

o.o.1 System: Statistical Color Image

WIP

```
1 import numpy as np
2 from scipy import special
3 from numba.experimental import jitclass
4 from numba import int64
5 integer = int64

1 __all__ = ['StatisticalImage']
2 @jitclass([
3     ('I0', integer[:, :]),
4     ('I', integer[:, :]),
5     ('N', integer),
6     ('M', integer),
7     ('sweep_steps', integer),
8     ('E', integer),
9     ('Ev', integer),
10    ('dE', integer),
11    ('dx', integer),
12    ('i', integer)
13 ])
14 class StatisticalImage:
15     def __init__(self, I0, I, M):
16         if len(I0) != len(I):
17             raise ValueError('Ground image I0 and current image I should have the same length.')
18         if M < 0:
19             raise ValueError('Maximum site value must be nonnegative.')
20         self.I0 = I0
21         self.I = I
22         self.N = len(I0)
23         self.M = M
24         self.sweep_steps = len(I0)
25         self.E = self.energy()
26         self.Ev = self.E
27         self.dE = 0
28         self.dx = 0
29         self.i = 0
30     def state(self):
31         return self.I0.copy(), self.I.copy(), self.M
32     def state_names(self):
33         return 'I0', 'I', 'M'
34     def copy(self):
35         return StatisticalImage(*self.state())
36     def energy_bins(self):
37         E0 = 0
38         Ef = np.sum(np.maximum(self.I0, self.M - self.I0))
39         ΔE = 1
40         return np.arange(E0, Ef + ΔE + 1, ΔE)
41     def energy(self):
42         return np.sum(np.abs(self.I - self.I0))
43     def propose(self):
44         i = np.random.randint(self.N)
45         self.i = i
46         x0 = self.I0[i]
47         x = self.I[i]
48         r = np.random.randint(2)
```

```

49         if x == 0:
50             dx = r
51         elif x == self.M:
52             dx = -r
53         else:
54             dx = 2*r - 1
55         dE = np.abs(dx) if x0 == x else (dx if x0 < x else -dx)
56         self.dx = dx
57         self.dE = dE
58         self.Ev = self.E + dE
59     def accept(self):
60         self.I[self.i] += self.dx
61         self.E = self.Ev

```

o.o.2 CIE L*a*b* Colors

```

1  import numpy as np
2  from skimage import color

1  color.rgb2lab(np.array([[np.random.rand(3)]]))

array([[ 57.44983892, -3.2750478, -38.81474096]])

1  color.rgb2lab(np.array([[[0,0,1]]]))

array([[ 32.29567257, 79.18559091, -107.85730021]])

1  color.lab2rgb(np.array([[[50, -100, -100]]]))

array([[ 0.          , 0.62986775, 1.          ]])

```