

STONY BROOK UNIVERSITY

CSE 537 – Artificial Intelligence

Assignment # 4

Submitted by:

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Introduction

Entailment in Propositional Logic

Propositional Logic is about facts, statements that are either true or false, nothing else. Each propositional variable stands for a fact about the world, values range {True,False}.

Minesniffer is a variant of the popular Minesweeper game. Every cell may potentially have a mine. If the mine count in a cell is lesser than the mines given around it, then our task is to find which ones out of the proposed mines are mines in actual.

Input grid - (Mentioned in cnf.txt)

3 3
2,X,X
X,X,3
2,3,X

Click here for [cnf.txt](#) -



We write the cnf clauses in [output.txt](#) and give that as the input to minisat to get our final output stating if it is SATISFIABLE or NOT.

Click here for [output.txt](#)



Output - SATISFIABLE

```
===== [ Problem Statistics ] =====
|
| Number of variables:      16
| Number of clauses:       8
| Parse time:              0.00 s
|
|===== [ Search Statistics ] =====
| Conflicts | ORIGINAL | LEARNT | Progress |
|           | Vars  Clauses Literals | Limit  Clauses Lit/Cl |
|=====
restarts      : 1
conflicts     : 0      (-nan /sec)
decisions     : 5      (0.00 % random) (inf /sec)
propagations  : 16     (inf /sec)
conflict literals : 0      (-nan % deleted)
Memory used   : 8.00 MB
CPU time      : 0 s

SATISFIABLE
```

Task in Prolog

The Missionaries and Cannibals Problem:

File to Run: - Q1AnshulAditi.P
Load the file - ?- ['Q1AnshulAditi.P'].
To run the file - ?- begin([3,3,left,0,0],[0,0,right,3,3]).

Output –

```
yes
1: ?- begin([3,3,left,0,0],[0,0,right,3,3]).

Boat moves left to right
Before move -> At Left = 3C & 3M ----- At Right = 0C & 0M
After move -> At Left = 1C & 3M ----- At Right = 2C & 0M
Boat moves right to left
Before move -> At Left = 1C & 3M ----- At Right = 2C & 0M
After move -> At Left = 3C & 3M ----- At Right = 0C & 0M
Boat moves left to right
Before move -> At Left = 3C & 3M ----- At Right = 0C & 0M
After move -> At Left = 2C & 2M ----- At Right = 1C & 1M
Boat moves right to left
Before move -> At Left = 2C & 2M ----- At Right = 1C & 1M
After move -> At Left = 2C & 3M ----- At Right = 1C & 0M
Boat moves left to right
Before move -> At Left = 2C & 3M ----- At Right = 1C & 0M
After move -> At Left = 0C & 3M ----- At Right = 3C & 0M
Boat moves right to left
Before move -> At Left = 0C & 3M ----- At Right = 3C & 0M
After move -> At Left = 1C & 3M ----- At Right = 2C & 0M
Boat moves left to right
Before move -> At Left = 1C & 3M ----- At Right = 2C & 0M
After move -> At Left = 1C & 1M ----- At Right = 2C & 2M
Boat moves right to left
Before move -> At Left = 1C & 1M ----- At Right = 2C & 2M
After move -> At Left = 2C & 2M ----- At Right = 1C & 1M
Boat moves left to right
Before move -> At Left = 2C & 2M ----- At Right = 1C & 1M
After move -> At Left = 2C & 0M ----- At Right = 1C & 3M
Boat moves right to left
Before move -> At Left = 2C & 0M ----- At Right = 1C & 3M
After move -> At Left = 3C & 0M ----- At Right = 0C & 3M
Boat moves left to right
Before move -> At Left = 3C & 0M ----- At Right = 0C & 3M
After move -> At Left = 1C & 0M ----- At Right = 2C & 3M
Boat moves right to left
Before move -> At Left = 1C & 0M ----- At Right = 2C & 3M
After move -> At Left = 1C & 1M ----- At Right = 2C & 2M
Boat moves left to right
Before move -> At Left = 1C & 1M ----- At Right = 2C & 2M
After move -> At Left = 0C & 0M ----- At Right = 3C & 3M

yes
1: ?-
```

The Assembly Problem:

File to Run: - Q2AnshulAditi.P
Load the file - ?- ['Q2AnshulAditi.P'].
To run the file - ?- test(true).

Output –

```
['Q2Anshul'].  
  
++Warning[XSB]: [Runtime/C] Redefining: member/2 from file C:\Users\Anshul\Desktop\XSB\bin\Q2Anshul.xwam; Previously defined from file C:\Users\Anshul\Desktop\XSB\bin\Q2AmanFinal.xwam  
[Q2Anshul loaded]  
  
yes  
1: ?- test(true).  
Size of board 3x3  
[-1,-2,3,4,][-4,1,4,-3,][-4,-3,2,4,]  
[2,-4,-3,4,][4,2,-3,-1,][2,-1,-4,3,]  
[-1,-2,3,2,][2,-1,-3,1,][-3,-2,1,4,]  
  
yes  
1: ?-
```

The Puzzling case of the water and zebra:

File to Run: - Q3AnshulAditi.P
Load the file - ?- ['Q3AnshulAditi.P'].
To run the file - ?- whoIswho(WaterDrinker,ZebraOwner).

Output –

```
esktop\XSB\bin\Q3AnshulAditi.xwam; Previously defined from file C:\Users\Anshul\Desktop\XSB\bin\Q3Anshul.xwam  
[Q3AnshulAditi loaded, cpu time used: 0.0310 seconds]  
  
yes  
1: ?- whoIswho(WaterDrinker,ZebraOwner).  
  
WaterDrinker = norwegian  
ZebraOwner = japanese  
yes  
1: ?-
```