Roulette Wheel Selection

# 01	0.98
# 02	0.93
# 03	0.87
# 04	0.75
# 05	0.61
# 06	0.54
# 07	0.48
# 08	0.36
# 09	0.21
# 10	0.16

Calculate the probability with which #10 chromosome is selected.

Traveling Salesperson

with 5 cities under distant matrix

	A	B	C	D	E
A	0	5	3	2	4
B	5	0	7	2	1
C	3	7	0	1	8
D	2	2	1	0	6
E	4	1	8	6	0

What is a route starting from A
of a chromosome 4 2 7 8
and its fitness?

Evolving Neural Network for XOR

```
                    -0.5
x1 => o --> o           o  0.6
                  0.3
                   x            o -> y
                 -0.8
x2 => o -> o            o 0.4
                  0.7
```

Calculate the fitness

Sorting Algorithms (1)

A chromosome to sort 4 items

with

1001111001100011100110 11

Sort

CADB

and

show the fitness value of the result.

Sorting Algorithms (2)

Diploidy chromosomes to sort 4 items

Two parents are now

100111100110

001110011011

&

110111001101

100001100101

Create one child.

Then sort CADB by the child

and

show the fitness value of the result.

Prisoner's Dilemma

Assuming chromosome of A & B are

11001010 11010100 01010010 10110001 01010100 01011010 10010100 10100001

&

11001010 00110100 00010111 01001010 10011000 11010000 11010010 10101001

What is the next action of A? And then B?

A 0 1 0 ?

B 1 1 0 ?

Dimension reduction - Data visualization

Assuming 7D to 2D Reduction,
Distance matrix of 7-D 5 points
after normalization is

0.0	0.8	0.2	0.5	0.1
0.8	0.0	0.3	0.7	0.9
0.2	0.3	0.0	0.6	0.1
0.5	0.7	0.6	0.0	1.0
0.1	0.9	0.1	1.0	0.0

Calculate fitness of
(3243597618)

Fitness Sharing (1)

Lucky dog with 2 sausages

Starting from (500,500), now dog A is at (797,795), B is at(799,798), C is at (802, 802), while sausage is at (800,800). Calculate shared fitness of dog A, B and C, with σ being 6.

Fitness Sharing (2)
2-D Function minimization

6 chromosomes each representing
x = 1, 2.5, 3.5, 4, 4.5 and 6
exist.
Now assuming fitness is
y = - (x - 3)^ 2

Calculate the shared fitness of
x = 4
with σ being 2.

A representation of coordinate x by binary chromosome

Assuming x = 0 is (00000) and x = 10 is (11111).

Then what chromosome represent x = 7?

Crowding algorithm

Assume now fitness function is

$$y = -(x - 5)^2$$

When population is

$$x \in \{1,2,3,4,5,6,7,8\}$$

create

c1 & c2

from

p1 = 2 & p2 = 6

Then which of these four survived?

What if two Fitness Functions?

Assume two fitness functions

$$y = (x - 3)^2$$

&

$$y = (x - 6)^2$$

When population is

$$x \in \{1,2,3,4,5,6,7,8\}$$

(1) which x=5 dominates?

(2) x=7 is dominated by which?

(3) What is rank of x=2?