



# GENETIC ALGORITHMS

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# Classification Of Genetic Algorithms:

1. **Simple Genetic Algorithm (SGA)**
2. **Parallel and Distributed Genetic Algorithm (PGA and DGA)**
3. **Hybrid Genetic Algorithm (HGA)**
4. **Adaptive Genetic Algorithm (AGA)**
5. **Fast Messy Genetic Algorithm (FmGA)**
6. **Independent Sampling Genetic Algorithm (ISGA)**

# 1. Simple Genetic Algorithm (SGA)

- **The mechanics of simple genetic algorithms (SGA) are simple involving nothing more complex than copying strings and swapping partial strings**

**SGA is composed of three operations**

- **Reproduction**
- **Crossover**
- **Mutation**

## 2. Parallel and Distributed Genetic Algorithm (PGA and DGA)

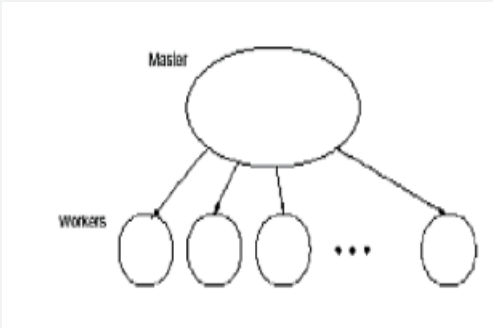
- **Parallel execution of various SGAs is called PGA (Parallel Genetic Algorithm)**

### **Various Methods of PGA:**

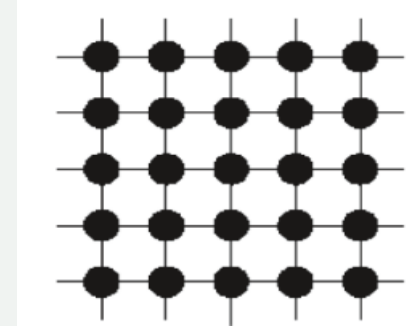
1. **Independent PGA**
2. **Migration PGA**
3. **Partition PGA**
4. **Segmentation PGA**
5. **Segmentation-Migration PGA**

# Types Of Parallelism

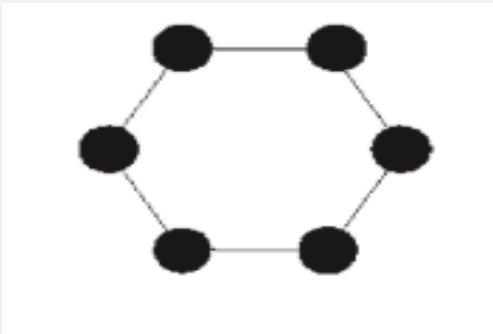
Master-Slave Parallelization



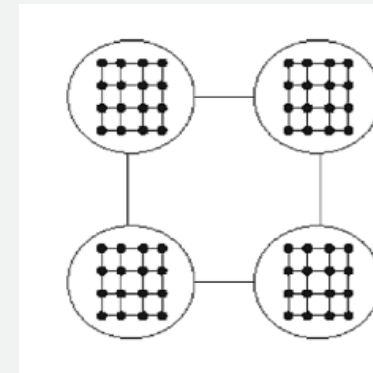
Fine Grained Parallel Gas (Cellular Gas)



Multiple-Deme Parallel Gas



Hierarchical Parallel Algorithms



### 3. Hybrid Genetic Algorithm (HGA)

- **A Hybrid Genetic Algorithm is designed by combining a variant of an already existing crossover operator with three heuristics**

#### **HGA for Travelling Salesman Problem:**

- **Initialization Heuristics**
- **Cross Over**
- **RemoveSharp and LocalOpt**
- **Shuffling**

## 4. Adaptive Genetic Algorithm (AGA)

- **Adaptive genetic algorithms (AGA) are GAs whose parameters, such as the population size, the crossing over probability, or the mutation probability are varied while the GA is running**

Algorithm procedure is as follows:

*Step 1:* Initial population

We use the population obtained by random number generation

*Step 2:* Genetic operators

Selection: elitist strategy in enlarged sampling space

Crossover: order-based crossover operator for activity priority

Mutation: local search-based mutation operator for activity mode

*Step 3:* Apply the local search using iterative hill-climbing method in GA loop

*Step 4:* Apply the heuristic for adaptively regulating GA parameters (i.e., the rates of crossover and the mutation operators).

*Step 5:* Stop condition

## 5. Fast Messy Genetic Algorithm (FMGA)

- **The fmGA is a binary, stochastic, variable string length, population based approach to solving optimization problems**

**The fmGA contains three phases of operation:**

- **the initialization phase Cross Over**
- **the building block filtering (BBF) phase**
- **the juxtapositional phase, which includes various parameters**



## 6. Independent Sampling Genetic Algorithm (ISGA)

- **Idealized Genetic Algorithm (IGA) allows each individual to evolve completely independently**

**Partially motivated by the idea of IGA, a more robust GA called Independent Sampling Genetic Algorithm, which proceeds in two phases:**

- **The independent sampling phase**
- **The breeding phase**

*Thank You*