
Python NES Emulator
Showsprite

NES Header

- 0x00 - 0x03 0x4E 0x45 0x53 0x1A
- 0x04 Program Rom Size / 0x4000
- 0x05 Character Rom Size / 0x2000
- 0x06 - 0x07 Mirroring and Mapper
- 0x08 ~ 0x0f Reserved

例）

address	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07
value	0x4E	0x45	0x53	0x1A	0x02	0x01	0x01	0x00

Program Rom Size = 0x8000
Character Rom Size = 0x2000

Structure of Rom

Header (0x0000 - 0x000f) Length 0x10
Program Rom (0x0010 - 0x800f) Length 0x8000
Character Rom (0x8010 - 0x1000f) Length 0x2000

Draw Sprite

0x0020	0x66
0x0021	0x7F
0x0022	0xFF
0x0023	0xFF
0x0024	0xFF
0x0025	0x7E
0x0026	0x3C
0x0027	0x18

0	1	1	0	0	1	1	0
0	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	0
0	0	1	1	1	1	0	0
0	0	0	1	1	0	0	0

low

+

=

0	1	1	0	0	1	1	0
0	1	0	1	1	1	1	1
1	0	1	1	1	1	1	1
1	0	1	1	1	1	1	1
1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	0
0	0	1	1	1	1	0	0
0	0	0	1	1	0	0	0

High

0x0028	0x66
0x0029	0x5F
0x002A	0xBF
0x002B	0xBF
0x002C	0xFF
0x002D	0x7E
0x002E	0x3C
0x002F	0x18

00	11	11	00	00	11	11	00
00	11	01	11	11	11	11	11
11	01	11	11	11	11	11	11
11	01	11	11	11	11	11	11
11	11	11	11	11	11	11	11
00	11	11	11	11	11	11	00
00	00	11	11	11	11	00	00
00	00	00	11	11	00	00	00

Open rom file

https://docs.python.jp/3/library/functions.html#open

```
path = 'file path'
f = open(path)
print(f.read())
f.close()
```

```
with open(path) as f:
    print(f.read())
```

Slice

```
list = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

```
print(list[start:end]
# [start <= x < stop]
```

```
print(list[1:5])
# [1, 2, 3, 4]
```

```
print(list[5:])
# [5, 6, 7, 8, 9, 10]
```

```
print(list[:2])
# [0, 1]
```

Install library

```
pip install numpy
```

```
pip install pillow
```

Construct sprite

```
sprite_memory =
[
[
[00, 11, 11, 00, 00, 11, 11, 00],
[00·····························11],
:
[00, 00, 00, 11, 11, 00, 00, 00]
],
[
[11, 11, 00, 01, 10, 00, 00, 10]
:
[11, 00, 00, 00, 00, 00, 01, 11]
],
]
```

Make array

```
import numpy as np
```

```
3
sprite_memory = np.zeros((sprite_sum, 8, 8))
4
sprite_memory = np.zeros((sprite_sum, 8, 8, 8))
```

For

```
for i in range(3):
# = for (int i = 0;i < 3;i++)
```

```
for j, k, l in zip(jlist, klist, llist):
#= for (j, k, l : jlist, klist, llist)
```

```
for c in “character”:
```

Convert 8bit

```
format(number, ‘08b’)
```