姓名：

For the hill climbing algorithm, generate 2 or 8 solutions for 4, 8, 16, 32 queens problems, write the total generated nodes and boards. Calculate the average searched nodes and stuck rate.

Stuck rate = (Total generated boards - #solutions) / Total generated boards

Where the solution is the optimal solution(No queen threats each other), the generated boards is the suboptimal solutions(Some queens threats each other).

**1. Find those # solutions, duplicated boards are ok.**

**a. hill climbing with random restart**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| size | #solutions | Total  generated  nodes | Total  generated  final boards | average searched nodes for one board | stuck rate | Execution time |
| 4 | 2 | 18 | 6 | 3 | 2/3 | 0.03 |
| 8 | 10 | 243 | 64 | 3.8 | 0.84 | 0.72 |
| 16 | 10 | 2828 | 472 | 6 | 0.97 | 1.31 |
| 32 | 10 | 14944 | 1293 | 11.5 | 0.99 | 30.138 |

**b. local beam with k state, you could choose a suitable k yourself.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| size | #solutions | Total  generated  nodes | Total  generated  final  boards | average searched nodes for one board | stuck rate | Execution time |
| 4  k=6 | 2 | 28 | 2 | 7 | 0 | 0.02s |
| 8  k=6 | 10 | 482 | 10 | 48.2 | 0 | 1.18 |
| 16  k=6 | 10 | 6882 | 10 | 688.2 | 0 | 5.21 |
| 32  k=6 | 10 | 6944 | 10 | 6944 | 0 | 17.113 |

**2. Find those # solutions without duplicated boards.**

**The tables are the same as question 1.**

**a. hill climbing with random restart**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| size | #solutions | Total  generated  nodes | Total  generated  final boards | average searched nodes for one board | stuck rate | Execution time |
| 4 | 2 | 26 | 10 | 2.6 | 0.8 | 0.02 |
| 8 | 10 | 377 | 109 | 3.09 | 0.9 | 0.52 |
| 16 | 10 | 3007 | 496 | 6.06 | 0.97 | 1.01 |
| 32 | 10 | 28826 | 2500 | 11.5 | 0.99 | 39.492 |

**b. local beam with k state, you could choose a suitable k yourself.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| size | #solutions | Total  generated  nodes | Total  generated  final  boards | average searched nodes for one board | stuck rate | Execution time |
| 4  k=6 | 2 | 16 | 2 | 8 | 0 | 0.02s |
| 8  k=6 | 10 | 1716 | 10 | 171.6 | 0 | 1.18 |
| 16  k=6 | 10 | 3383 | 10 | 338.3 | 0 | 6.82 |
| 32  k=6 | 10 | 8043 | 10 | 804.3 | 0 | 25.113 |

1. 兩種方法的比較，ex. 搜尋速度，搜尋成功率…(Compare hill climbing and local beam search for search speed, sueecssful rate, and so on...)

**hill climbing搜尋速度快，成功率也比較高**

2.K值的設定對搜尋的影響(How the K affect the local beam search?)

K值越大搜越多，但是時間可能花比較多