Population Evaluation

Schema Theorem

Given: Schema → 1 * 1 * *

Chromosomes →		fitness
	C_1: 00101	10
	C_2: 11101	25 *
	C_3: 00000	15
	C_4: 10010	20
	C_5: 11111	30 *

→ fit chromosomes

Calculate:

- $m(s,t)$ → # of instances of schema s in the population at time t
- $f(h)$ → fitness of hypothesis h
- $\bar{f}(h)$ → average fitness of all individuals in pop at t
- $\hat{u}(s,t)$ → average fitness of instances of s.

- $Pr(h) = \dfrac{f(h)}{\sum f(h_i)}$ } fitness of h

- $Pr(h \in s) = \sum \dfrac{f(h)}{n\bar{f}(t)} = \underbrace{\dfrac{\hat{u}(s,t)}{n\bar{f}(t)} m(s,t)}_{\text{prob that we'll pick a hypothesis in the schema}}$

  ↳ hyp. in schema

- $\hat{u}(s,t) = \dfrac{\sum_{h\in s} f(h)}{m(s,t)}$ → schemaya uyanların fitness toplamı

  ↳ schemaya uyanların sayısı

Solution:

1) $\hat{u}(s,t) = \dfrac{25+30}{2} = 27.5$

2) $\bar{f}(t) = \dfrac{100}{5} = 20$ → $27.5 > 20$ elements of schema expected to increase

$m(s,t) = 2$

3) $P_c = 1$

$d(s) = 3-1$

$l = 5$

4) $E[m(s,t+1)] \geq \dfrac{\hat{u}(s,t)}{\bar{f}(t)} m(s,t) \times \left(1 - P_c \dfrac{d(s)}{l-1}\right) \times (1-p_m)^{o}$ ← # bits

$E[m(s,t+1)] \geq 1.375$

↳ Expected # is decreasing due to crossover