CSE643: Artificial Intelligence
Assignment-2

- Implemented DFS (Depth First Search) and BestFS (Best First Search) in prolog.

- DFS can be implemented by calling "`dfs('Start_City_Name','Destination_city_name', D, P)`" and it will give the distance as D and path as P between Start_City and Destination_City.

- To implement Best First Search type "`bestFS('Begin_City_Name','End_City_Name', Path)`" and the distance and the path will be printed using the heuristics as the smallest distance and will print 0 if not possible to reach the destination.

- The text files containing facts are also added as route.txt and yukti_heuristics.txt.

- CODE

```
%DFS
dfs(Source,Destination,Distance,[Source|Path]):-
   dfs(Source, Destination, [Source], Distance, Path).

dfs(Destination, Destination,_, 0, []) :- !.

dfs(Source, Destination, Visited, Distance, [Next|Path]):-
   connectedBothWays(Source, Next, D0),
   \+memberchk(Next, Visited),
   dfs(Next, Destination, [Next|Visited], D1, Path),
   Distance is D0 + D1.

connectedBothWays(City1,City2,Dist) :- route(City1,City2,Dist).
connectedBothWays(City1,City2,Dist) :- route(City2,City1,Dist).

%BestFirstSearch

next_node(Present, Next, End, Path, Cost) :- heuristic(Present, Next, End, Cost),
   connectedBothWays(Present, Next, C0),
   \+memberchk(Next, Path).

plist([]) :- write(' Destination Reached.!'),nl.
plist([H|T]):- write(H), write(' -> '),plist(T).

best_f(End, End, C, [End], Cost) :-
   write('Cost: '),
```

```
    write(Cost), nl, nl,
    reverse(C, C1),
    plist(C1),nl.
best_f(Begin, End, Visited, [Begin|Path], Cst) :-
    next_node(Begin, Next_node, End, Visited, Cost),
    MinCost is Cst+Cost,
    best_f(Next_node, End, [Next_node|Visited], Path, MinCost).

bestFS(Begin,End,Path) :- best_f( Begin, End, [Begin], Path, 0).
```

- OUTPUT SCREENSHOTS

```
| ?- consult('RoadRoute.pl').
compiling /Users/yuktigoswami/Desktop/AI-A2-Yukti-Goswami-MT21109/RoadRoute.pl f
or byte code...
/Users/yuktigoswami/Desktop/AI-A2-Yukti-Goswami-MT21109/RoadRoute.pl:18-20: warn
ing: singleton variables [C0] for next_node/5
/Users/yuktigoswami/Desktop/AI-A2-Yukti-Goswami-MT21109/RoadRoute.pl compiled, 3
123 lines read - 513893 bytes written, 166 ms

(66 ms) yes
| ?- dfs('Pune', 'Surat', D, P).

D = 27922
P = ['Pune','Ahmedabad','Bangalore','Bhubaneshwar','Bombay','Calcutta','Chandiga
rh','Cochin','Delhi','Hyderabad','Indore','Jaipur','Kanpur','Lucknow','Madras','
Nagpur','Nasik','Panjim','Patna','Pondicherry','Surat'] ?

(2 ms) yes
| ?-
```

```
| ?- bestFS('Agra', 'Amritsar', P).
Cost: 645

Agra -> Delhi -> Amritsar ->  Destination Reached.!


P = ['Agra','Delhi','Amritsar'] ?
```