

# Evolutionary computing

1. Introduction to Evolutionary Computation
  - Biological and artificial evolution
  - computation and AI
  - Different historical branches of EC
  - Simple genetic algorithm
2. Search Operators
  - Crossover
  - Mutation
  - Crossover and mutation rates
  - Crossover for real-valued representation
  - Mutation for real-valued representation
  - Combinational GA
3. Selection Schemes
  - Fitness proportional selection
  - Fitness scalling ranking
  - Tournament Selection
  - Selection pressure and its impact on evolutionary search
4. Theoretical Analysis of Evolutionary Algorithm
  - Schema theorems
  - Covergence of the algorithm
  - Computational time complexity of the algorithms
  - No free lunch theorems
5. Search Operators and Representation
  - Mixing different search operators
  - Adaptive representation
  - Niching and speciation
  - Fitness sharing
  - Crowding and mating restriction
6. Contrain Handling
  - Common techniques
  - Penalty methods
  - Repair methods
  - Deb's penalty parameters method
7. Multi-objective evolutionary optimization
  - Pareto optimality
  - Multi-objective evolutionary algorithms:MOGA,NSGA-II,etc.
  - Application of GA in engineering problems
  - Job-shop scheduling and routing problems