

demo-01_encoding

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

1.1 Priprema za izvođenje

```
[1]: import os

CD_KEY = "--HW04_D01_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.encoding import BinaryDecoder, BinaryEncoder
```

1.3 Inicijalizacija

1.3.1 Formatiranje

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

1.3.2 Konstante

```
[5]: bits = (2, 4, 8, 11)
    ranges = (
        (-1, 1),
        (-50, 50),
        (0, 15),
        (0, 16)
    )
    test_inputs = (0, 1, -1, 15, [3.14])
```

1.3.3 Enkoderi

```
[6]: encoders = [BinaryEncoder(b, r) for b in bits for r in ranges]
```

1.3.4 Dekoderi

```
[7]: decoders = [BinaryDecoder(b, r) for b in bits for r in ranges]
```

1.4 Demonstracija

```
[8]: for encoder, decoder in zip(encoders, decoders):
    print(f"x -> {encoder} -> {decoder}:")

    for x in test_inputs:
        y = encoder(x)
        z = decoder(y)

        print(f"\t{x} -> {y} -> {z}")
    print()
```

```
x -> BinaryEncoder(2 bit, [-1. 1.]) -> BinaryDecoder(2 bit, [-1. 1.]):
  0 -> [0 1] -> -0.3333333333333333
  1 -> [1 1] -> 1.0
 -1 -> [0 0] -> -1.0
 15 -> [1 1] -> 1.0
[3.14] -> [[1 1]] -> [1.]
```

```
x -> BinaryEncoder(2 bit, [-50. 50.]) -> BinaryDecoder(2 bit, [-50. 50.]):
  0 -> [0 1] -> -16.666666666666664
  1 -> [0 1] -> -16.666666666666664
 -1 -> [0 1] -> -16.666666666666664
 15 -> [0 1] -> -16.666666666666664
[3.14] -> [[0 1]] -> [-16.67]
```

```
x -> BinaryEncoder(2 bit, [ 0. 15.]) -> BinaryDecoder(2 bit, [ 0. 15.]):
  0 -> [0 0] -> 0.0
```

```

1 -> [0 0] -> 0.0
-1 -> [0 0] -> 0.0
15 -> [1 1] -> 15.0
[3.14] -> [[0 0]] -> [0.]

x -> BinaryEncoder(2 bit, [ 0. 16.]) -> BinaryDecoder(2 bit, [ 0. 16.]):
0 -> [0 0] -> 0.0
1 -> [0 0] -> 0.0
-1 -> [0 0] -> 0.0
15 -> [1 0] -> 10.666666666666666
[3.14] -> [[0 0]] -> [0.]

x -> BinaryEncoder(4 bit, [-1. 1.]) -> BinaryDecoder(4 bit, [-1. 1.]):
0 -> [0 1 1 1] -> -0.06666666666666665
1 -> [1 1 1 1] -> 1.0
-1 -> [0 0 0 0] -> -1.0
15 -> [1 1 1 1] -> 1.0
[3.14] -> [[1 1 1 1]] -> [1.]

x -> BinaryEncoder(4 bit, [-50. 50.]) -> BinaryDecoder(4 bit, [-50. 50.]):
0 -> [0 1 1 1] -> -3.3333333333333286
1 -> [0 1 1 1] -> -3.3333333333333286
-1 -> [0 1 1 1] -> -3.3333333333333286
15 -> [1 0 0 1] -> 10.0
[3.14] -> [[0 1 1 1]] -> [-3.33]

x -> BinaryEncoder(4 bit, [ 0. 15.]) -> BinaryDecoder(4 bit, [ 0. 15.]):
0 -> [0 0 0 0] -> 0.0
1 -> [0 0 0 1] -> 1.0
-1 -> [0 0 0 0] -> 0.0
15 -> [1 1 1 1] -> 15.0
[3.14] -> [[0 0 1 1]] -> [3.]

x -> BinaryEncoder(4 bit, [ 0. 16.]) -> BinaryDecoder(4 bit, [ 0. 16.]):
0 -> [0 0 0 0] -> 0.0
1 -> [0 0 0 0] -> 0.0
-1 -> [0 0 0 0] -> 0.0
15 -> [1 1 1 0] -> 14.933333333333334
[3.14] -> [[0 0 1 0]] -> [2.13]

x -> BinaryEncoder(8 bit, [-1. 1.]) -> BinaryDecoder(8 bit, [-1. 1.]):
0 -> [0 1 1 1 1 1 1 1] -> -0.0039215686274509665
1 -> [1 1 1 1 1 1 1 1] -> 1.0
-1 -> [0 0 0 0 0 0 0 0] -> -1.0
15 -> [1 1 1 1 1 1 1 1] -> 1.0
[3.14] -> [[1 1 1 1 1 1 1 1]] -> [1.]

x -> BinaryEncoder(8 bit, [-50. 50.]) -> BinaryDecoder(8 bit, [-50. 50.]):

```

```

0 -> [0 1 1 1 1 1 1 1] -> -0.19607843137254832
1 -> [1 0 0 0 0 0 1 0] -> 0.9803921568627416
-1 -> [0 1 1 1 1 1 0 0] -> -1.3725490196078454
15 -> [1 0 1 0 0 1 0 1] -> 14.705882352941174
[3.14] -> [[1 0 0 0 0 1 1 1]] -> [2.94]

x -> BinaryEncoder(8 bit, [ 0. 15.]) -> BinaryDecoder(8 bit, [ 0. 15.]):
0 -> [0 0 0 0 0 0 0 0] -> 0.0
1 -> [0 0 0 1 0 0 0 1] -> 1.0
-1 -> [0 0 0 0 0 0 0 0] -> 0.0
15 -> [1 1 1 1 1 1 1 1] -> 15.0
[3.14] -> [[0 0 1 1 0 1 0 1]] -> [3.12]

x -> BinaryEncoder(8 bit, [ 0. 16.]) -> BinaryDecoder(8 bit, [ 0. 16.]):
0 -> [0 0 0 0 0 0 0 0] -> 0.0
1 -> [0 0 0 0 1 1 1 1] -> 0.9411764705882353
-1 -> [0 0 0 0 0 0 0 0] -> 0.0
15 -> [1 1 1 0 1 1 1 1] -> 14.996078431372549
[3.14] -> [[0 0 1 1 0 0 1 0]] -> [3.14]

x -> BinaryEncoder(11 bit, [-1. 1.]) -> BinaryDecoder(11 bit, [-1. 1.]):
0 -> [0 1 1 1 1 1 1 1 1 1 1] -> -0.0004885197850512668
1 -> [1 1 1 1 1 1 1 1 1 1 1] -> 1.0
-1 -> [0 0 0 0 0 0 0 0 0 0 0] -> -1.0
15 -> [1 1 1 1 1 1 1 1 1 1 1] -> 1.0
[3.14] -> [[1 1 1 1 1 1 1 1 1 1 1]] -> [1.]

x -> BinaryEncoder(11 bit, [-50. 50.]) -> BinaryDecoder(11 bit, [-50. 50.]):
0 -> [0 1 1 1 1 1 1 1 1 1 1] -> -0.02442598925256334
1 -> [1 0 0 0 0 0 1 0 0 1 1] -> 0.95261358085002
-1 -> [0 1 1 1 1 1 0 1 0 1 1] -> -1.0014655593551538
15 -> [1 0 1 0 0 1 1 0 0 1 0] -> 14.97313141182218
[3.14] -> [[1 0 0 0 0 1 1 1 1 1 1]] -> [3.1]

x -> BinaryEncoder(11 bit, [ 0. 15.]) -> BinaryDecoder(11 bit, [ 0. 15.]):
0 -> [0 0 0 0 0 0 0 0 0 0 0] -> 0.0
1 -> [0 0 0 1 0 0 0 1 0 0 0] -> 0.9965803615046409
-1 -> [0 0 0 0 0 0 0 0 0 0 0] -> 0.0
15 -> [1 1 1 1 1 1 1 1 1 1 1] -> 15.0
[3.14] -> [[0 0 1 1 0 1 0 1 1 0 0]] -> [3.14]

x -> BinaryEncoder(11 bit, [ 0. 16.]) -> BinaryDecoder(11 bit, [ 0. 16.]):
0 -> [0 0 0 0 0 0 0 0 0 0 0] -> 0.0
1 -> [0 0 0 0 1 1 1 1 1 1 1] -> 0.9926722032242306
-1 -> [0 0 0 0 0 0 0 0 0 0 0] -> 0.0
15 -> [1 1 1 0 1 1 1 1 1 1 1] -> 14.999511480214949
[3.14] -> [[0 0 1 1 0 0 1 0 0 0 1]] -> [3.13]

```