Genetic Algorithms

(ACO)

non convential

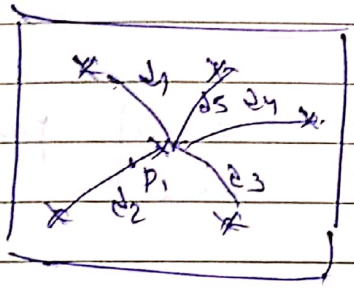
↳ Inspired by biological phenomenon

SWARM Intelligence

Optimization Techniques

- Conventional
  - Operational research.
- non convential
  - ↳ GA
  - ↳ Evolutionary tech
  - ↳ ACO
  - ↳ SWARM.

→



~~Euclidian~~ Distance

$P_1 = d_1 + d_2 + d_3 + d_4 + d_5$

if $P_1 < P_2$ then P_1 is nearer

$P_1 = 700$ V

$P_2 = 60$ 2

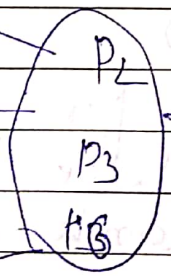
$P_3 = 65$ 3

$P_4 = 100$

$P_5 = 90$

$P_6 = 50$ 1

8



C1

C2 - 55

C3

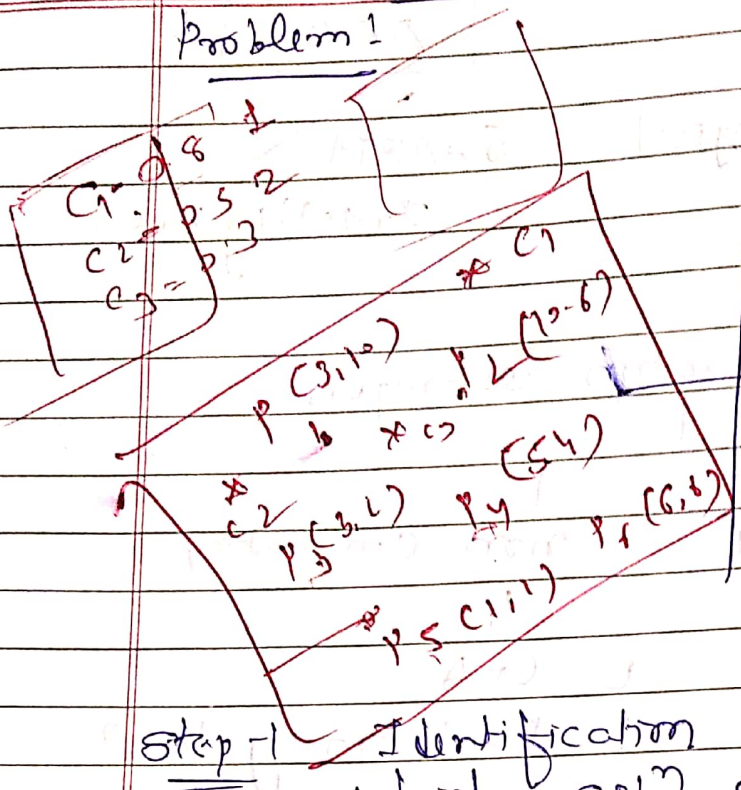
C4

C5

C6

GA

Problem 1



$P_1 = (3, 10)$

P_4 C

Step-1 Identification of space in which soln may exist

→ (0,0) to (15,15)

Step-2 Select random no of population in the identified space

Let's say soln are

C1 to C8

Step-3 Selection of chromosomes from the given population.

C1 (1,14)

→ Methods for Selection

1. Roulette Wheel Selection
2. Rank Selection
3. Tournament Selection
4. Boltzman Selection / Random

$2^2 + 4 + 4$

4 bits for x co-ordinate
4 bit for y co-ordinate

C_1 (1, 14) = 0001 1110 =

C_2 (4, 2) = 0100 0010

C_3 (15, 15) = 1111 1111

C_4 (10, 10) = 1010 1010

C_5 (11, 7) = 1011 0111

C_6 (8, 12) = 1000 1100

(x, y)

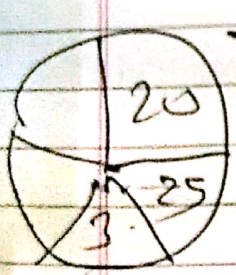
$C_1P_1 + C_1P_2 + C_1P_3 + C_1P_4 + C_1P_5 + C_1P_6$

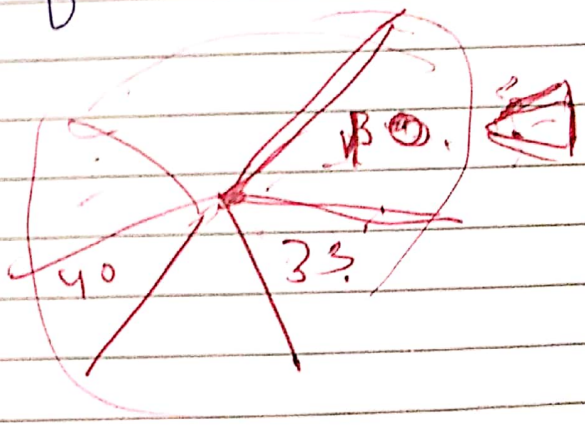
assume 30 (total distance)

Ex. ↑

⇒ Total

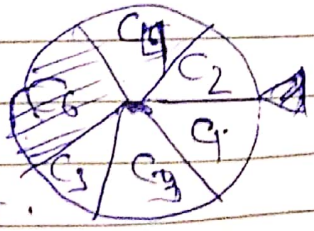
C_1 = 30	③	(fitness function
C_2 = 25	④	
C_3 = 40	⑥	①
C_4 = 30	⑤	
C_5 = 33	⑨	②
C_6 = 20		⑩

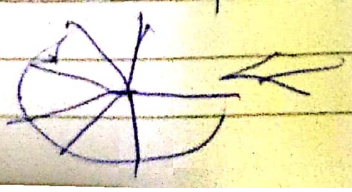




① Roulette Selection

Selection of C_6 is high because area occupied is wider.





⇒ (x) Rank Selection

give rank to chromosome according to fitness value

→ Take lower rank to next ge

⇒ (3) Tournament Selection

Take two random C of take tournament which fitter team to next gen.

⇒

(x) Maximize $Y = 2a_1 + a_2$

$a_1, a_2 \geq 0$

$a_1 + 2a_2 \leq 10$

$a_1 \leq 2$