META-HEURISTICS IN BANK LENDING DECISION

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Bank Lending

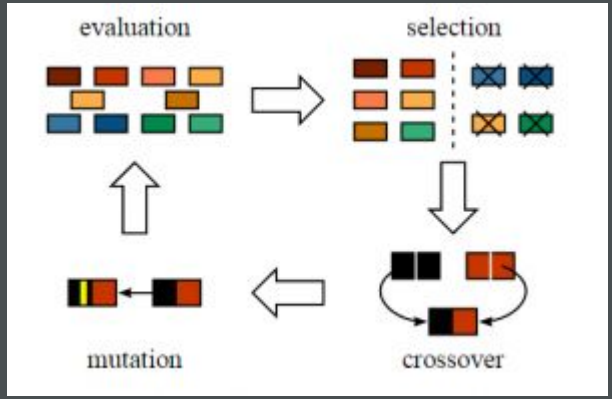
A simple game of maximising the bank's profits during times of capital constraints.

- Choosing customers
- Regulatory compliance

Approach 1

Genetic Algorithm

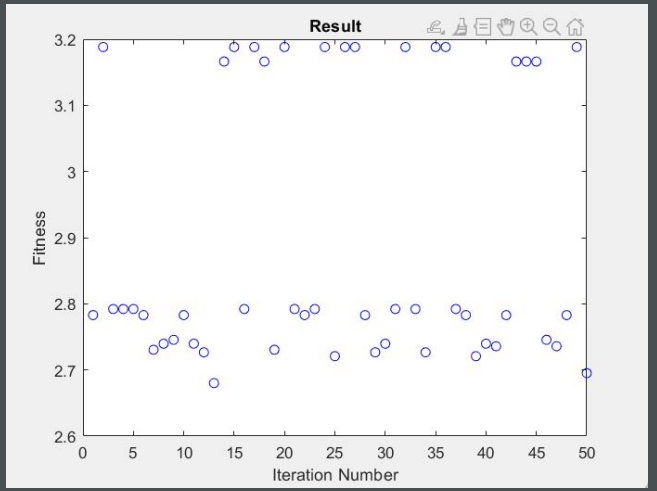
- Population Size = 60
- Generations = 60
- Reproduction Probability = 0.194
- Crossover Probability = 0.8
- Mutation Probability = 0.006



Approach 1

Limitations of Genetic Algorithm

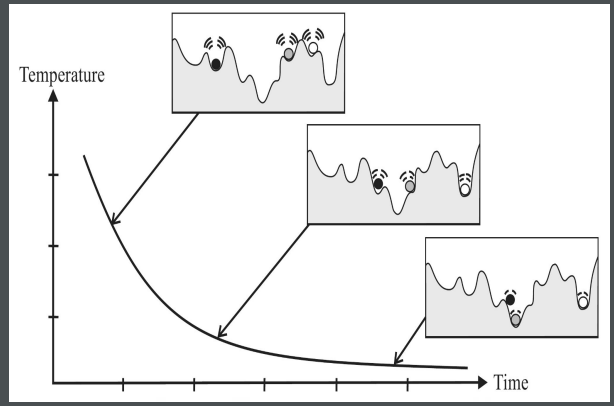
- Choosing the best keeps reducing the chances of variance in future generations
- High density of intermediate solutions
- Probability of stucking in local optima



Approach 2

Simulated Annealing

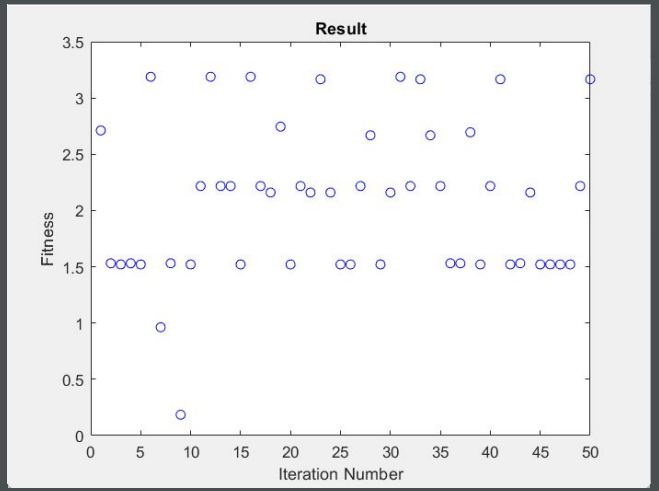
- Initial Temperature = ~ 1 to 2
- Max Runs = 60
- Boltzmann Constant = 1
- Minimum Temperature = 0.0001
- Alpha = 0.9
- Initial Search = 60
- Maximum rejections = 20



Approach 2

Limitations of Simulated Annealing

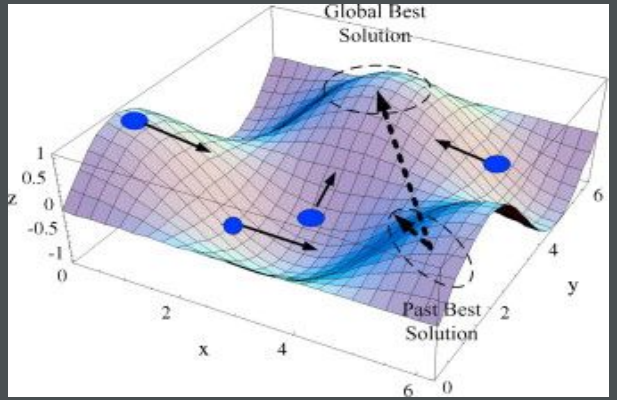
- Binary Nature of chromosomes makes the child generation futile in long run
- Large Variance
- Probability of stucking in local solutions



Approach 3

Genetic Algorithm with Particle Swarm Optimisation

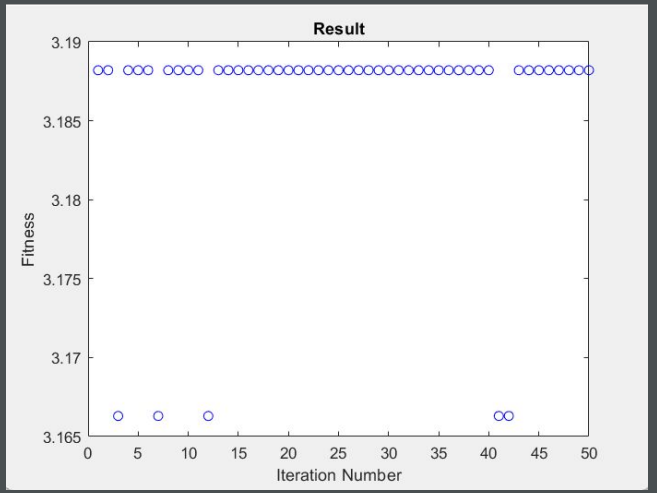
- Population Size = 60
- Generations = 60
- Reproduction Probability = 0.194
- W = 5
- C1 = 0 #No effect of local best
- C2 = 1



Approach 3

How PSO overcomes the Limitations of GA and SA

- Higher Randomised children generation
- Higher density of near optimal solutions
- Every time a parent is again chosen the child is closer to the parent than its elder (Allows local search)



GA	SA	GA + PSO
 Average of 0.34 s	 Average of 0.007 s	 Average of 0.55 s
 High Variance 32% optimal	 Very High Variance	 Lower Variance ~ 90% optimal

THANKS!