

Genetic Algorithms: De Jong Test Functions

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Abstract

Here is where I write the abstract.

Index Terms

Genetic Algorithms, Binary Encoding, De Jong Test Functions, Optimization

I. Q1: BINARY ENCODING AND INITIALIZATION

A. Variable Encoding

Here is where I describe the variable encoding using binary strings (8-bit and 16-bit)

B. Generating Initial Population

Here is where I write about the function to generate a random initial population of binary chromosomes.

II. Q2: CHROMOSOME DECODING AND FUNCTION EVALUATION

A. Decoding a Chromosome

Here is where I write about decoding a binary chromosome into a real number using linear mapping to the domain of each De Jong function.

B. Function Evaluation

Here is where I write about implementing evaluation functions for all of the De Jong functions.

III. Q3: GENETIC ALGORITHM OPERATIONS

A. *Fitness Proportionate Selection*

Here is where I write about the fitness proportionate selection method using the roulette wheel selection algorithm.

B. *Crossover*

Here is where I write about the one-point or two-point crossover operation for binary chromosomes (probability = 0.90)

C. *Bitwise Mutation*

Here is where I write about the bitwise mutation operation (probability = $1/\text{Length of chromosome}$)

IV. Q4: GENETIC ALGORITHM EXECUTION

A. *Execution of the Genetic Algorithm*

Here is where I write about the genetic algorithm execution (50 generations, population size = 20).

B. *Fitness Evaluation*

Here is where I include plots for best fitness and average fitness per generation for each function.

C. *Best Solution*

Here is where I write about the best solution found and its decoded real values.

V. Q5: ANALYSIS AND COMPARISON

A. *Convergence Comparison*

Here is where I write about the convergence behavior of all functions.

B. *Optimization Analysis*

Here is where I answer the questions: Which function was easiest to optimize? Which was hardest? Why?

VI. CONCLUSION

Here is where I write the conclusion.