

Object	Tablet	Laptop	Projector
Weight (w)	5 kg	8 kg	10 kg
Value (v)	\$ 570	\$ 710	\$ 640

1st generation (000, 001, 010, 100):

Fitness(C_1) = 0 Pr(C_1) = 0

Fitness(C_2) = 640 and weight 10kg Pr(C_2) = $\frac{640}{640+570+710} = .3333$

Fitness(C_3) = 710 and weight 8kg Pr(C_3) = $\frac{710}{640+570+710} = .3698$

Fitness(C_4) = 570 and weight 5kg Pr(C_4) = $\frac{570}{640+570+710} = .2969$

Suppose C_2 and C_4 and C_2 and C_3 are selected for crossover:

$C_2 = 00|1 \rightarrow C_5 = 000$ $C_2 = 00|1 \rightarrow C_7 = 000$

$C_4 = 10|0 \rightarrow C_6 = 101$ $C_3 = 01|0 \rightarrow C_8 = 011 \rightarrow 010$ because 011 is more than 18kg

2nd generation (101, 010, 000, 000)

Fitness(C_6) = 640+570=1210 and weight 15kg Pr(C_6) = $\frac{640+570}{640+570+710} = .6302$

Fitness(C_8) = 710 and weight 8kg Pr(C_8) = $\frac{710}{640+570+710} = .3698$

Fitness(C_5) = 0 Pr(C_5) = $\frac{0}{640+570+710} = 0$

Fitness(C_7) = 0 Pr(C_7) = $\frac{0}{640+570+710} = .0$

$C_6 = 1|01 \rightarrow C_9 = 101 \rightarrow 100$ $C_6 = 1|01 \rightarrow C_{11} = 110$

$C_6 = 1|01 \rightarrow C_{10} = 101$ $C_8 = 0|10 \rightarrow C_{12} = 001$

3rd generation (100, 101, 110, 001)

Fitness(C_9) = 570 and weight 5kg Pr(C_4) = $\frac{570}{640+570+710} = .2969$

Fitness(C_{10}) = 640+570=1210 and weight 15kg Pr(C_{10}) = $\frac{1210}{640+570+710} = .6302$

Fitness(C_{11}) = 570+710= 1280 and weight 13kg Pr(C_{11}) = $\frac{1280}{640+570+710} = .6667$

Fitness(C_{12}) = 640 and weight 10kg Pr(C_{12}) = $\frac{640}{640+570+710} = .3333$

Best chromosome found: 110

2)

Outlook	Temperature	PlayTennis
Sunny	Hot	No

Overcast	Cool	Yes
Overcast	Hot	Yes
Rain	Cool	No
Overcast	Mild	Yes

Outlook <Sunny, Overcast, Rain>

Temperature<Hot, Mild, Cool>

1st generation (C1=1001001, C2=0100101, C3=1011000, C4=1101100):

$$\text{Fitness}(C_1) = .2 \Pr(C_1) = \frac{.2}{2} = .1$$

$$\text{Fitness}(C_2) = .6 \Pr(C_2) = \frac{.6}{2} = .3$$

$$\text{Fitness}(C_3) = .8 \Pr(C_3) = \frac{.8}{2} = .4$$

$$\text{Fitness}(C_4) = .6 \Pr(C_4) = \frac{.6}{2} = .3$$

Suppose C2 and C4 and C2 and C3 are selected for crossover:

C3=101|1000 → C5 = 1011100

C4 = 110|1100 → C6 = 1101000

2nd generation (C2=0100101, C3=1011000, C5=1011100, C6=1101000):

$$\text{Fitness}(C_2) = .6 \Pr(C_2) = \frac{.6}{2.6} = .2308$$

$$\text{Fitness}(C_3) = .8 \Pr(C_3) = \frac{.8}{2.6} = .3077$$

$$\text{Fitness}(C_5) = .8 \Pr(C_3) = \frac{.8}{2.6} = .3077$$

$$\text{Fitness}(C_6) = .4 \Pr(C_4) = \frac{.4}{2.6} = .1538$$

Suppose C2 and C4 and C2 and C3 are selected for crossover:

C3=101|10|00 → C7 = 1011100

C5 = 101|11|00 → C8 = 1011000 ->1011010

3rd generation (C3=0100101, C5=1011000, C7=1011100, C8=1011010):

$$\text{Fitness}(C_3) = .8 \Pr(C_3) = \frac{.8}{3.4} = .2353$$

$$\text{Fitness}(C_5) = .8 \Pr(C_3) = \frac{.8}{3.4} = .2353$$

$$\text{Fitness}(C_7) = .8 \Pr(C_7) = \frac{.8}{3.4} = .2353$$

$$\text{Fitness}(C_8) = 1 \Pr(C_8) = \frac{1}{3.4} = .2941$$

C8 is 100% accurate

3)

$$w_i = w_i + \Delta w_i$$

$$\Delta w_i = \eta(t-y) x_i$$

