

The Generate_Heuristics.pl file generates heuristics.

The Generate_Distances.pl file creates rules from the converted .pdf file.

Screenshots of the working program

Depth First Search -

Agartala - Ahmedabad.

```
warning: Singleton variables: []
Warning: /home/lenavo/Desktop/AI/Assignments/AI-A2-RounakSaraf-2018183/Script.pl:204:
Warning: Singleton variable in branch: Source
Warning: Singleton variable in branch: Destination
Welcome to SWI-Prolog (threaded, 64 bits, version 8.2.1)
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).

?- main.
Enter the option for Depth-First Search or Best-First Search (0 or 1)
|: 0.

Enter the city for Source:
|: agartala.

Enter the city for Destination:
|: ahmedabad.

The new open state is:
[ahmedabad,agartala]
[bangalore,agartala]
[bhubaneshwar,agartala]
[bombay,agartala]
[calcutta,agartala]
[chandigarh,agartala]
[cochin,agartala]
[delhi,agartala]
[hyderabad,agartala]
[indore,agartala]
[jaipur,agartala]
[kanpur,agartala]
[lucknow,agartala]
[madras,agartala]
[nagpur,agartala]
[nasik,agartala]
[panjim,agartala]
[patna,agartala]
[pondicherry,agartala]
[pune,agartala]

The new closed state is:
[agartala,nil]

Goal Test is Passed
A Solution is Found!
The Total Depth First Search Cost is: 3305
agartala
ahmedabad
The Path cost between ahmedabad and agartala is: 3305
true .

?- 
```

Agartala - Hubli.

```
?- main.  
Enter the option for Depth-First Search or Best-First Search (0 or 1)  
|: 0.
```

```
Enter the city for Source:  
|: agartala.
```

```
Enter the city for Destination:  
|: hubli.
```

```
The new open state is:  
[ahmedabad,agartala]  
[bangalore,agartala]  
[bhubaneshwar,agartala]  
[bombay,agartala]  
[calcutta,agartala]  
[chandigarh,agartala]  
[cochin,agartala]  
[delhi,agartala]  
[hyderabad,agartala]  
[indore,agartala]  
[jaipur,agartala]  
[kanpur,agartala]  
[lucknow,agartala]  
[madras,agartala]  
[nagpur,agartala]  
[nasik,agartala]  
[panjim,agartala]  
[patna,agartala]  
[pondicherry,agartala]  
[pune,agartala]
```

```
The new closed state is:  
[agartala,nil]
```

```
The new open state is:  
[agra,ahmedabad]  
[allahabad,ahmedabad]  
[amritsar,ahmedabad]  
[asansol,ahmedabad]  
[baroda,ahmedabad]  
[bhopal,ahmedabad]  
[calicut,ahmedabad]  
[coimbatore,ahmedabad]  
[gwalior,ahmedabad]  
[hubli,ahmedabad]  
[imphal,ahmedabad]  
[jabalpur,ahmedabad]  
[jamshedpur,ahmedabad]  
[jullundur,ahmedabad]  
[kolhapur,ahmedabad]  
[ludhiana,ahmedabad]  
[madurai,ahmedabad]  
[meerut,ahmedabad]
```

```
[ludhiana,ahmedabad]
[madurai,ahmedabad]
[meerut,ahmedabad]
[ranchi,ahmedabad]
[shillong,ahmedabad]
[shimla,ahmedabad]
[surat,ahmedabad]
[trivandrum,ahmedabad]
[varanasi,ahmedabad]
[vijayawada,ahmedabad]
[vishakapatnam,ahmedabad]
[bangalore,agartala]
[bhubaneshwar,agartala]
[bombay,agartala]
[calcutta,agartala]
[chandigarh,agartala]
[cochin,agartala]
[delhi,agartala]
[hyderabad,agartala]
[indore,agartala]
[jaipur,agartala]
[kanpur,agartala]
[lucknow,agartala]
[madras,agartala]
[nagpur,agartala]
[nasik,agartala]
[panjim,agartala]
[patna,agartala]
[pondicherry,agartala]
[pune,agartala]
```

The new closed state is:

```
[gwalior,ahmedabad]
[coimbatore,ahmedabad]
[calicut,ahmedabad]
[bhopal,ahmedabad]
[baroda,ahmedabad]
[asansol,ahmedabad]
[amritsar,ahmedabad]
[allahabad,ahmedabad]
[agra,ahmedabad]
[ahmedabad,agartala]
[agartala,nil]
```

Goal Test is Passed

A Solution is Found!

The Total Depth First Search Cost is: 4406

agartala

ahmedabad

The Path cost between ahmedabad and agartala is: 3305

hubli

The Path cost between hubli and ahmedabad is: 1101

true .

Best First Search - Agartala - Hubli.

```
?- main.  
Enter the option for Depth-First Search or Best-First Search (0 or 1)  
|: 1.  
  
Enter the city for Source:  
|: agartala.  
  
Enter the city for Destination:  
|: hubli.  
  
The new open state is:  
[panjim,agartala,1,169,170]  
[bangalore,agartala,1,371,372]  
[pune,agartala,1,409,410]  
[hyderabad,agartala,1,457,458]  
[bombay,agartala,1,591,592]  
[nasik,agartala,1,624,625]  
[pondicherry,agartala,1,629,630]  
[madras,agartala,1,661,662]  
[cochin,agartala,1,752,753]  
[nagpur,agartala,1,969,970]  
[jaipur,agartala,1,1031,1032]  
[indore,agartala,1,1033,1034]  
[ahmedabad,agartala,1,1079,1080]  
[bhubaneshwar,agartala,1,1600,1601]  
[kanpur,agartala,1,1749,1750]  
[lucknow,agartala,1,1831,1832]  
[delhi,agartala,1,1833,1834]  
[patna,agartala,1,1971,1972]  
[calcutta,agartala,1,2010,2011]  
[chandigarh,agartala,1,2072,2073]  
  
The new closed state is:  
[agartala,nil,0,3646,3646]  
  
The new open state is:  
[hubli,panjim,2,0,2]  
[bangalore,agartala,1,371,372]  
[pune,agartala,1,409,410]  
[kolhapur,panjim,2,412,414]  
[hyderabad,agartala,1,457,458]  
[bombay,agartala,1,591,592]  
[nasik,agartala,1,624,625]  
[pondicherry,agartala,1,629,630]  
[madras,agartala,1,661,662]  
[coimbatore,panjim,2,693,695]  
[vijayawada,panjim,2,724,726]  
[calicut,panjim,2,732,734]  
[cochin,agartala,1,752,753]  
[madurai,panjim,2,792,794]  
[surat,panjim,2,818,820]  
[trivandrum,panjim,2,943,945]  
[baroda,panjim,2,951,953]  
[nagpur,agartala,1,969,970]  
[jaipur,agartala,1,1031,1032]
```

```
[coimbatore,panjim,2,693,695]
[vijayawada,panjim,2,724,726]
[calicut,panjim,2,732,734]
[cochin,agartala,1,752,753]
[madurai,panjim,2,792,794]
[surat,panjim,2,818,820]
[trivandrum,panjim,2,943,945]
[baroda,panjim,2,951,953]
[nagpur,agartala,1,969,970]
[jaipur,agartala,1,1031,1032]
[indore,agartala,1,1033,1034]
[vishakapatnam,panjim,2,1055,1057]
[ahmedabad,agartala,1,1079,1080]
[jabalpur,panjim,2,1186,1188]
[bhopal,panjim,2,1211,1213]
[agra,panjim,2,1258,1260]
[meerut,panjim,2,1355,1357]
[gwalior,panjim,2,1381,1383]
[allahabad,panjim,2,1530,1532]
[ludhiana,panjim,2,1597,1599]
[bhubaneshwar,agartala,1,1600,1601]
[varanasi,panjim,2,1640,1642]
[shimla,panjim,2,1663,1665]
[amritsar,panjim,2,1727,1729]
[kanpur,agartala,1,1749,1750]
[shillong,panjim,2,1762,1764]
[ranchi,panjim,2,1782,1784]
[lucknow,agartala,1,1831,1832]
[delhi,agartala,1,1833,1834]
[jullundur,panjim,2,1918,1920]
[patna,agartala,1,1971,1972]
[jamshedpur,panjim,2,2008,2010]
[calcutta,agartala,1,2010,2011]
[chandigarh,agartala,1,2072,2073]
[asansol,panjim,2,2080,2082]
[imphal,panjim,2,3492,3494]
```

The new closed state is:

```
[panjim,agartala,1,169,170]
[agartala,nil,0,3646,3646]
```

Goal Test is Passed

The solution path is:

The Total Best First Search Path Cost is: 3697

The Total Heuristic Cost is: 3815

agartala

panjim

The Path cost between panjim and agartala is: 3507

The Heuristic cost between agartala and hubli is: 3646

hubli

The Path cost between hubli and panjim is: 190

The Heuristic cost between panjim and hubli is: 169

true