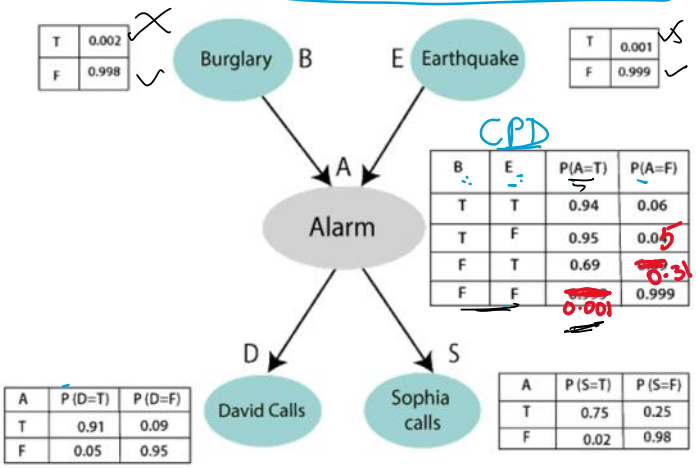
Bayesian Network

23 June 2023 19:58

1. Random Variables
2. Dependencies
3. Conditional Prob. Distribution (CPD)

- Harry, installed a new burglar alarm
- This b alarm, responds to robbery but also responds to earthquakes
- Harry neighbours, David & Sophia will inform Harry if alarm rings
- David calls Harry on Alarm, but sometimes gets confused with his phone ringing
- Sophia listens to music & sometimes does not hear the Alarm



T	0.002
F	0.998

T	0.001
F	0.999

CPD

B	E	P(A=T)	P(A=F)
T	T	0.94	0.06
T	F	0.95	0.05
F	T	0.69	0.31
F	F	0.001	0.999

A	P (D=T)	P (D=F)
T	0.91	0.09
F	0.05	0.95

A	P (S=T)	P (S=F)
T	0.75	0.25
F	0.02	0.98

Problem:
- Calculate the probability that the alarm has sounded
- But, no burglary & no_earthquake happened
- And both David & Sophia call Harry

Joint Probability distributions

$P(S, D, A, \neg B, \neg E) = P(S|A) * P(D|A) * P(A|\neg B, \neg E) * P(\neg B) * P(\neg E)$

$= 0.75 * 0.91 * 0.001 * 0.998 * 0.999$

$= 0.000680045$

Prof. Patrick Winston, MIT } BAI

H/W:
- Burglary happens, Earth quake not happ
- Alarm rings
- Neither David nor Sophia call Harry

$P(S=F, H=F, A=T, B=T, E=F) =$