ARTIFICIAL INTELLIGENCE

LAB ASSIGNMENT – 11

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Q) Explain genetic algorithm with an example?

GENETIC ALGORITHM:

Genetic algorithm is nothing but a search-based algorithm used for solving optimization problem.

A genetic algorithm is a heuristic search algorithm used to solve search and optimization problems. This is a subset of evolution algorithms, which are used in computation Working of genetic algorithm:

Phenotype to genotype is encoding

Genotype to phenotype is decoding

Phenotype is raw data

Genotype is processed data

It is widely used today in business, scientific & engineering circles Genetic operators are selection, crossover, mutation.

Example :

f(x)=x^2, maximize this function with x interval[0,31]

1.generate initial population at rondom (called genotype)

01101(13), 11000(24), 01000(8), 10011(19)

2.calculate fitness f(x)=x^2

13-169, 24-576, 8-64, 19-361

3.select any 2 parents based on fitness

Pi=fi/sum j=1ton fj

No	Initial population	X value	F(x)=x^2	Pi	Expected count= n*p
1	01101	13	169	0.14	0.56
2	11000	24	576	0.49	1.97
3	01000	8	64	0.06	0.22
4	10011	19	361	0.31	1.23
			1170	1.00	4.00

In selection we have to select 2 parents max count in expected count

I take 1.97 and replace with the lowest value in initial population

4.crossover

No	Intial	Crossover point	After crossover	x	F(x)=xˆ2
1	01101	4	01100	12	144
2	11000	4	11001	25	625
3	11000	2	11011	27	729
4	10011	2	10000	16	256
					1754

5.mutation

Applied to each child after crossover

In crossover table 625 and 729 are maximum we don’t need to change

No	After crossover	After mutation	X	F(x)=xˆ2
1	01100	11100	26	676
2	11001	11001	25	625
3	11011	11011	27	729
4	10000	10100	18	324
				2354

If the algorithm sum is going to increase in every step we are doing a correct way otherwise it will be wrong.