

demo-04_crossover

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1 Analiza i projektiranje računalom - 4. laboratorijska vježba: demo crossover.py

1.1 Priprema za izvođenje

```
[1]: import os

CD_KEY = "--HW04_D04_IN_ROOT"

[2]: if (
    CD_KEY not in os.environ
    or os.environ[CD_KEY] is None
    or len(os.environ[CD_KEY]) == 0
    or os.environ[CD_KEY] == "false"
):
    %cd ..
else:
    print(os.getcwd())

os.environ[CD_KEY] = "true"
```

/mnt/data/projekti/faks/AIPR/dz/dz-04

1.2 Učitavanje paketa

```
[3]: import numpy as np

from src.evolution.crossover import (
    ANDCrossover,
    AveragingCrossover,
    ChooseOneCrossover,
    XORCrossover,
    XORTransformedCrossover,
)
from src.evolution.encoding import (
    BinaryEncoder,
    BinaryDecoder,
)
```

1.3 Inicijalizacija

1.3.1 Formatiranje

```
[4]: np.set_printoptions(precision=2, suppress=True)
```

1.3.2 Konstante

```
[5]: n_specimen = 5

float_shape = 3

bits = 8
interval = (-1, 1)
```

1.3.3 Jedinke

```
[6]: specimina = np.random.uniform(*interval, (n_specimen, float_shape))
```

1.3.4 Koderi

```
[7]: be = BinaryEncoder(dim=8, interval=interval)
bd = BinaryDecoder(dim=8, interval=interval)
```

1.3.5 Operatori

```
[8]: float_operators = [
    AveragingCrossover(interval=interval),
    ChooseOneCrossover(interval=interval)
]
binary_operators = [
    ANDCrossover(),
```

```

XORCrossover(),
XORTransformedCrossover()
]

```

1.4 Demonstracija

1.4.1 Prikaz s pomičnom točkom

```

[9]: for float_operator in float_operators:
    print(f"Koristeći {float_operator}")

    for i in range(n_specimen - 1):
        chosen = specimina[i: i + 2]

        print(f"{chosen} -> {float_operator(chosen)}\n")

    print()

```

Koristeći AveragingCrossover operator

```

[[-0.24 -0.92 -0.31]
 [ 0.35 -0.85  0.23]] -> [[ 0.05 -0.89 -0.04]]

[[ 0.35 -0.85  0.23]
 [ 0.64 -0.37 -0.66]] -> [[ 0.49 -0.61 -0.21]]

[[ 0.64 -0.37 -0.66]
 [ 0.45 -0.87  0.24]] -> [[ 0.55 -0.62 -0.21]]

[[ 0.45 -0.87  0.24]
 [ 0.91 -0.12  0.  ]] -> [[ 0.68 -0.49  0.12]]

```

Koristeći ChooseOneCrossover operator

```

[[-0.24 -0.92 -0.31]
 [ 0.35 -0.85  0.23]] -> [[ 0.35 -0.92  0.23]]

[[ 0.35 -0.85  0.23]
 [ 0.64 -0.37 -0.66]] -> [[ 0.35 -0.85  0.23]]

[[ 0.64 -0.37 -0.66]
 [ 0.45 -0.87  0.24]] -> [[ 0.45 -0.37  0.24]]

[[ 0.45 -0.87  0.24]
 [ 0.91 -0.12  0.  ]] -> [[ 0.91 -0.87  0.24]]

```

1.4.2 Prikaz u binarnom obliku

```
[10]: for binary_operator in binary_operators:
      print(f"Koristeći {binary_operator}")

      for i in range(n_specimen - 1):
          chosen = be(specimina[i: i + 2])

          print(f"{chosen} ->\n" + ("-" * 30) + "\n" +
                f"\n{binary_operator(chosen)}\n\n")

      print()
```

Koristeći ANDCrossover operator

```
[[[0 1 1 0 0 0 0 0]
  [0 0 0 0 1 0 1 0]
  [0 1 0 1 1 0 0 0]]
```

```
[[[1 0 1 0 1 0 1 1]
  [0 0 0 1 0 0 1 0]
  [1 0 0 1 1 1 0 0]]] ->
```

```
-----
[[[0 0 1 0 0 0 0 0]
  [0 0 0 0 0 0 1 0]
  [0 0 0 1 1 0 0 0]]]
```

```
[[[1 0 1 0 1 0 1 1]
  [0 0 0 1 0 0 1 0]
  [1 0 0 1 1 1 0 0]]]
```

```
[[[1 1 0 1 0 0 0 1]
  [0 1 0 0 1 1 1 1]
  [0 0 1 0 1 0 1 1]]] ->
```

```
-----
[[[1 0 0 0 0 0 0 1]
  [0 0 0 0 0 0 1 0]
  [0 0 0 0 1 0 0 0]]]
```

```
[[[1 1 0 1 0 0 0 1]
  [0 1 0 0 1 1 1 1]
  [0 0 1 0 1 0 1 1]]]
```

```
[[[1 0 1 1 1 0 0 1]
  [0 0 0 1 0 0 0 0]
  [1 0 0 1 1 1 0 1]]] ->
```

```
-----
```

```
[[[1 0 0 1 0 0 0 1]
  [0 0 0 0 0 0 0 0]
  [0 0 0 0 1 0 0 1]]]
```

```
[[[1 0 1 1 1 0 0 1]
  [0 0 0 1 0 0 0 0]
  [1 0 0 1 1 1 0 1]]]
```

```
[[1 1 1 1 0 0 1 1]
 [0 1 1 1 0 0 0 0]
 [0 1 1 1 1 1 1 1]] ->
```

```
[[[1 0 1 1 0 0 0 1]
  [0 0 0 1 0 0 0 0]
  [0 0 0 1 1 1 0 1]]]
```

Koristeći XORCrossover operator

```
[[[0 1 1 0 0 0 0 0]
  [0 0 0 0 1 0 1 0]
  [0 1 0 1 1 0 0 0]]]
```

```
[[1 0 1 0 1 0 1 1]
 [0 0 0 1 0 0 1 0]
 [1 0 0 1 1 1 0 0]] ->
```

```
[[[1 1 0 0 1 0 1 1]
  [0 0 0 1 1 0 0 0]
  [1 1 0 0 0 1 0 0]]]
```

```
[[[1 0 1 0 1 0 1 1]
  [0 0 0 1 0 0 1 0]
  [1 0 0 1 1 1 0 0]]]
```

```
[[1 1 0 1 0 0 0 1]
 [0 1 0 0 1 1 1 1]
 [0 0 1 0 1 0 1 1]] ->
```

```
[[[0 1 1 1 1 0 1 0]
  [0 1 0 1 1 1 0 1]
  [1 0 1 1 0 1 1 1]]]
```

```
[[[1 1 0 1 0 0 0 1]
  [0 1 0 0 1 1 1 1]
```

```

[0 0 1 0 1 0 1 1]]

[[1 0 1 1 1 0 0 1]
 [0 0 0 1 0 0 0 0]
 [1 0 0 1 1 1 0 1]]] ->
-----
[[[0 1 1 0 1 0 0 0]
  [0 1 0 1 1 1 1 1]
  [1 0 1 1 0 1 1 0]]]

```

```

[[[1 0 1 1 1 0 0 1]
  [0 0 0 1 0 0 0 0]
  [1 0 0 1 1 1 0 1]]

[[1 1 1 1 0 0 1 1]
 [0 1 1 1 0 0 0 0]
 [0 1 1 1 1 1 1 1]]] ->
-----
[[[0 1 0 0 1 0 1 0]
  [0 1 1 0 0 0 0 0]
  [1 1 1 0 0 0 1 0]]]

```

Koristeći XORTransformedCrossover operator

```

[[[0 1 1 0 0 0 0 0]
  [0 0 0 0 1 0 1 0]
  [0 1 0 1 1 0 0 0]]

[[1 0 1 0 1 0 1 1]
 [0 0 0 1 0 0 1 0]
 [1 0 0 1 1 1 0 0]]] ->
-----
[[[1 1 0 0 1 0 1 1]
  [0 0 0 1 1 0 0 0]
  [1 1 0 0 0 1 0 0]]]

```

```

[[[1 0 1 0 1 0 1 1]
  [0 0 0 1 0 0 1 0]
  [1 0 0 1 1 1 0 0]]

[[1 1 0 1 0 0 0 1]
 [0 1 0 0 1 1 1 1]
 [0 0 1 0 1 0 1 1]]] ->
-----
[[[0 1 1 1 1 0 1 0]

```

```
[0 1 0 1 1 1 0 1]
[1 0 1 1 0 1 1 1]]]
```

```
[[[1 1 0 1 0 0 0 1]
  [0 1 0 0 1 1 1 1]
  [0 0 1 0 1 0 1 1]]]
```

```
[[1 0 1 1 1 0 0 1]
 [0 0 0 1 0 0 0 0]
 [1 0 0 1 1 1 0 1]]] ->
```

```
-----
[[[0 1 1 0 1 0 0 0]
  [0 1 0 1 1 1 1 1]
  [1 0 1 1 0 1 1 0]]]
```

```
[[[1 0 1 1 1 0 0 1]
  [0 0 0 1 0 0 0 0]
  [1 0 0 1 1 1 0 1]]]
```

```
[[1 1 1 1 0 0 1 1]
 [0 1 1 1 0 0 0 0]
 [0 1 1 1 1 1 1 1]]] ->
```

```
-----
[[[0 1 0 0 1 0 1 0]
  [0 1 1 0 0 0 0 0]
  [1 1 1 0 0 0 1 0]]]
```