

# 15장. Stochastic Algorithms

Minimization 문제의 경우

# Simulated Annealing (SA)

```
 $s \leftarrow$  initial solution;  
 $t \leftarrow$  initial temperature;  
repeat  
  repeat  
     $s' \leftarrow$  perturb( $s$ );  
     $\Delta s \leftarrow$  cost( $s'$ ) - cost( $s$ );  
    if ( $\Delta s < 0$  or random() < f( $\Delta s$ ,  $t$ ))  
       $s \leftarrow s'$ ; //accept  
    until (time to change temperature)  
  change  $t$ ;  
until (stopping condition)
```

# Genetic Algorithm (GA)

create a fixed # of initial solutions;

**repeat**

**for**  $i \leftarrow 1$  **to**  $k$

        choose two parent solution  $P_1, P_2$ , from the population;

$\text{offspring}_i \leftarrow \text{crossover}(P_1, P_2)$ ;

$\text{offspring}_i \leftarrow \text{mutation}(\text{offspring}_i)$ ;

$\text{offspring}_i \leftarrow \text{local-optimization}(\text{offspring}_i)$ ; //optional

    no indent replace the whole or part of the population with  $\text{offspring}_1 \dots \text{offspring}_k$  ;

**until** (stopping condition)

**return** the best solution in the population;

# LSMC (Large-Step Markov Chain)

```
 $s \leftarrow \text{initial solution};$   
repeat  
     $s' \leftarrow \text{perturb}(s);$   
     $s'' \leftarrow \text{local-optimization}(s');$   
     $\Delta s \leftarrow \text{cost}(s'') - \text{cost}(s);$   
    if ( $\Delta s < 0$ ) // 추가로 SA 같은 조건 가미 가능  
         $s \leftarrow s''$ ; //accept  
until (stopping condition)
```

# Tabu Search (TS)

```
 $x_0 \leftarrow$  initial solution;  
initialize tabu list  $T$  and aspiration function  $A$ ;  
 $i \leftarrow 1$ ;  
repeat  
    pick the best  $x_i$  in  $N(x_{i-1})$ ;  
    if ( $x_i$  is not in  $T$ ) then accept  $x_i$ ;  
        update  $T$  and  $A$ ;  
    else if ( $\text{cost}(x_i) < A(x_{i-1})$ ) then accept  $x_i$ ;  
        update  $T$  and  $A$ ;  
  
    else reject  $x_i$ ;  
     $i++$ ;  
until (stopping condition)
```