

COMP 3710 - 3

Applied Artificial Intelligence (3,1,0)

Fall 2017

Seminar/Lab 4

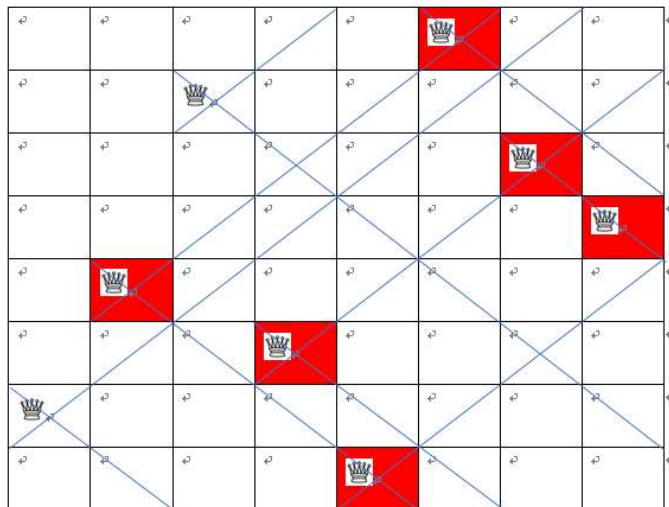
Genetic Algorithms

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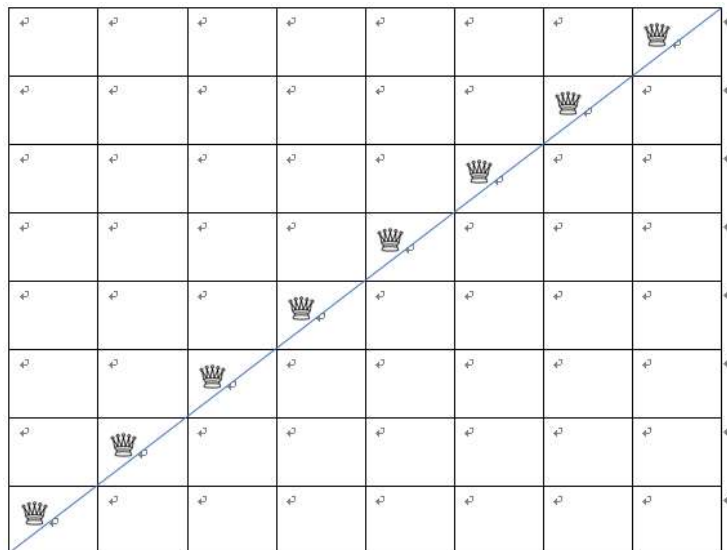
[2,4,7,3,1,8,6,5]



The number of conflicts: 4

The fitness value is $(28-4) = 24$;

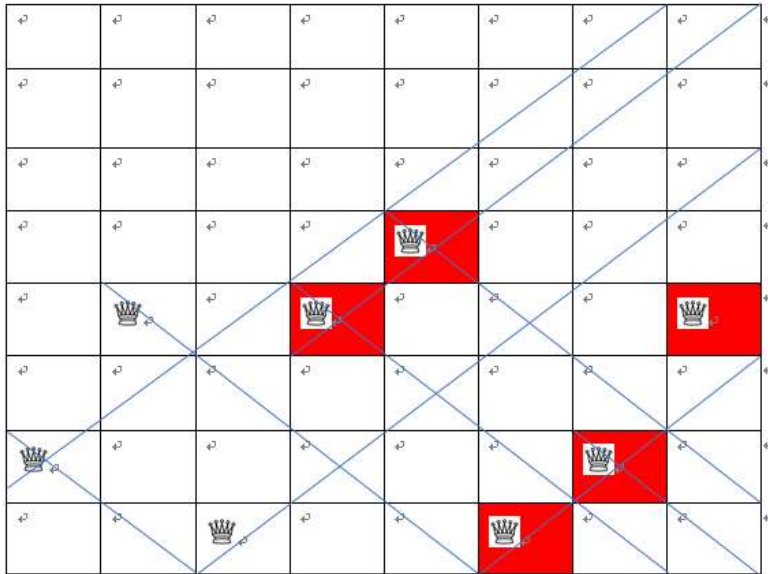
[1,2,3,4,5,6,7,8,]



The number of conflicts: $7+6+5+4+3+2+1 = 28$

The fitness value is $(28-28) = 0$;

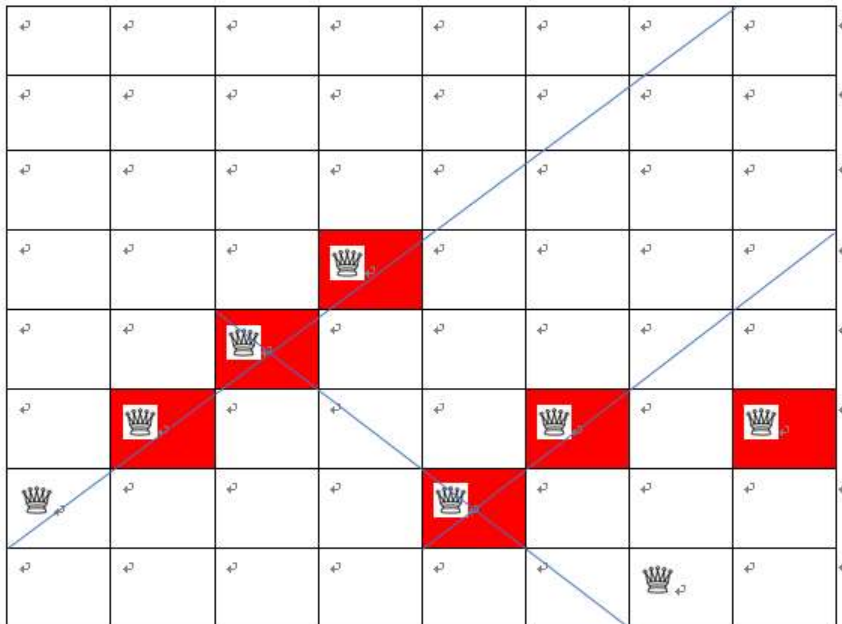
[2,4,1,4,5,1,2,4]



The number of conflicts: 7

The fitness value is $(28-7) = 21$;

[2,3,4,5,2,3,1,3]



The number of conflicts: 13

The fitness value is $(28-13) = 15$;

$$24+0+21+15 = 60$$

Individuals	Fitness values	Fitness ratios (%)
[2 4 7 3 1 8 6 5]	24	$24/60 = 0.4 = 40\%$
[2 4 1 4 5 1 2 4]	21	$21/60 = 0.35 = 35\%$
[2 3 4 5 2 3 1 3]	15	$15/60 = 0.25 = 25\%$
[1 2 3 4 5 6 7 8]	0	$0/60 = 0$

40%, 35%, 25%, 0(drop)

From above, construct a list – [0, 40, 75(40+35), 100(75+25)]

- With the above example, if $r \leq 40$, then the first one is selected
- else if $r \leq 75$, then the second one is selected
- else if $r \leq 100$, then the third one is selected

r	Selected individuals	New individuals	m	v	p	Mutated individuals
32.326969	[2 4 7 3 1 8 6 5]	[2,4,7,3,5,1,2,4]	36	4	5	[2,4,7,3,5,1,2,4]
17027824		[2,4,1,4,1,8,6,5]	71	1	3	[2,4,1,4,1,8,6,5]
		[2,4,7,3,2,3,1,3]	4	6	7	[2,4,7,3,2,7,1,3]
		[2,3,4,5,1,8,6,5]	89	8	6	[2,3,4,5,1,8,6,5]

Individuals	Fitness values	Fitness ratios (%)
[2,4,1,4,1,8,6,5]	28-4=24	24/90=26.7%
[2,4,7,3,5,1,2,4]	28-5=23	23/(23+24+23+20)=25.6%
[2,4,7,3,2,7,1,3]	28-5=23	23/90=25.6%
[2,3,4,5,1,8,6,5]	28-8=20	20/90=22.2%

26.7%, 25.6%, 25.6%, 22.2%

From above, construct a list – [0, 26.7,52.3 ,77.9,100.1]

- With the above example, if $r \leq 26.7$, then the first one is selected
- else if $r \leq 52.3$, then the second one is selected
- else if $r \leq 77.9$, then the third one is selected
- else, the last one is selected.

r	Selected individuals	New individuals	m	v	p	Mutated individuals
51.76951 55330057 94	[2,4,7,3,5,1,2,4]	[2,4,1,4,5,1,2,4]	76	4	4	[2,4,1,4,5,1,2,4]
		[2,4,7,3,1,8,6,5]	61	1	5	[2,4,7,3,1,8,6,5]
		[2,4,7,3,5,1,2,4]	24	5	3	[2,4,7,3,5,1,2,4]
		[2,4,7,3,2,7,1,3]	8	3	8	[2,4,8,3,2,7,1,3]

Individuals	Fitness values	Fitness ratios (%)
[2,4,7,3,1,8,6,5]	28-3=25	25/92=27.2%
[2,4,7,3,5,1,2,4]	28-5=23	23/92=25%
[2,4,8,3,2,7,1,3]	28-5=23	23/92=25%
[2,4,1,4,5,1,2,4]	28-7=21	21/(21+25+23+23)=22.8%

27.2%,25%,25%,22.8%

From above, construct a list – [0, 27.2,52.5 ,77.2,100]

- With the above example, if $r \leq 27.2$, then the first one is selected
- else if $r \leq 52.5$, then the second one is selected
- else if $r \leq 77.2$, then the third one is selected
- else, the last one is selected.

r	Selected individuals	New individuals	m	v	p	Mutated individuals
24.78430	[2,4,7,3,1,8,6,5]	[2,4,7,3,5,1,2,4]	17	2	5	[2,5,7,3,5,1,2,4]
25504924		[2,4,7,3,1,8,6,5]	51	7	8	[2,4,7,3,1,8,6,5]
		[2,4,7,3,2,7,1,3]	45	2	5	[2,4,7,3,2,7,1,3]
2		[2,4,8,3,1,8,6,5]	35	6	3	[2,4,8,3,1,8,6,5]