

## **Assignment 2**

### **Road Route Finding System using Prolog**

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B.tech, Computer Science and Biosciences

## **Depth-First Search**

- Firstly, the program checks whether the destination place is the start place. If yes, then it prints the start place and outputs the distance traveled as 0.
- If not the same, then the depth search of one of the neighboring cities is carried out using recursion.
- The code is commented out for a better understanding

## **Best-First Search**

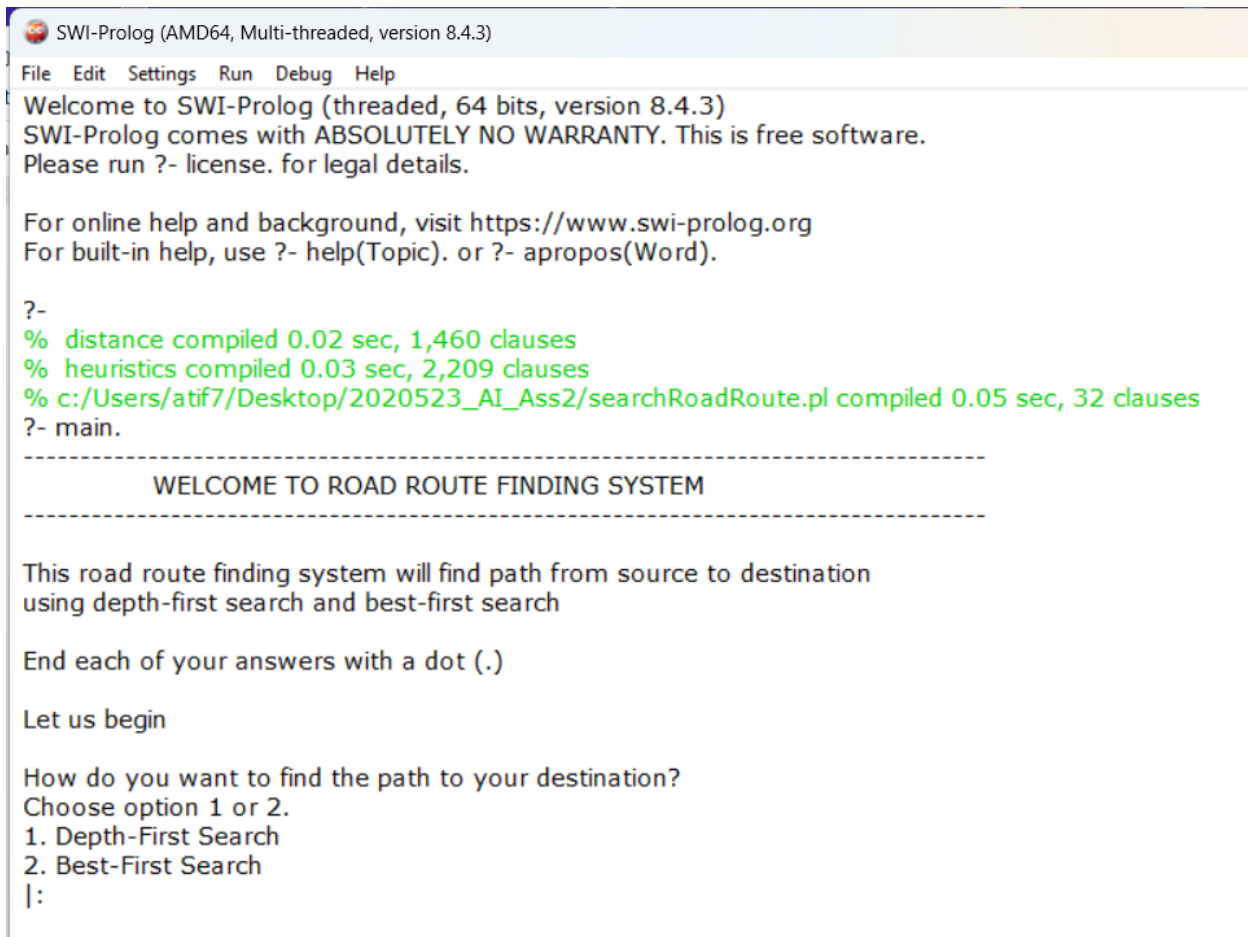
- Firstly, the program checks whether the destination place is the start place. If yes, then it prints the start place and outputs the distance traveled as 0.
- If the current node and destination are not the same, then all the unopened nodes are sorted in ascending order according to their heuristic values which are pre-calculated. Then, the node with the least heuristic value is opened.
- The code is commented out for a better understanding

## Sample Outputs

Consult the program with the file name “searchRoadRoute.pl”.

Run the main function using the command:- main.

The sample output is attached below.



```
SWI-Prolog (AMD64, Multi-threaded, version 8.4.3)
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.3)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?-
% distance compiled 0.02 sec, 1,460 clauses
% heuristics compiled 0.03 sec, 2,209 clauses
% c:/Users/atif7/Desktop/2020523_AI_Ass2/searchRoadRoute.pl compiled 0.05 sec, 32 clauses
?- main.

-----
                WELCOME TO ROAD ROUTE FINDING SYSTEM
-----

This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|:
```

The program will then ask the user to choose option 1 or 2 to select whether he/she wants to perform a depth-first search on the cities or a best-first search.

Enter “1.” for the depth-first search and “2.” for the best-first search.

# Depth-First Search

```
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WELCOME TO ROAD ROUTE FINDING SYSTEM
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This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 1.
Enter your source location |: delhi.
Enter your destination location |: pune.

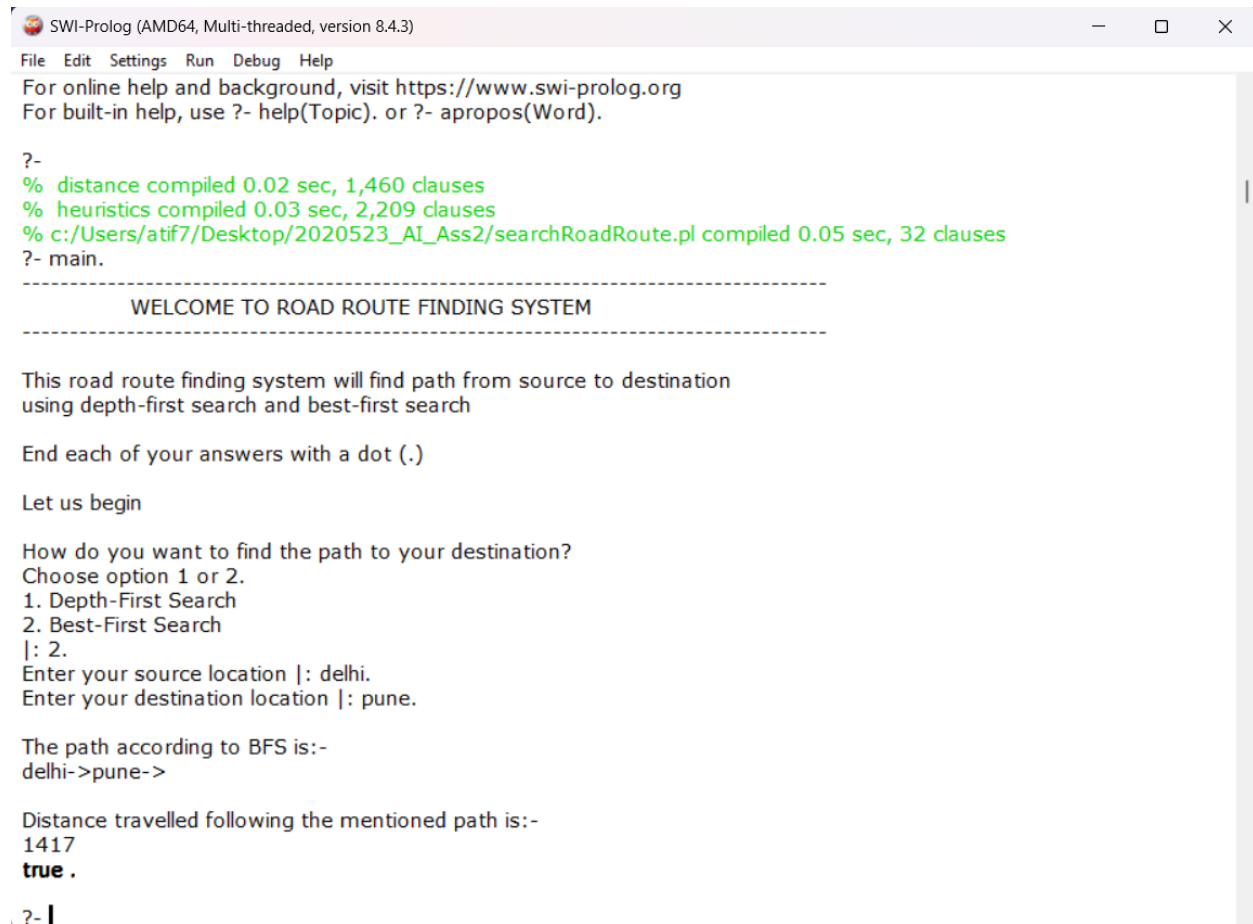
The path according to DFS is:-
delhi->agartala->ahmedabad->agra->bangalore->allahabad->bhubaneshwar->amritsar->bombay->asansol->calcutta-
da->chandigarh->bhopal->cochin->calicut->hyderabad->coimbatore->indore->gwalior->jaipur->hubli->kanpur->impha
->lucknow->jabalpur->madras->jamshedpur->nagpur->jullundur->nasik->kolhapur->panjim->ludhiana->patna->madu
ondicherry->meerut->pune->

Distance travelled following the mentioned path is:-
54635
true .
?- |
```

If chosen depth-first search, the program will ask the user to enter the source and destination places, respectively. Then, the program would perform a depth-first search from the source to the destination and show the path it took, the total distance one would cover while following the path.

The path generated for Delhi to Pune is a direct path with a distance of 54635, which is a much longer path.

## Best-First Search



```
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                WELCOME TO ROAD ROUTE FINDING SYSTEM
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This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 2.
Enter your source location |: delhi.
Enter your destination location |: pune.

The path according to BFS is:-
delhi->pune->

Distance travelled following the mentioned path is:-
1417
true .

?- |
```

If chosen best-first search, the program will ask the user to enter the source and destination places, respectively. Then, the program would perform a best-first search from the source to the destination and show the path it took, the total distance one would cover while following the path.

The path generated for Delhi to Pune is a direct path with a distance of 1417, which is much better than the path generated due to DFS.

## More sample outputs for Depth-First Search

```
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File Edit Settings Run Debug Help
?-
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-----
WELCOME TO ROAD ROUTE FINDING SYSTEM
-----

This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.).

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 1.
Enter your source location |: bhopal.
Enter your destination location |: pune.

The path according to DFS is:-
bhopal->ahmedabad->agartala->bangalore->agra->bhubaneshwar->allahabad->bombay->amritsar->calcutta->asa
chandigarh->baroda->cochin->calicut->delhi->coimbatore->hyderabad->gwalior->indore->hubli->jaipur->imphal->k
anpur->jabalpur->lucknow->jamshedpur->madras->jullundur->nagpur->kolhapur->nasik->ludhiana->panjim->madi
>patna->meerut->pondicherry->pune->

Distance travelled following the mentioned path is:-
57571
true .
?- |
```

The path generated for Bhopal to Pune is a path with a distance of 57571.

```
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?-
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This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 1.
Enter your source location |: ahmedabad.
Enter your destination location |: delhi.

The path according to DFS is:-
ahmedabad->agartala->bangalore->agra->bhubaneshwar->allahabad->bombay->amritsar->calcutta->
l->chandigarh->baroda->cochin->bhopal->delhi->

Distance travelled following the mentioned path is:-
24280
true .

?- |
```

The path generated for Ahmedabad to Delhi is a path with a distance of 24280.

## More sample outputs for Best-First Search

```
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-----

This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 2.
Enter your source location |: hubli.
Enter your destination location |: agra.

The path according to BFS is:-
hubli->delhi->agra->

Distance travelled following the mentioned path is:-
2054
true .

?- |
```

The path generated for Hubli to Agra is a path with a distance of 2054.



```
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File Edit Settings Run Debug Help
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?- mian.
Correct to: "main"? yes
-----
                WELCOME TO ROAD ROUTE FINDING SYSTEM
-----

This road route finding system will find path from source to destination
using depth-first search and best-first search

End each of your answers with a dot (.)

Let us begin

How do you want to find the path to your destination?
Choose option 1 or 2.
1. Depth-First Search
2. Best-First Search
|: 2.
Enter your source location |: nagpur.
Enter your destination location |: asansol.

The path according to BFS is:-
nagpur->asansol->

Distance travelled following the mentioned path is:-
1122
true .
?-
```

The path generated for Nagpur to Asansol is a path with a distance of 1122.