report

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1 Team Members

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1.1 Data Structures used

- Node `custom made structure`
- Tree `custom made structure`
- ArrayList
- Queue
- Stack
- Priority Queue
- HashTable
- Enumeration

1.2 Creating the Node

The Node will contain the following data fields:

- Parent `Node`
- Children `ArrayList`
- state `2D Array`
- String State `String` *which will be used to generate a hash code and compare it the goal state*
- Direction `Enumeration` *Action taken to reach this node*
- Depth `int`
- Missing tile Row `int`
- Missing tile Col `int`
- cost `int`

[5]:
```
import java.util.Scanner;
Scanner sc = new Scanner(System.in);
int[][] initialState = new int[3][3];
int input1,input2;
System.out.println("Welcome to 8 puzzle Solver");
```

```
System.out.print("Enter the puzzle : ");
for(int i = 0; i < 3;i++){
    for(int j = 0;j < 3;j++)
        initialState[i][j] = sc.nextInt();
    }
Tree Board = new Tree(initialState);
System.out.println("Choose the Algorithm");
System.out.println("1. BFS");
System.out.println("2. DFS");
System.out.println("3. A*");
System.out.print("Enter your choice: ");
input1 = sc.nextInt();

switch (input1) {
    case 1, 2 -> System.out.println("Not yet implemented");
    default -> {
        System.out.println("Choose the Heuristic function");
        System.out.println("1. Manhattan");
        System.out.println("2. Ecludian");
        System.out.print("Enter your choice: ");
        input2 = sc.nextInt();
        if (input2 == 1)
            Board.aStar(1);
        else
            Board.aStar(2);
    }
}
```

```
Welcome to 8 puzzle Solver
Enter the puzzle : 1 2 3 4 5 6 7 8 0
Choose the Algorithm
1. BFS
2. DFS
3. A*
Enter your choice: 3
Choose the Heuristic function
1. Manhattan
2. Ecludian
Enter your choice: 1
The root node
1       2       3
4       5       6
7       8       0


Direction Moved: Left
Depth: 1
```

```
Cost: 1

Current Node:

1       2       3
4       5       6
7       0       8



Direction Moved: Up
Depth: 2
Cost: 2

Current Node:

1       2       3
4       0       6
7       5       8



Direction Moved: Right
Depth: 3
Cost: 3

Current Node:

1       2       3
4       6       0
7       5       8



Direction Moved: Up
Depth: 4
Cost: 4

Current Node:

1       2       0
4       6       3
7       5       8
```

```
Direction Moved: Left
Depth: 5
Cost: 5

Current Node:

1       0       2
4       6       3
7       5       8



Direction Moved: Left
Depth: 6
Cost: 6

Current Node:

0       1       2
4       6       3
7       5       8



Direction Moved: Down
Depth: 7
Cost: 7

Current Node:

4       1       2
0       6       3
7       5       8



Direction Moved: Right
Depth: 8
Cost: 8

Current Node:

4       1       2
```

```
6       0       3
7       5       8



Direction Moved: Right
Depth: 9
Cost: 9

Current Node:

4       1       2
6       3       0
7       5       8



Direction Moved: Up
Depth: 10
Cost: 10

Current Node:

4       1       0
6       3       2
7       5       8



Direction Moved: Left
Depth: 11
Cost: 11

Current Node:

4       0       1
6       3       2
7       5       8



Direction Moved: Down
Depth: 12
Cost: 12
```

```
Current Node:

4       3       1
6       0       2
7       5       8



Direction Moved: Down
Depth: 13
Cost: 13

Current Node:

4       3       1
6       5       2
7       0       8



Direction Moved: Left
Depth: 14
Cost: 14

Current Node:

4       3       1
6       5       2
0       7       8



Direction Moved: Up
Depth: 15
Cost: 15

Current Node:

4       3       1
0       5       2
6       7       8
```

```
Direction Moved: Up
Depth: 16
Cost: 16

Current Node:

0       3       1
4       5       2
6       7       8



Direction Moved: Right
Depth: 17
Cost: 17

Current Node:

3       0       1
4       5       2
6       7       8



Direction Moved: Right
Depth: 18
Cost: 18

Current Node:

3       1       0
4       5       2
6       7       8



Direction Moved: Down
Depth: 19
Cost: 19

Current Node:

3       1       2
4       5       0
```

```
6       7       8



Direction Moved: Left
Depth: 20
Cost: 20

Current Node:

3       1       2
4       0       5
6       7       8



Direction Moved: Left
Depth: 21
Cost: 21

Current Node:

3       1       2
0       4       5
6       7       8



Direction Moved: Up
Depth: 22
Cost: 22

Current Node:

0       1       2
3       4       5
6       7       8


Time: 35.0 millie seconds
Space: 1529
```

[ ]: