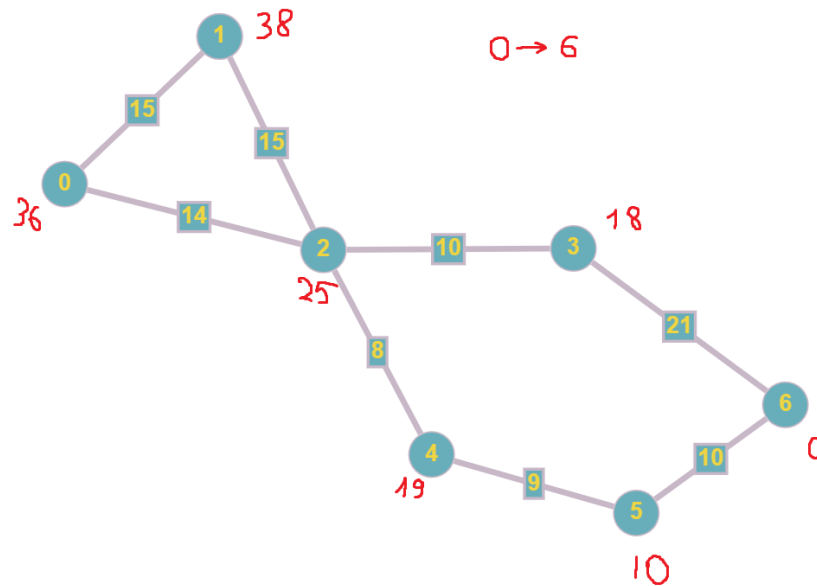# LAB 01: SEARCH STRATEGIES

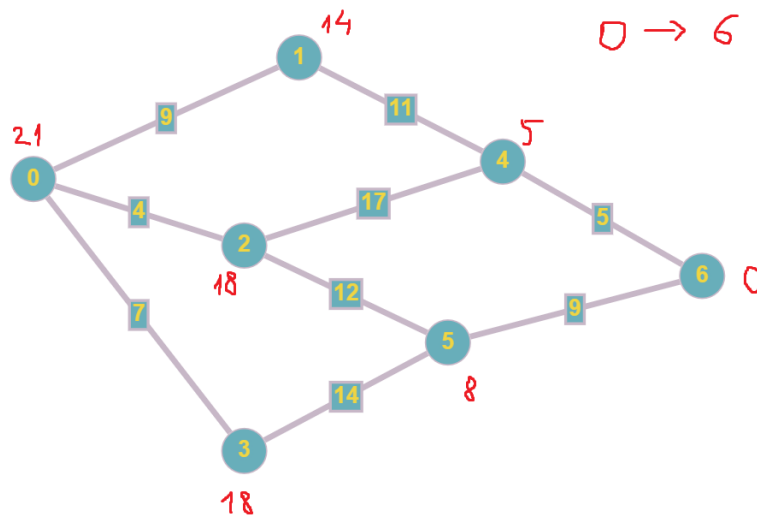# REPORT

## 1. INFORMATION:
- <u>Fullname:</u> Nguyễn Hứa Hùng
- <u>ID:</u> 19127150
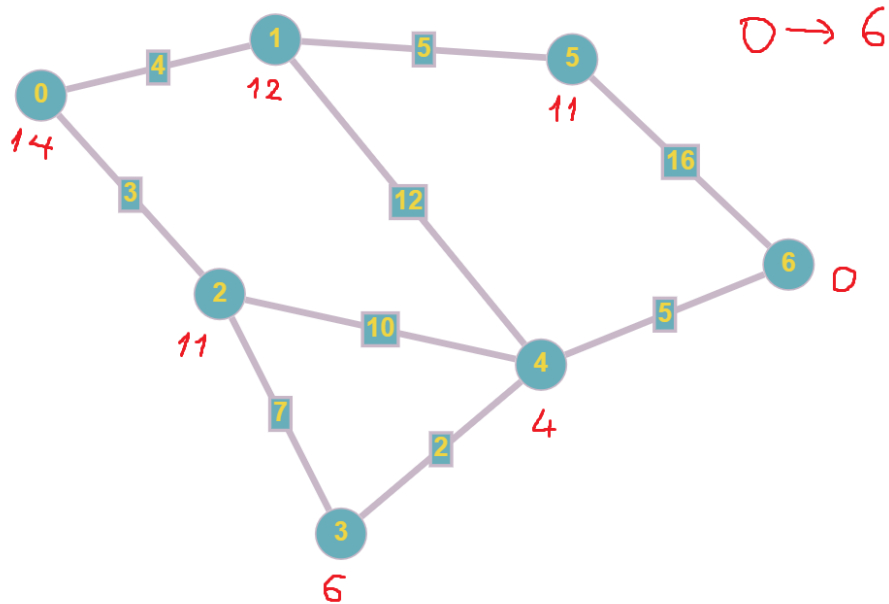- <u>Implemented strategies:</u> BFS, DFS, UCS, IDS, GBFS, ASTAR. All are 100% completed.

## 2. GRAPHS: (3 input files for 3 graphs)



*input_1.txt*



*input_2.txt*

*input_3.txt*

## 3. RESULT AND COMMENT:

*Each output: First line is a list of expanded nodes, the next line is the path found. Each run will append the result at the end of output.txt.*

### a. input_1 result:

BFS:
```
0 1 2 3
0 2 3 6
```

DFS:
```
0 1 2 3
0 1 2 3 6
```

UCS:
```
0 2 1 4 3 5 6
0 2 4 5 6
```

IDS:
```
0 1 2 3 4 2 1 3 6
0 2 3 6
```

GBFS:
```
0 2 3
0 2 3 6
```

ASTAR:
```
0 2 4 5 6
0 2 4 5 6
```

## b. input_2 result:

BFS:
```
0 1 2 3 4
0 1 4 6
```

DFS:
```
0 1 4 2 5 3
0 1 4 2 5 3 6
```

UCS:
```
0 2 3 1 5 4 6
0 2 5 6
```

IDS:
```
0 1 4 2 6
0 1 4 6
```

GBFS:
```
0 1 4
0 1 4 6
```

ASTAR:
```
0 2 1 5 3 4 6
0 2 5 6
```

## c. input_3 result:

BFS:
```
0 1 2 4
0 1 4 6
```

DFS:
```
0 1 4 2 3 3 2
0 1 4 3 2 6
```

UCS:
```
0 2 1 5 3 4 6
0 2 3 4 6
```

IDS:
```
0 1 4 2 3 6
0 1 4 6
```

GBFS:
```
0 2 4
0 2 4 6
```

ASTAR:
```
0 2 1 3 4 6
0 2 3 4 6
```

**d. Comment:**



THE AVERAGE NUMBER OF NODES EXPANDED BY EACH STRATEGY

■AvgNode

| BFS | DFS | UCS | IDS | GBFS | ASTAR |
| 4.3 | 5.6 | 7 | 6.6 | 3 | 6 |
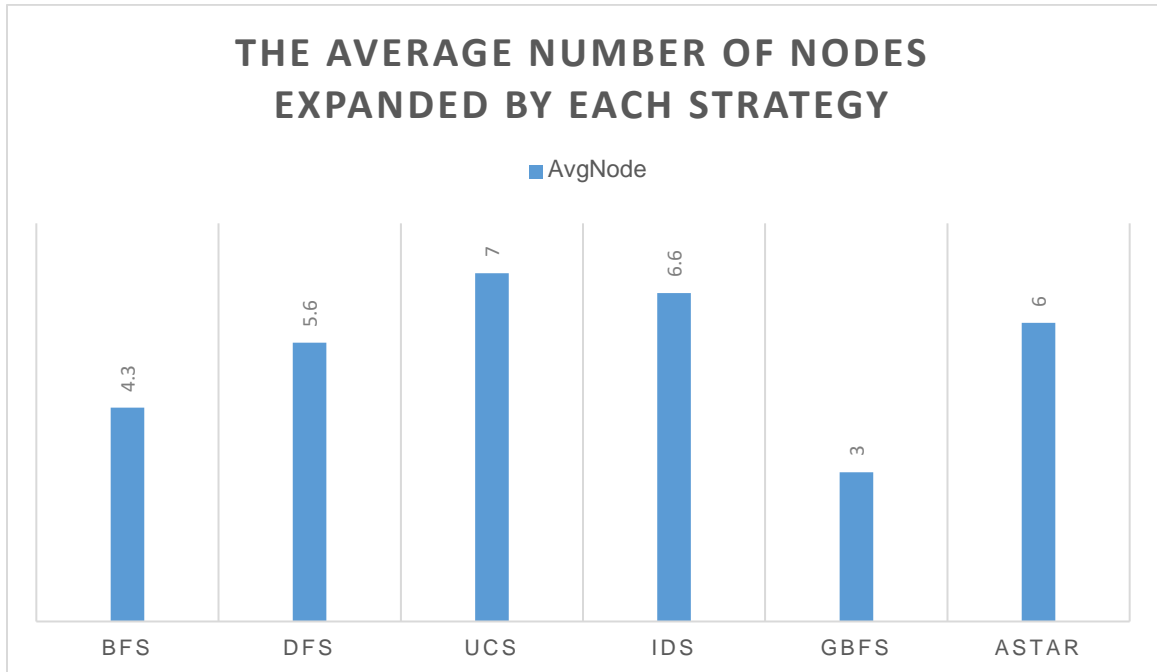
*Note: In terms of IDS, it only counts number of node in the last depth search. The total of nodes is 7 in this case.

- According to the bar chart above, GBFS strategy has to expand the least number of nodes among 6 strategies. So in this case, GBFS is the fastest search strategy.
- UCS has the highest average number of nodes since it needs to expand almost the graph for finding an optimal path.
- DFS and IDS have the largest difference in each test case. The reason for that is DFS and IDS depend on the path they have dug, which relies on the given graph of the test case.
- Among the strategies which find an optimal path, UCS is the slowest one.