16 (2692)
- 17 → 16 (2973, 3236) · 19 → 17 → 16 (2399)
- 20 → 16 (2100)
- 21 → 5 → 10 (1801)
- 22 → 6 → 7 (1508) · 24 → 28 → 10 (964)
- 23 → 7 (1827) · 25 → 9 → 11 → 10 (725)
- 26 → 10 · 27 → 11 → 10
- 28 → 12 · 29 → 13 → 12
- 30 → 14 → 10
- 31 → 15 → 10

## BEST IMPROVEMENT RESULTS:

| initial value | local optimum |
|---|---|
| 0 | 10 |
| 1 | 10 |
| 2 | 10 |
| 3 | 10 |
| 4 | 12 |
| 5 | 10 |
| 6 | 7 |
| 7 | 7 |
| 8 | 10 |
| 9 | 10 |
| 10 | 10 |
| 11 | 10 |
| 12 | 12 |
| 13 | 12 |
| 14 | 10 |
| 15 | 10 |
| 16 | 16 |
| 17 | 16 |
| 18 | 16 |
| 19 | 16 |
| 20 | 16 |
| 21 | 10 |
| 22 | 7 |
| 23 | 7 |
| 24 | 10 |
| 25 | 10 |
| 26 | 10 |
| 27 | 10 |
| 28 | 12 |
| 29 | 12 |
| 30 | 10 |
| 31 | 10 |

**local optimum**

7 10 12 16

4/32 18/32 5/32 5/32

7: 6, 7, 22, 23

10: 0, 1, 2, 3, 5, 8, 9, 10, 11, 14, 15, 21, 24, 25, 26, 27, 30, 31

12: 4, 12, 13, 28, 29

16: 16, 17, 18, 19, 20

II first improvement

1. 11110, 30, 100 → 01110, 14, 3684

01110, 14, 3684 → 11110, 30, 100
00110, 6, 3556
01010, 10, 4100

② ⇒ 10 optim local

2. 01000, 8, 3972 → 11000, 24, 964
00000, 0, 100
01100, 12, 3988

01100, 12, 3988, ③ ⇒ 12 local optimum

3. 00100, 4, 2804 → 10100, 20, 2100
01100, 12, 3988

12 ⇒ local optimum, ③

4. 00110, 6, 3556 → 10110, 22, 1508
01110, 14, 3684

01110, 14, 3684 → 11110, 30, 100
00110, 6, 3556
01010, 10, 4100

② ⇒ 10 local optimum

5. 10011, 19, 2399 → 00011, 3, 2287
11011, 27, 343
10111, 23, 1227
10001, 17, 2973

10001, 17, 2973 → 00001, 1, 941
11001, 25, 725
10101, 21, 1801
10011, 19, 2399
10000, 16, 3236

10000, 16, 3236 → 00000, 0, 100
11000, 24, 964
10100, 20, 2100
10010, 18, 2692
10001, 17, 2973

⇒ 16 local optimum

- 0 → 16
100 3236
- 1 → 17 → 16
941 2973 3236
- 2 → 18 → 16
1508 2692 3236
- 3 → 19 → 17 → 16
2287 2399 2973 3236
- 4 → 12
2804 3988
- 5 → 7
3225 3803
- 6 → 7
3556 3803
- 7
- 8 → 12 (the same for 12)
3972 3988
- 9 → 11 → 10 (the same for 10, 11)
4089 4071 4100
- 13 → 9 → 10
3857 4069
- 14 → 10
3684
- 15 → 7
3475 3803
- 16
3236
- 17 → 16
- 18 → 16
- 19 → 17 → 16
- 20 → 4 → 12
- 21 → 5 → 7
- 22 → 6 → 7
- 23 → 7
- 24 → 8 → 12
- 25 → 9 → 10
- 26 → 10
- 27 → 11 → 10
- 28 → 12
- 29 → 13 → 10
- 30 → 14 → 10
- 31 → 15 → 7

extra notes:
- each strategy contains five random-bit experiments and a section with a simplified computation process
- the results were obtained using „data.txt" paper

## FIRST IMPOVEMENT RESULTS

| initial value | local optimum |
|---|---|
| 0 | 16 |
| 1 | 16 |
| 2 | 16 |
| 3 | 16 |
| 4 | 12 |
| 5 | 7 |
| 6 | 7 |
| 7 | 7 |
| 8 | 12 |
| 9 | 10 |
| 10 | 10 |
| 11 | 10 |
| 12 | 12 |
| 13 | 10 |
| 14 | 10 |
| 15 | 7 |
| 16 | 16 |
| 17 | 16 |
| 18 | 16 |
| 19 | 16 |
| 20 | 12 |
| 21 | 7 |
| 22 | 7 |
| 23 | 7 |
| 24 | 12 |
| 25 | 10 |
| 26 | 10 |
| 27 | 10 |
| 28 | 12 |
| 29 | 10 |
| 30 | 10 |
| 31 | 7 |

local optimum

7 10 12 16

8 8 6 8/32
32 32 32

7: 5,6,7,15,21,22,23,31
10: 9,10,11,13,14,25,26,27,29,30
12: 4,8,12,20,24,28
16: 0,1,2,3,16,17,18,19