

$$P(G_{\Delta} | O_{\Delta}, A_{\Delta}) = ?$$

var. assume - F, X

$$\begin{aligned} P(G_{\Delta} | O_{\Delta}, A_{\Delta}) &= \alpha \cdot \sum_f \sum_x P(G_{\Delta}, A_{\Delta}, f, O_{\Delta}, x) = \\ &= \alpha \cdot \sum_f \sum_x P(G_{\Delta}) \cdot P(A_{\Delta}) \cdot P(f | G_{\Delta}, A_{\Delta}) \cdot P(O_{\Delta} | f) \cdot P(x | f) \\ &= \alpha P(G_{\Delta}) P(A_{\Delta}) [P(F_{\Delta} | G_{\Delta}, A_{\Delta}) \cdot P(O_{\Delta} | F_{\Delta}) \cdot P(X_{\Delta} | F_{\Delta}) + \\ &\quad P(F_N | G_{\Delta}, A_{\Delta}) \cdot P(O_{\Delta} | F_N) \cdot P(X_{\Delta} | F_N) + \\ &\quad P(F_{\Delta} | G_{\Delta}, A_{\Delta}) \cdot P(O_{\Delta} | F_{\Delta}) \cdot P(X_N | F_{\Delta}) + \\ &\quad P(F_N | G_{\Delta}, A_{\Delta}) \cdot P(O_{\Delta} | F_N) \cdot P(X_N | F_N)] \\ &= \alpha \cdot 0,1 \cdot 0,05 \left[\begin{array}{l} 0,8 \cdot \frac{30}{0,6 \cdot 0,5} = \frac{240}{1000} = 0,24 \\ 0,2 \cdot 0,2 \cdot 0,1 = \frac{2}{1000} = 0,002 \\ 0,8 \cdot 0,6 \cdot 0,5 = 0,24 \\ 0,2 \cdot 0,2 \cdot 0,9 = \frac{36}{1000} = 0,036 \end{array} \right] \begin{array}{l} 0,48 \\ 0,04 \end{array} \\ &= \alpha \cdot 0,005 \cdot 0,52 \cdot 0,04 \\ &= \boxed{0,0026\alpha} \end{aligned}$$

$$\begin{aligned} P(G_N | O_{\Delta}, A_{\Delta}) &= \alpha \cdot \sum_f \sum_x P(G_N, A_{\Delta}, f, O_{\Delta}, x) = \\ &= \alpha \cdot \sum_f \sum_x P(G_N) \cdot P(A_{\Delta}) \cdot P(f | G_N, A_{\Delta}) \cdot P(O_{\Delta} | f) \cdot P(x | f) \\ &= \alpha P(G_N) P(A_{\Delta}) [P(F_{\Delta} | G_N, A_{\Delta}) \cdot P(O_{\Delta} | F_{\Delta}) \cdot P(X_{\Delta} | F_{\Delta}) + \\ &\quad P(F_N | G_N, A_{\Delta}) \cdot P(O_{\Delta} | F_N) \cdot P(X_{\Delta} | F_N) + \\ &\quad P(F_{\Delta} | G_N, A_{\Delta}) \cdot P(O_{\Delta} | F_{\Delta}) \cdot P(X_N | F_{\Delta}) + \\ &\quad P(F_N | G_N, A_{\Delta}) \cdot P(O_{\Delta} | F_N) \cdot P(X_N | F_N)] \\ &= \alpha \cdot 0,9 \cdot 0,05 \left(\begin{array}{l} 0,25 \cdot \frac{150}{0,6 \cdot 0,5} = \frac{750}{1000} = 0,75 \\ 0,75 \cdot 0,2 \cdot 0,1 = \frac{15}{1000} = 0,015 \\ 0,25 \cdot 0,6 \cdot 0,5 = \frac{75}{1000} = 0,075 \\ 0,75 \cdot \frac{150}{0,2 \cdot 0,9} = \frac{1875}{1000} = 1,875 \end{array} \right) \begin{array}{l} 0,15 \\ 0,15 \end{array} \\ &= 0,045\alpha \cdot 0,13 = 0,00585\alpha \end{aligned}$$

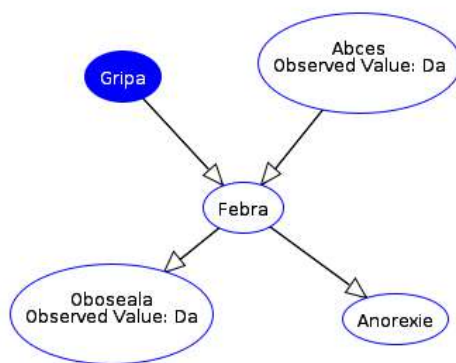
$$P_{\text{final}} = \frac{0,0026\alpha}{0,0026\alpha + 0,00585\alpha} = \frac{0,0026}{0,00845} = 0,3077$$

File Edit View Network Options Help

Make Observation Query P(e) Query Toggle Monitoring Select View Probability Table View/Modify Decision Add No-forgetting Arcs Optimize Decisions Independence Quiz

Create Solve

Click on a node to query its probability or utility.



Query Results

Query Results for Variable Gripe [Abces=Da] [Oboseala=Da]

 $P(\text{Gripe} = \text{Da}) = 0.10744$ $P(\text{Gripe} = \text{Nu}) = 0.89256$

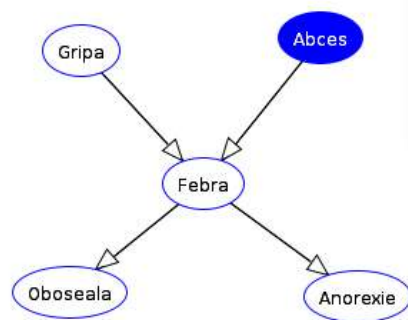
OK

File Edit View Network Options Help

Create Node Create Arc Select Delete Set Properties Modify Probability Table

Create Solve

Click on a regular node to change its probability table.



Probability Table for Abces

	$P(\text{Abces}=\text{Da})$	$P(\text{Abces}=\text{Nu})$
Prior Probability	0.05	0.95

Observed value : Da

OK

Cancel

Belief and Decision Network Tool Version 5.1.10 --- untitled.xml

File Edit View Network Options Help

Create Node

Create Arc

Select

Delete

Set Properties

Modify Probability Table

Create Solve

Click on a regular node to change its probability table.

Gripa

Abces

Febra

Oboseala

Anorexie

Probability Table for Anorexie

Febra	$P(\text{Anorexie}=T)$	$P(\text{Anorexie}=F)$
Da	0.5	0.5
Nu	0.1	0.9

No observed value for this node.

OK

Cancel

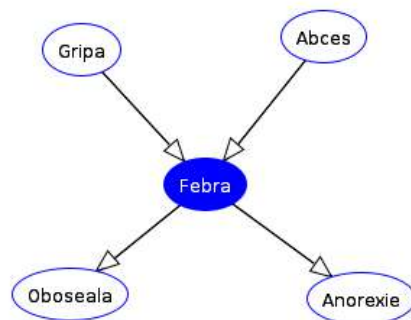
Belief Network Mode

File Edit View Network Options Help



Create Solve

Click on a regular node to change its probability table.



Probability Table for Febra

Abces	Gripe	$P(\text{Febra}=\text{Da})$	$P(\text{Febra}=\text{Nu})$
Da	Da	0.8	0.2
Da	Nu	0.7	0.3
Nu	Da	0.25	0.75
Nu	Nu	0.05	0.95

No observed value for this node.

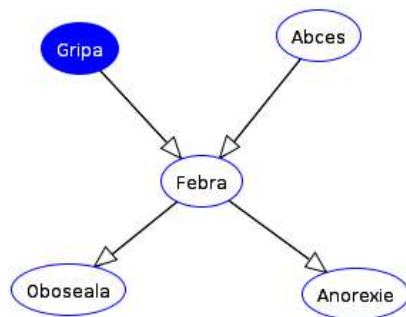
OK Cancel

File Edit View Network Options Help

Create Node Create Arc Select Delete Set Properties Modify Probability Table

Create Solve

Click on a regular node to change its probability table.



Probability Table for Gripa x

	$P(\text{Gripa}=\text{Da})$	$P(\text{Gripa}=\text{Nu})$
Prior Probability	<input type="text" value="0.1"/>	<input type="text" value="0.9"/>

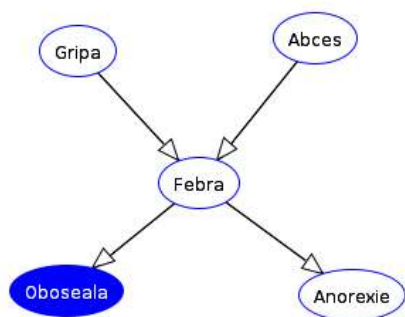
No observed value for this node.

File Edit View Network Options Help



Create Solve

Click on a regular node to change its probability table.



Probability Table for Oboseala x

Febra	$P(Oboseala=Da)$	$P(Oboseala=Nu)$
Da	<input type="text" value="0.6"/>	<input type="text" value="0.4"/>
Nu	<input type="text" value="0.2"/>	<input type="text" value="0.8"/>

Observed value : Da

Belief and Decision Network Tool Version 5.1.10 --- Instance.xml

File Edit View Network Options Help

Make Observation Query Plot Query Toggle Monitoring Select View Probability Table View/Modify Decision Add/Remove Nodes Optimize Decisions Independence Quiz

Create Solve

Click on a node to make an observation about its value.

Inspecting Factors

Click on a value to see its derivation or select a new factor to inspect it.

Reorder Variable Columns

Febra	Anorexia	Value
Da	T	0.5
Da	F	0.5
Nu	T	0.1
Nu	F	0.9

This factor represents $P(\text{Anorexia} \mid \text{Febra})$.

OK

Querying Node Febra

Start by choosing whether or not to prune all irrelevant variables.

Current Factors:

- f1(Gripe)
- f1(Abces)
- f2(Gripe, Abces, Febra)
- f3(Febra, Obeseala)
- f4(Febra, Anorexia)

Eliminated Factors:

1) Prune Irrelevant Variables:

Yes No

2) Project Observations:

Project Observations

3) Sum Out Variables:

Heuristic: Minimize

Sum Out Next

Automatically Sum Out

Apply Final Factors

Size:

Finalize Final Factor

Close Reset Query Undo Elimination Order

Belief and Decision Network Tool Version 5.1.10 --- instance.xml

File Edit View Network Options Help

Make Observation Query P(e) Query Toggle Monitoring Select View Probability Table View/Modify Decision Add/Remove/Relabel Node Optimize Decisions Independence Query

Create Solve

Click on a node to make an observation about its value.

Obeseala

Da	0.30	■
Nu	0.70	■

Anorexia

T	0.20	■
F	0.80	■

Inspecting Factors

Click on a value to see its derivation or select a new factor to inspect it.

Reorder Variable Columns Inspecting Factor [3]Febra, Obeseala

Febra	Obeseala	Value
Da	Da	0.6
Da	Nu	0.4
Nu	Da	0.2
Nu	Nu	0.8

This factor represents $P(\text{Obeseala} \mid \text{Febra})$.

OK

Querying Node Febra

Start by choosing whether or not to prune all irrelevant variables.

Click on a factor to inspect it.

Current Factors:

- f0(Gripe)
- f1(Abces)
- f2(Gripe, Abces, Febra)
- f3(Febra, Obeseala)
- f4(Febra, Anorexia)

Eliminated Factors:

1) Prune Irrelevant Variables:

Yes No

2) Project Observations:

Project Observations

3) Sum Out Variables:

Heuristic: MinFill

Sum Out Next

Automatically Sum Out

Close Reset Query Undo Elimination Order

Belief and Decision Network Tool Version 5.1.10 ---- Instance.xml

File Edit View Network Options Help

Make Observation Query Plot Query Toggle Monitoring Select View Probability Table View Model Decision Add Not-Forgetting Arcs Synthesize Decision Independence Quiz

Create Solve

Click on a node to make an observation about its value.

```
graph TD; Gripa((Gripa  
Observed Value: Da)) --> Febra((Febra)); Abces((Abces  
Observed Value: Nu)) --> Febra; Febra --> Obeseala((Obeseala)); Febra --> Anorexia((Anorexia));
```

Query Results

Query Results for Variable Febra [Gripa=Da] [Abces=Nu]

$P(\text{Febra} = \text{Da}) = 0.25$

$P(\text{Febra} = \text{Nu}) = 0.75$

OK

Querying Node Febra

Press "Reset Query" to start a new query.
Maximum Encountered Factor Size: 8

Click on a factor to inspect it.
Current Factors:
Answer: $f_6(\text{Febra})$

Eliminated Factors:

- $f_0(\text{Gripa})$
- $f_1(\text{Abces})$
- $f_3(\text{Febra}, \text{Obeseala})$
- $f_4(\text{Febra}, \text{Anorexia})$
- $f_2(\text{Gripa}, \text{Abces}, \text{Febra})$
- $f_5(\text{Abces}, \text{Febra})$

1) Prune Irrelevant Variables:
Irrelevant Variables Pruned

2) Project Observations:
Observations Projected

3) Sum Out Variables:
Heuristic:
No Variables Eliminated
Automatically Sum Out

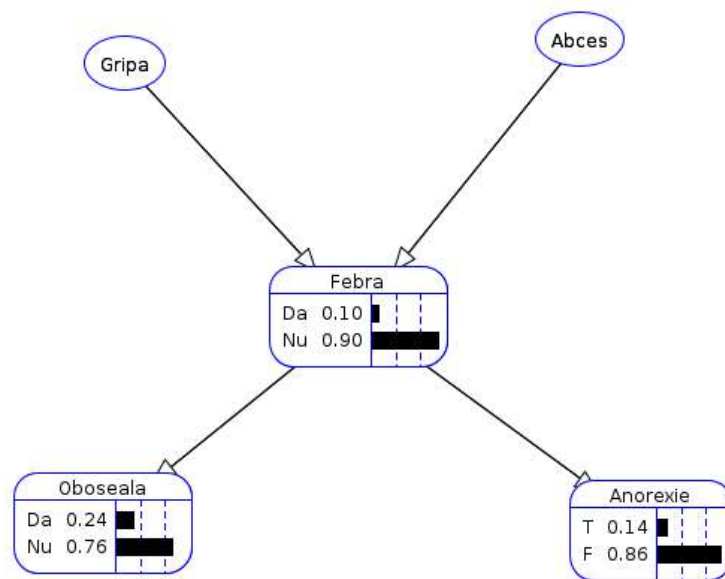
4) Multiply:
No Multiplication Needed

5) Normalize:
No Normalization Needed

Close Reset Query Undo Elimination Order

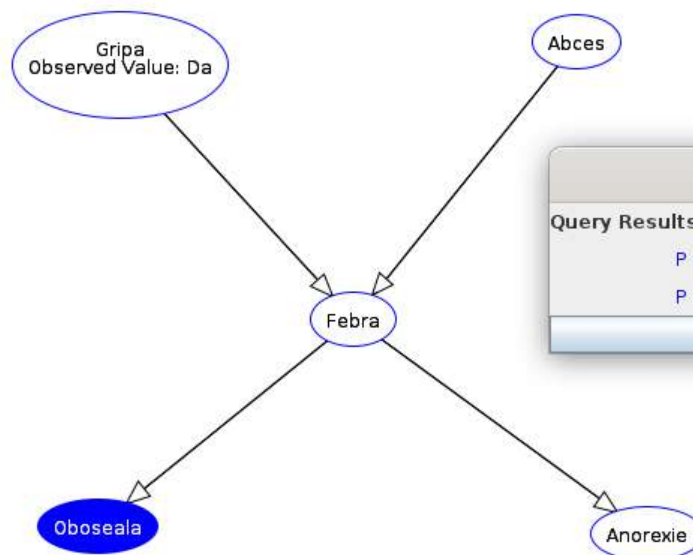
Belief Network Mode

Click on an entity and drag the mouse to move it.





Click on a node to query its probability or utility.



Query Results		x	
Query Results for Variable Oboseala [Gripa=Da]			
P (Oboseala = Da)		= 0.311	
P (Oboseala = Nu)		= 0.689	
		OK	

Querying Node Oboseala

Click on a factor to inspect it

Current Factors:

f3(Febra, Oboseala)

Eliminated Factors:

f0(Gripa)
f1(Abces)
f2(Gripa, Abces, Febra)
f4(Febra, Anorexie)

1) Prune Irrelevant Variables:

Irrelevant Variables Pruned

2) Project Observations:

Project Observations

3) Sum Out Variables:

Heuristic:

Sum Out Next

Automatically Sum Out

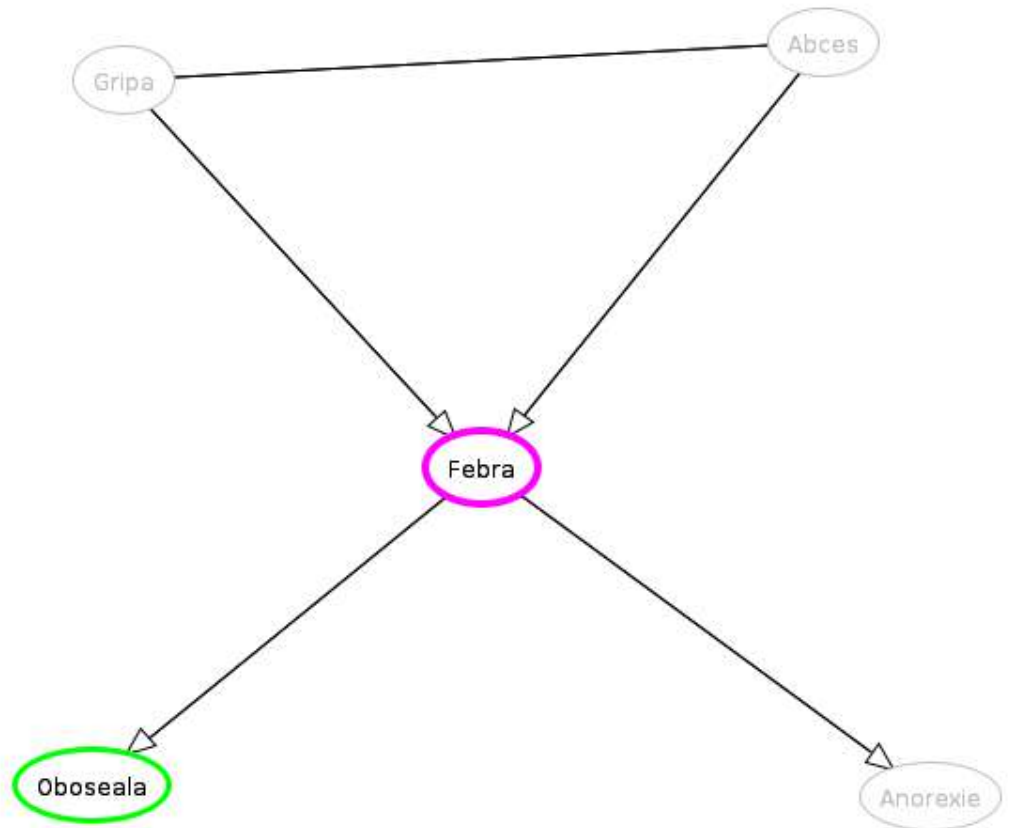
4) Multiply:

Multiply Final Factors

5) Normalize:

Normalize Final Factor

Project observations by clicking on an observed node or by pressing "Project Observations".



Close

Reset Query

Undo

Elimination Order

Make Observation Query

Create Solve

Querying Node Oboseala

Click on a factor to inspect it
Current Factors:
Answer: f5(Oboseala)

Press "Reset Query" to start a new query.
Maximum Encountered Factor Size: 8

Eliminated Factors:
f0(Gripa)
f1(Abces)
f2(Gripa, Abces, Febra)
f4(Febra, Anorexie)
f3(Febra, Oboseala)

1) Pr
In
2) Pr
3) St
Heuristic:

No Variables Eliminated
Automatically Sum Out

4) Multiply:
No Multiplication Needed

5) Normalize:
No Normalization Needed

Query Results

Query Results for Variable Oboseala [Gripa=Da] [Febr=Nu]

$P(Oboseala = Da) = 0.2$
 $P(Oboseala = Nu) = 0.8$

OK

No Variables Eliminated
Automatically Sum Out

4) Multiply:
No Multiplication Needed

5) Normalize:
No Normalization Needed

Close Reset Query Undo Elimination Order

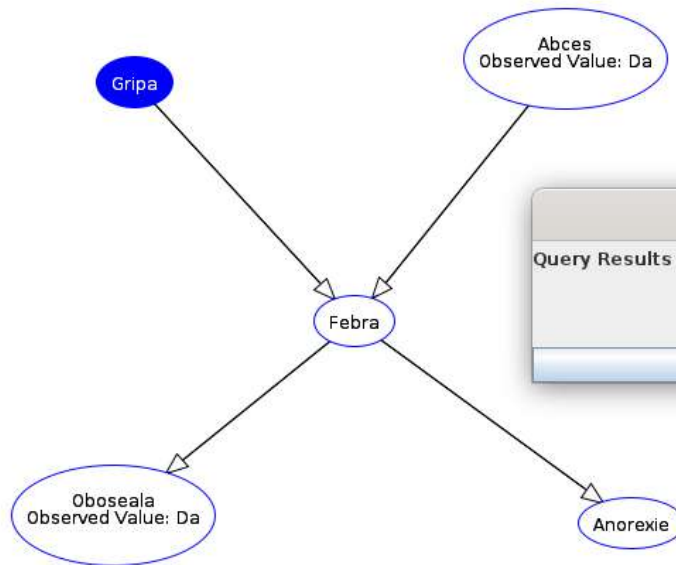
```
graph TD; Gripa((Gripa)) --- Abces((Abces)); Gripa((Gripa)) --- Febra((Febr)); Abces((Abces)) --- Febra((Febr)); Febra((Febr)) --- Oboseala((Oboseala)); Febra((Febr)) --- Anorexie((Anorexie));
```

File Edit View Network Options Help

Make Observation Query P(e) Query Toggle Monitoring Select View Probability Table View/Modify Decision Add No-forgetting Arcs Optimize Decisions Independence Quiz

Create Solve

Click on a node to query its probability or utility.



Query Results
Query Results for Variable Gripe [Abces=Da] [Oboseala=Da]
$P(\text{Gripe} = \text{Da}) = 0.16149$
$P(\text{Gripe} = \text{Nu}) = 0.83851$
OK

Belief Network Mode