**ANALYSIS OF THE SEARCH ALGORITHMS**

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1. **N-Puzzle problem analysis**

For N=8

1. Initial State : Goal State:

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 4 | 0 | 5 |
| 7 | 8 | 6 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 0 |

Comparisons:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BFS | DFS | A-STAR | ID A-STAR |
| ITERATIONS | 10 | 31 | 3 | 5 |
| MAX DEPTH | 2 | 30 | 2 | 2 |

For N=8

1. Initial State : Goal State:

|  |  |  |
| --- | --- | --- |
| 1 | 0 | 3 |
| 4 | 2 | 5 |
| 7 | 8 | 6 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 0 |

Comparisons:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BFS | DFS | A-STAR | ID A-STAR |
| ITERATIONS | 12 | 853 | 4 | 6 |
| MAX DEPTH | 3 | 833 | 3 | 3 |

For N=8

1. Initial State : Goal State:

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 0 |
| 4 | 5 | 3 |
| 7 | 8 | 6 |

|  |  |  |
| --- | --- | --- |
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 0 |

Comparisons:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BFS | DFS | A-STAR | ID A-STAR |
| ITERATIONS | 4 | 31 | 3 | 3 |
| MAX DEPTH | 2 | 30 | 2 | 2 |

1. n\*n matrix coloring problem

for n=5

BFS

initial state:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 2 | 3 | 3 | 2 |
| 4 | 3 | 3 | 2 | 1 |
| 1 | 3 | 4 | 2 | 4 |
| 1 | 4 | 4 | 3 | 4 |
| 4 | 2 | 4 | 1 | 2 |

goal state:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 2 | 3 | 1 | 2 |
| 1 | 3 | 1 | 2 | 1 |
| 2 | 1 | 4 | 1 | 4 |
| 1 | 4 | 1 | 3 | 1 |
| 4 | 2 | 4 | 1 | 2 |

Max number of iterations: 7806

DFS

initial state:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 2 | 3 | 3 | 2 |
| 4 | 3 | 3 | 2 | 1 |
| 1 | 3 | 4 | 2 | 4 |
| 1 | 4 | 4 | 3 | 4 |
| 4 | 2 | 4 | 1 | 2 |

goal state:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | 2 | 3 | 4 | 2 |
| 3 | 4 | 2 | 3 | 1 |
| 1 | 3 | 4 | 2 | 4 |
| 4 | 2 | 3 | 4 | 3 |
| 3 | 1 | 4 | 1 | 2 |

Max number of iterations: 21

for n=6

BFS

initial state:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 | 4 | 1 | 3 | 2 | 3 |
| 2 | 1 | 1 | 2 | 4 | 1 |
| 3 | 4 | 3 | 3 | 2 | 3 |
| 2 | 3 | 4 | 2 | 2 | 2 |
| 1 | 1 | 4 | 2 | 1 | 2 |
| 2 | 4 | 4 | 3 | 4 | 3 |

goal state:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 | 4 | 1 | 3 | 2 | 3 |
| 2 | 1 | 3 | 2 | 4 | 1 |
| 3 | 4 | 1 | 3 | 2 | 3 |
| 2 | 3 | 4 | 2 | 3 | 2 |
| 1 | 4 | 1 | 4 | 1 | 4 |
| 2 | 1 | 4 | 3 | 4 | 3 |

Max number of iterations: 3669

DFS

initial state:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 | 4 | 1 | 3 | 2 | 3 |
| 2 | 1 | 1 | 2 | 4 | 1 |
| 3 | 4 | 3 | 3 | 2 | 3 |
| 2 | 3 | 4 | 2 | 2 | 2 |
| 1 | 1 | 4 | 2 | 1 | 2 |
| 2 | 4 | 4 | 3 | 4 | 3 |

goal state:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 | 4 | 1 | 3 | 2 | 3 |
| 2 | 1 | 4 | 2 | 4 | 1 |
| 3 | 4 | 3 | 4 | 2 | 3 |
| 2 | 3 | 4 | 2 | 4 | 2 |
| 1 | 4 | 3 | 4 | 1 | 4 |
| 2 | 3 | 4 | 3 | 4 | 3 |

Max number of iterations: 9

For n=7

BFS

Initial state:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 3 | 4 | 2 | 1 | 4 | 1 |
| 1 | 3 | 1 | 2 | 3 | 1 | 3 |
| 2 | 4 | 3 | 2 | 3 | 1 | 4 |
| 2 | 4 | 1 | 3 | 1 | 2 | 3 |
| 3 | 1 | 2 | 1 | 3 | 4 | 4 |
| 1 | 2 | 3 | 1 | 1 | 2 | 2 |
| 2 | 4 | 2 | 2 | 2 | 1 | 4 |

goal state:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 1 | 4 | 2 | 1 | 4 | 1 |
| 1 | 3 | 1 | 4 | 3 | 1 | 3 |
| 2 | 4 | 3 | 2 | 4 | 3 | 4 |
| 1 | 2 | 1 | 3 | 1 | 2 | 3 |
| 3 | 1 | 2 | 1 | 3 | 4 | 1 |
| 1 | 2 | 3 | 2 | 1 | 2 | 3 |
| 2 | 4 | 2 | 1 | 2 | 1 | 4 |

Max number of iterations: 24707

DFS

Initial state:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 3 | 4 | 2 | 1 | 4 | 1 |
| 1 | 3 | 1 | 2 | 3 | 1 | 3 |
| 2 | 4 | 3 | 2 | 3 | 1 | 4 |
| 2 | 4 | 1 | 3 | 1 | 2 | 3 |
| 3 | 1 | 2 | 1 | 3 | 4 | 4 |
| 1 | 2 | 3 | 1 | 1 | 2 | 2 |
| 2 | 4 | 2 | 2 | 2 | 1 | 4 |

goal state:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 3 | 4 | 3 | 2 | 1 | 4 | 1 |
| 1 | 3 | 1 | 4 | 3 | 1 | 3 |
| 2 | 4 | 3 | 2 | 4 | 3 | 4 |
| 4 | 3 | 1 | 3 | 1 | 2 | 3 |
| 3 | 1 | 2 | 1 | 3 | 4 | 2 |
| 1 | 2 | 3 | 2 | 1 | 2 | 4 |
| 2 | 4 | 2 | 4 | 2 | 1 | 3 |

Max number of iterations: 40