Metaheurísticas

Unidad 3
Metaheurísticas basadas en Poblaciones

Tema 5: Otros enfoques evolutivos

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Algoritmo del pájaro cuco

Seudocódigo Cuckoo Search con Vuelos de Lévy

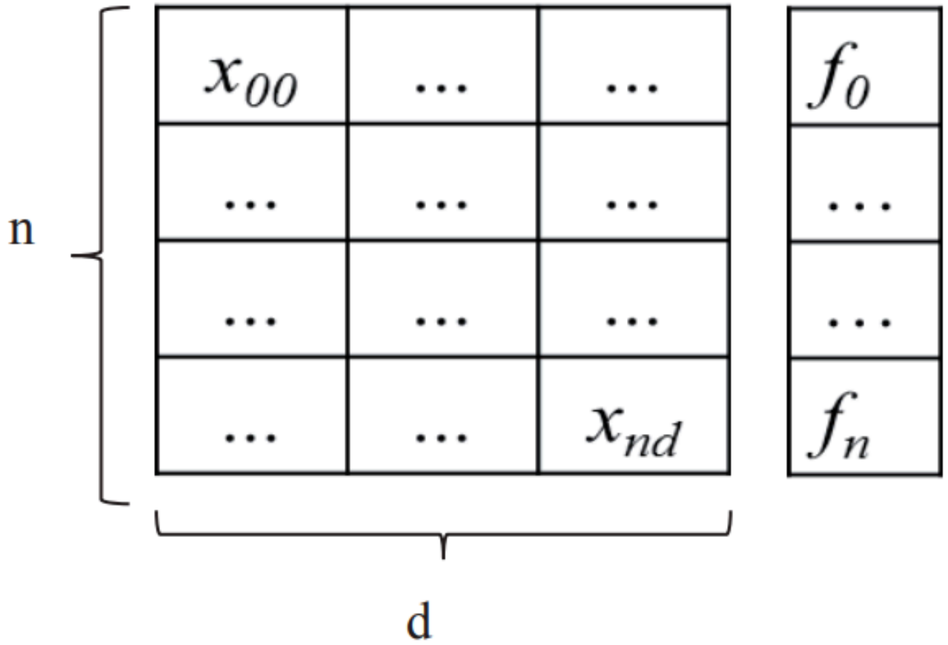
```
1:  Inicio
2:  Función objetivo f(x), x=(x_1,…x_d)^T
3:     Generar población inicial de n nidos x_i (i=1,2,…,n)
4:  While(t<MáximaGeneración) o (Criterio de finalizar)
5:        Obtener nuevo cuckoo mediante vuelo de lévy
6:         Evaluar su calidad / fitness F_i
7:  Elegir nuevo nido entre n (ejemplo j) aleatoriamente
8:  Si (F_i >F_j) /* '>' Se utiliza para maximizar, '<' para minimizar */
9:              Remplazar j por la nueva solución
10: Fin
11:       Una fracción p_a de los peores nidos son abandonados
12:       Y nuevos nidos son construidos
13:       Mantener mejores soluciones
14:       Ordenar las soluciones y encontrar la mejor
15: Fin mientras
16: Fin
```

Algoritmo del pájaro cuco

población inicial

Matriz Inicial

Arreglo Fitness

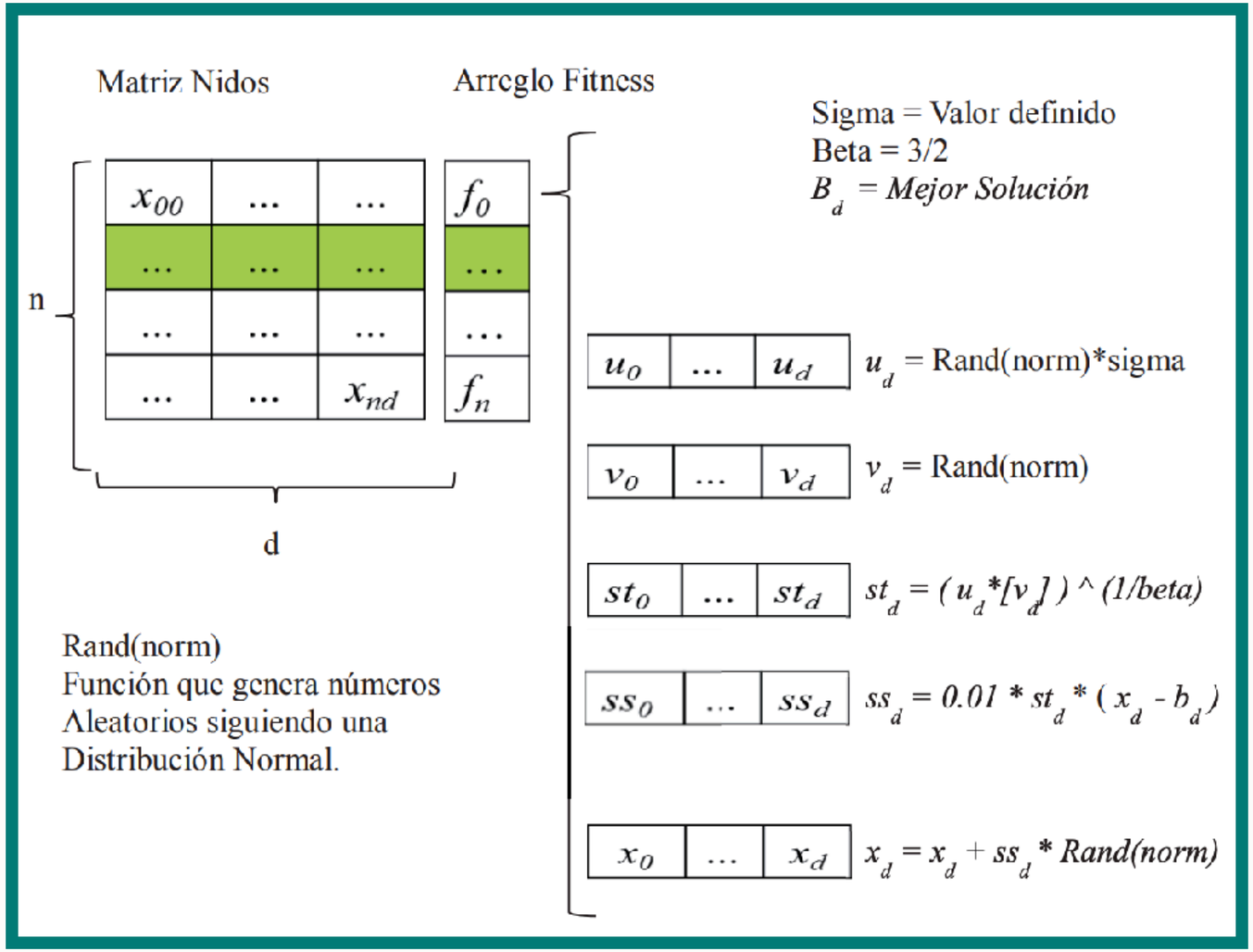


n = Número de Nidos (Soluciones)
d = Tamaño Solución
F = Fitness
ub = Límite Superior
lb = Límite Inferior

X_{nd} = lb + ((ub - lb) * Rand(0,1);

Algoritmo del pájaro cuco

fase de mejoramiento de soluciones



Algoritmo del pájaro cuco

búsqueda de nuevas soluciones

Matriz Nidos

x_{00}	...	...
...	...	...
...	...	...
...	...	x_{nd}

n

d

Arreglo Fitness

f_0
...
...
f_n

pa = Factor Descubrimiento (25%)
perm = *permutación aleatoria*
m = *Matriz Nidos*
F = *Fitness*

N1 = *perm(Matriz Nidos)*

N2 = *perm(Matriz Nidos)*

Ss = *rand(0,1)* * *(N1 – N2)*

nm = *m* + *(ss* * *mpa)*

Si $F(m_n) > F(nm_n)$

$F(m_n) = F(nm_n)$

mpa

0	1	0
0	0	0
1	0	0
0	0	1

25% = 1
75% = 0

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Xin-She Yang
A new metaheuristic bat-inspired algorithm
NICSO 2010, SCI 284
pp. 65-74, 2010.

Algoritmo del murciélago

Bat Algorithm

Objective function $f(\mathbf{x}), \quad \mathbf{x} = (x_1, ..., x_d)^T$
Initialize the bat population $\mathbf{x}_i$ $(i = 1, 2, ..., n)$ *and* $\mathbf{v}_i$
Define pulse frequency f_i *at* $\mathbf{x}_i$
Initialize pulse rates r_i *and the loudness* A_i
while *(t <Max number of iterations)*
Generate new solutions by adjusting frequency,
and updating velocities and locations/solutions [equations (2) to (4)]
  if $(rand > r_i)$
  Select a solution among the best solutions
  Generate a local solution around the selected best solution
  end if
  Generate a new solution by flying randomly
  if $(rand < A_i \ \& \ f(\mathbf{x}_i) < f(\mathbf{x}_*))$
  Accept the new solutions
  Increase r_i *and reduce* A_i
  end if
Rank the bats and find the current best $\mathbf{x}_*$
end while
Postprocess results and visualization

Figure 1: Pseudo code of the bat algorithm (BA).

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Algoritmo del murciélago

Algoritmo COVID

Coronavirus Optimization Algorithm: A bioinspired metaheuristic based on the COVID-19 propagation model
F. Martínez-Alvarez y otros 2020
Big Data Journal
https://arxiv.org/pdf/2003.13633.pdf

Otros enfoques

Otros enfoques

Shark Smell Optimization

Otros enfoques

Shark Smell Optimization

Grey Wolf Optimization

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Firefly Algorithm

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Teaching Learning Based Optimization Algorithm

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