

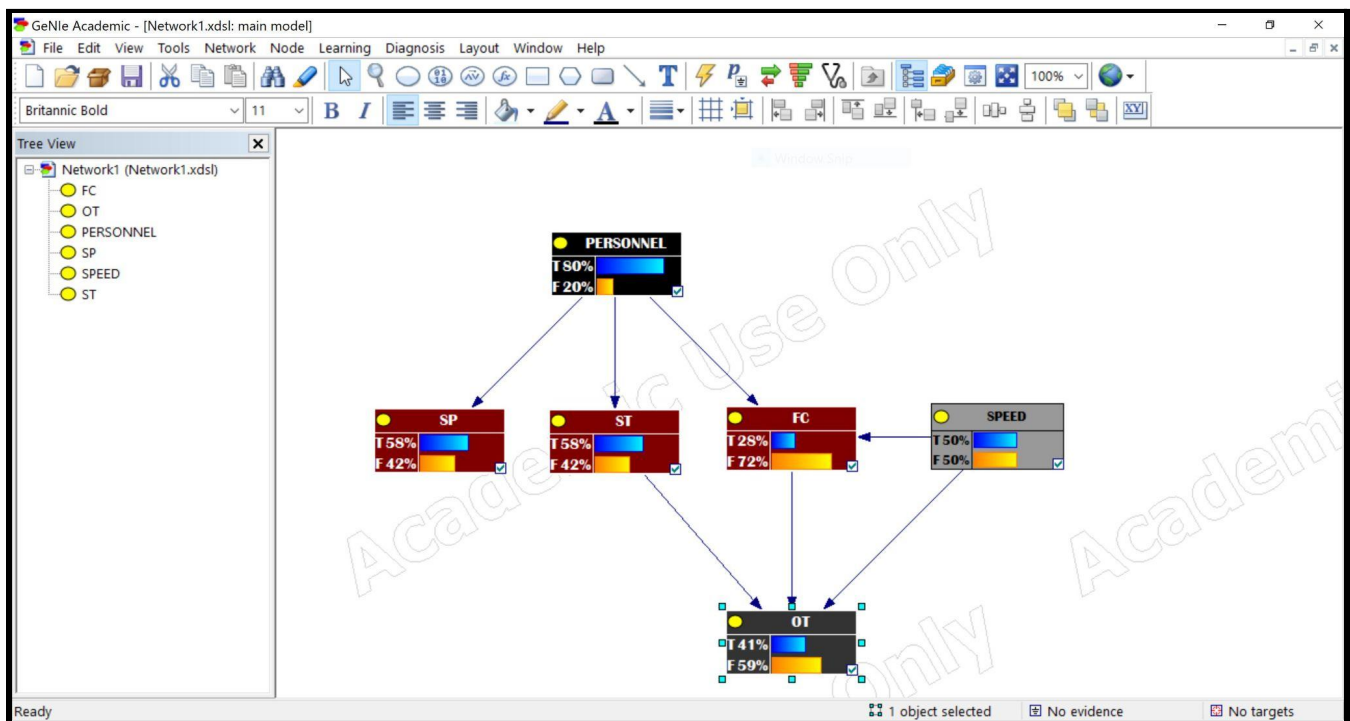
BAYESIAN NETWORK WITH GENIE

OBJECTIVE

Design a Bayesian network using the software Genie and to determine the Joint Probability Distributions for the variables of a given Probabilistic Model.

The Network

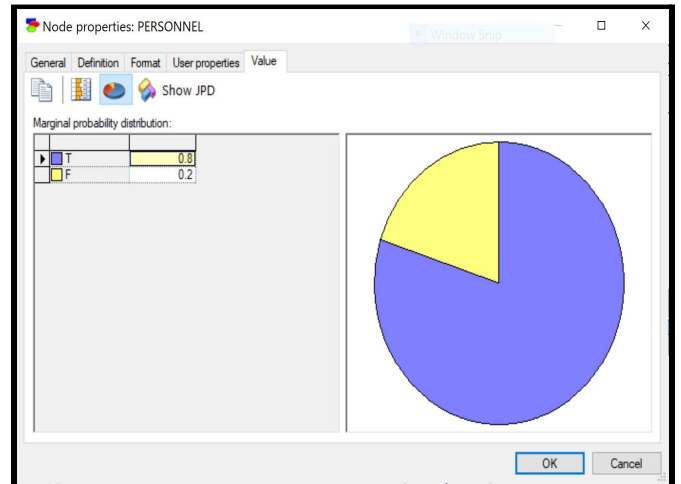
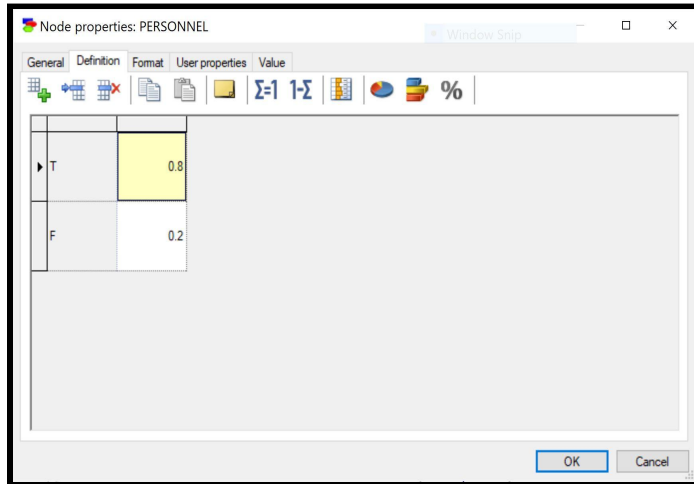
The Bayesian Network constructed using the given probabilistic model in the Assignment. Since all the attributes are Boolean, each attribute has only two probabilities, namely TRUE & FALSE. Overall probabilities of each Attribute are displayed in the form of a barchart.



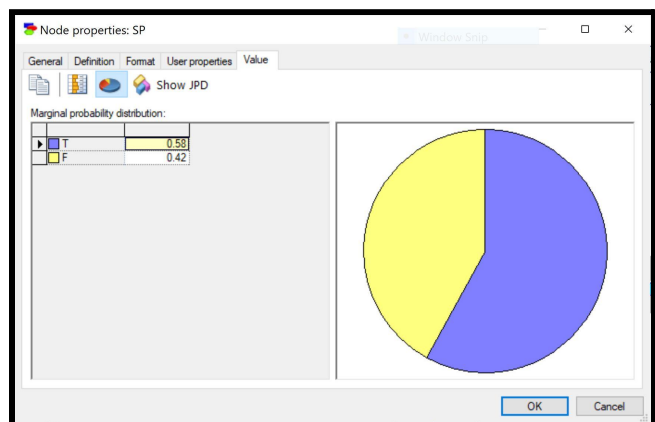
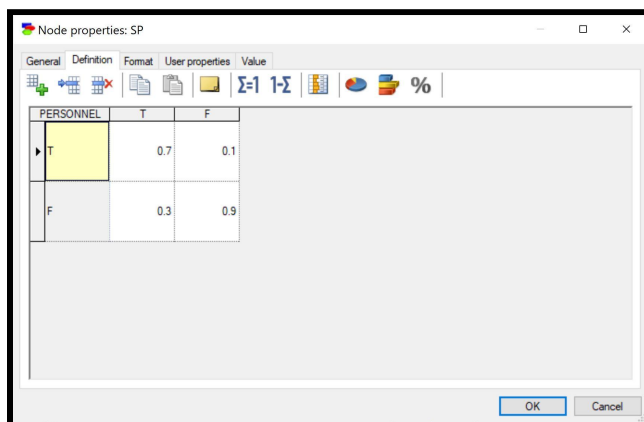
Attribute Probability Distributions

On the left are the Probability Distributions of the Attributes and on the right is the Pie Chart showing the overall probabilities.

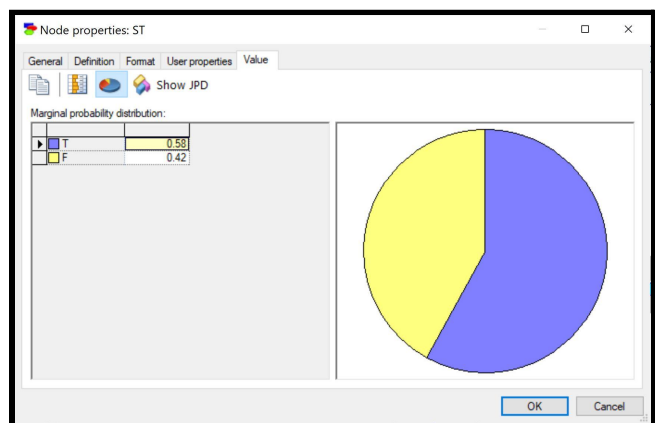
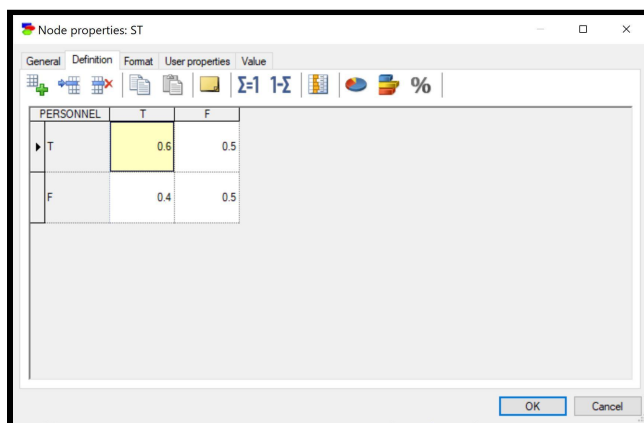
Personnel



See Personnel



Slow Traffic



Fine Chit

Node properties: FC

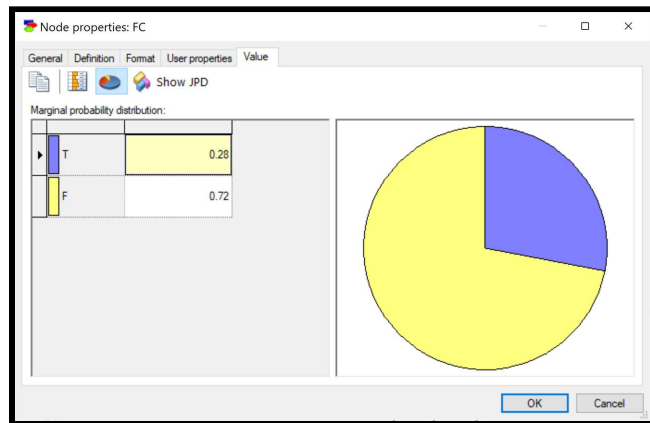
General Definition Format User properties Value

PERSONNEL ☐ T ☐ F

SPEED ☐ T ☐ F ☐ T ☐ F

T	0.4	0.2	0.2	0.2
F	0.6	0.8	0.8	0.8

OK Cancel



On Time

Node properties: OT

General Definition Format User properties Value

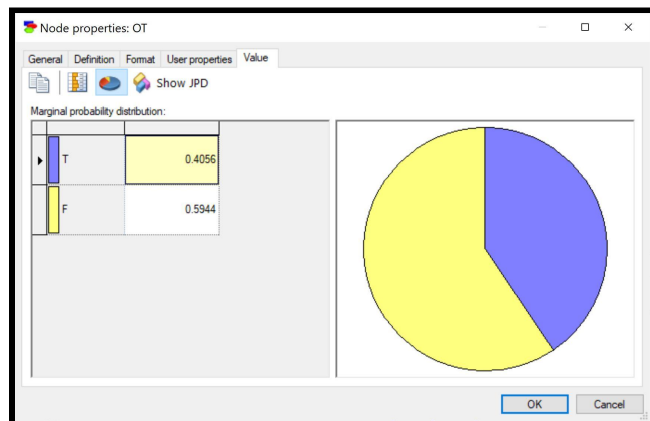
ST ☐ T ☐ F

FC ☐ T ☐ F ☐ T ☐ F

SPEED ☐ T ☐ F ☐ T ☐ F ☐ T ☐ F ☐ T ☐ F

T	0.1	0.1	0.7	0.3	0.1	0.1	0.7	0.5
F	0.9	0.9	0.3	0.7	0.9	0.9	0.3	0.5

OK Cancel

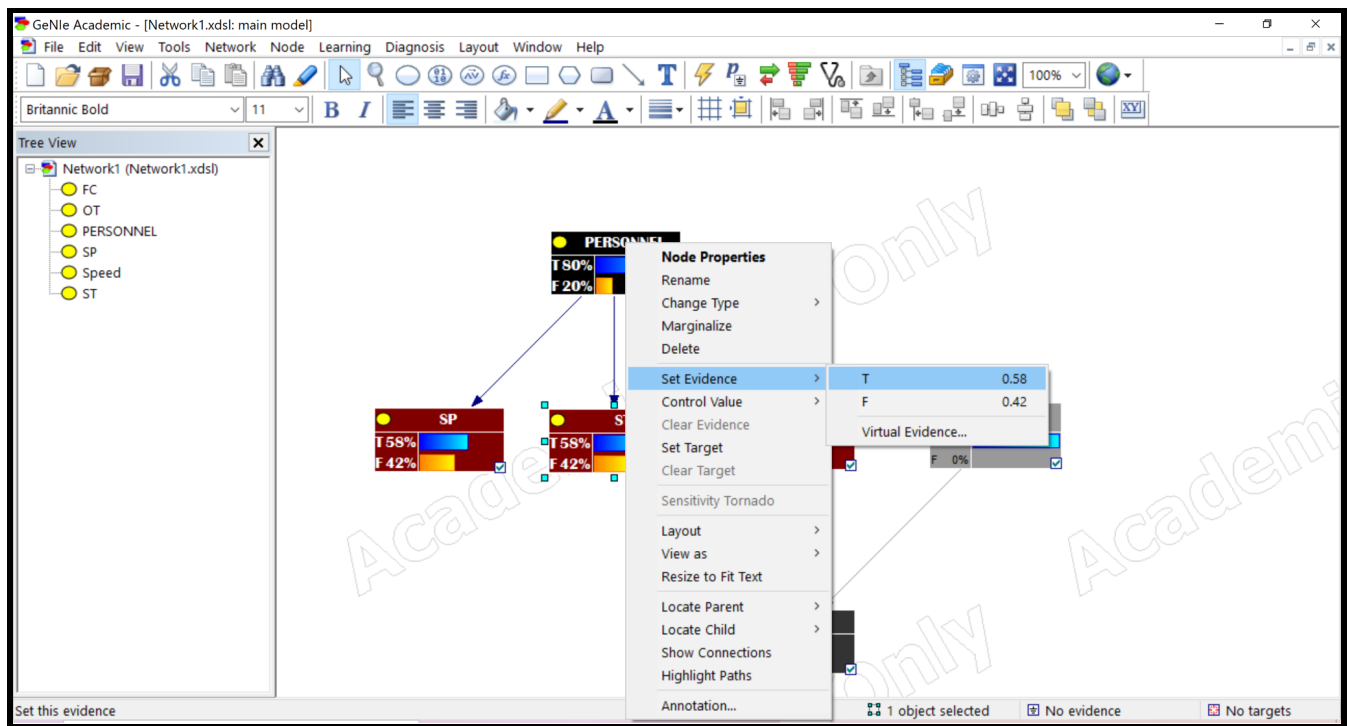


2a. Set Slow Traffic to True using the option Set Evidence

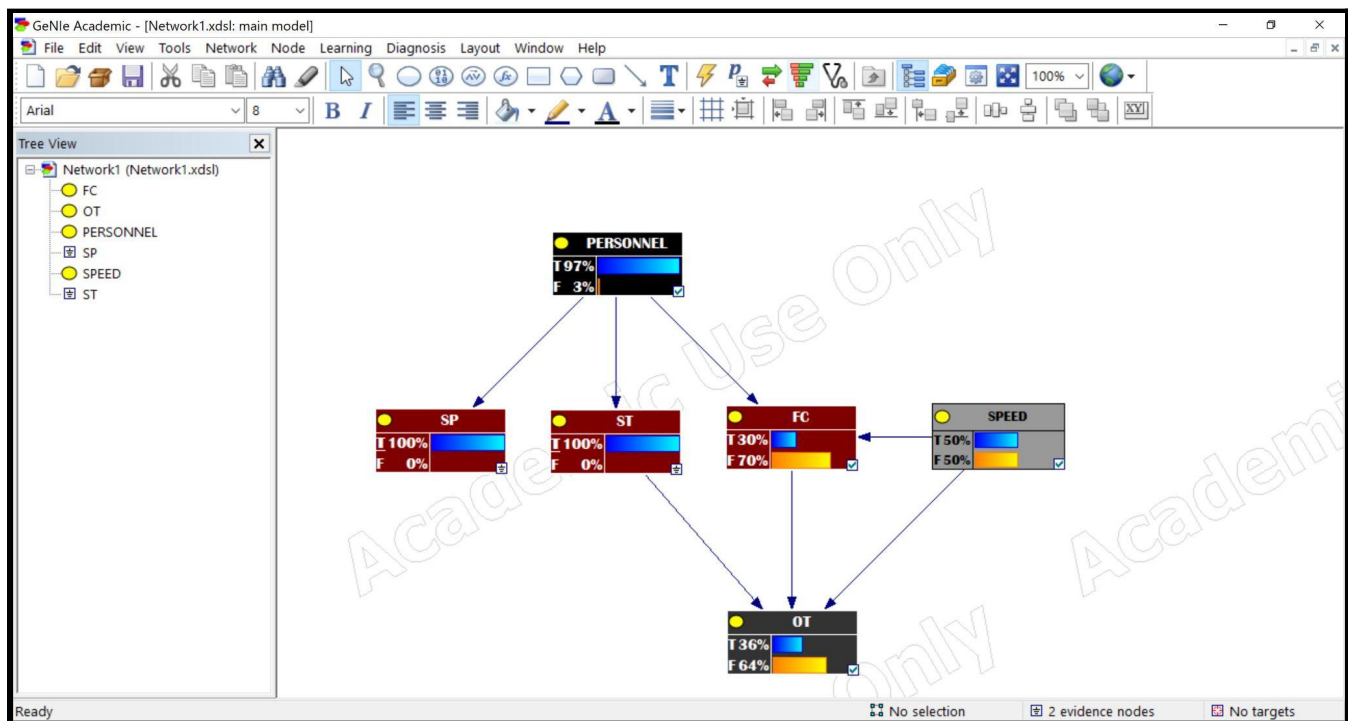
Right Click on the node Slow Traffic and go to Set Evidence -> T

Same goes for See Personnel.

With this the Probabilities of the other nodes will be altered accordingly.



Altered Probabilities

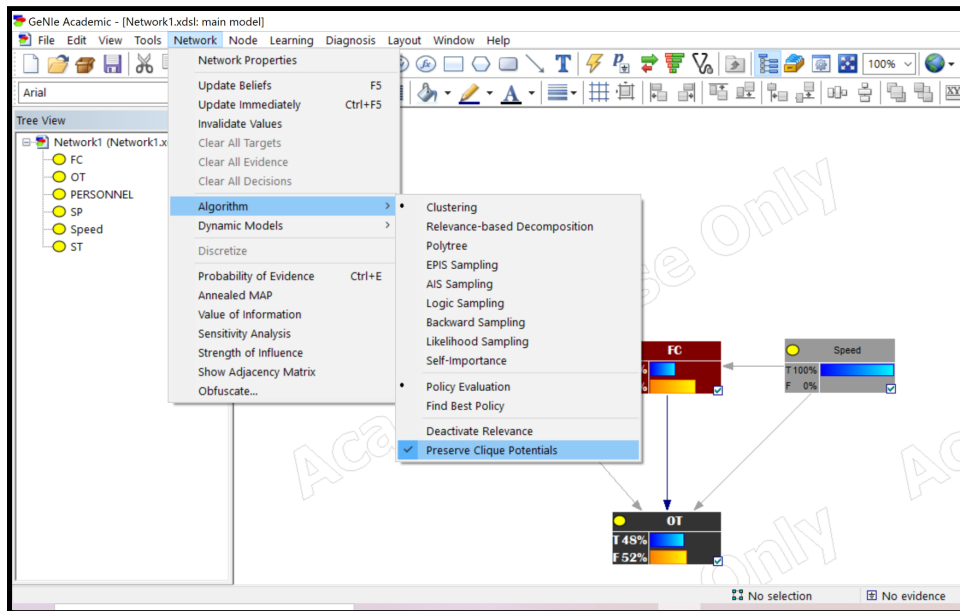


JOINT PROBABILITY DISTRIBUTIONS

Enabling “Preserve Clique Potentials”

In order to display Joint Probability distributions for a given Set of Attributes, we need to do the following:

Network → Algorithms → Enable “Preserve Clique Potentials”



Effect of Personnel on Fine Chit

Case 1: Slow Traffic is set to True and so is See Personnel

Node properties: FC

General Definition Format User properties Value

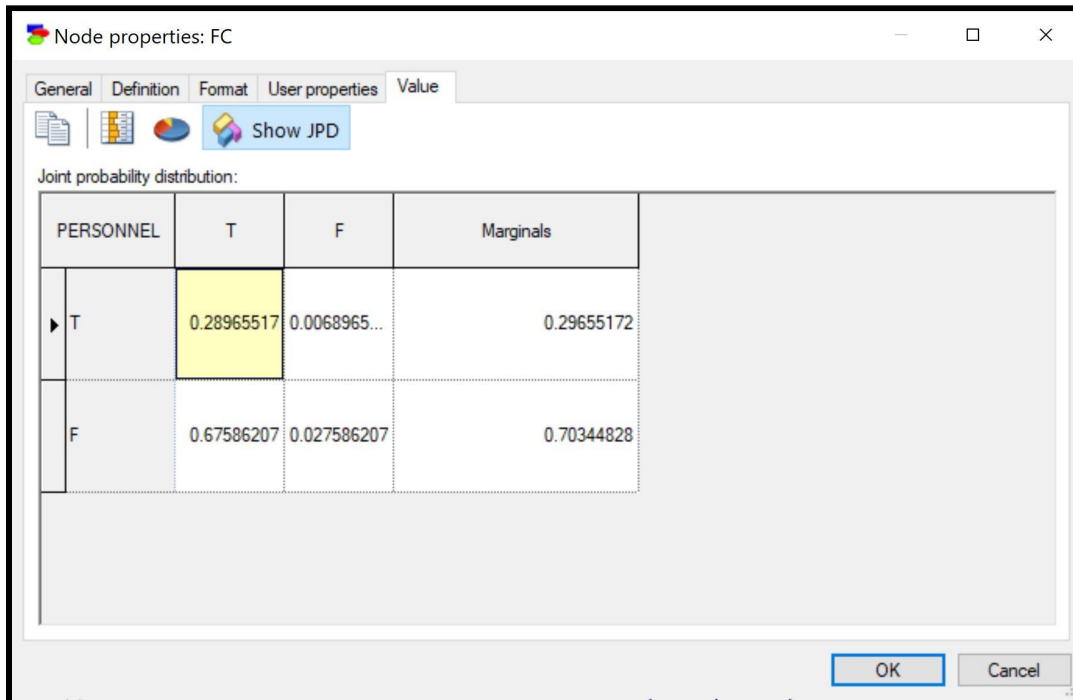
Show JPD

Joint probability distribution:

PERSONNEL	T	F	Marginals
T	0.29132948	0.0057803...	0.29710983
F	0.67976879	0.023121387	0.70289017

OK Cancel

Case 2: Slow Traffic in normal conditions



Node properties: FC

General Definition Format User properties Value

Show JPD

Joint probability distribution:

PERSONNEL	T	F	Marginals
T	0.28965517	0.0068965...	0.29655172
F	0.67586207	0.027586207	0.70344828

OK Cancel

NOTE: The variable set for determining above Probability distributions is { Personnel, Slow Traffic, Speed}

JPD of On Time, provided Slow Traffic is True

Variable Set Considered: {FC, Speed, Slow Traffic set Constant, See Personnel Set Constant}

Node properties: OT

General Definition Format User properties Value

Show JPD

Joint probability distribution:





FC	T	F	Marginals	
SPEED	T	F	T	F
T	0.019710983	0.01	0.21202312	0.12
F	0.17739884	0.09	0.090867052	0.28

OK Cancel

JPD of On Time in normal conditions

Node properties: OT

GeneralDefinitionFormatUser propertiesValue

 Show JPD

Joint probability distribution:

FC		T				F				Marginals
SPEED	ST	T		F		T		F		
		T	F	T	F	T	F	T	F	
▶ T		0.0106	0.0074	0.0058	0.0042	0.1288	0.0952	0.0696	0.084	0.4056
F		0.0954	0.0666	0.0522	0.0378	0.0552	0.0408	0.1624	0.084	0.5944

OKCancel