Technische Universität München

Exercises for the Lecture

Techniques in Artificial Intelligence

18.1.2013 – Sheet 3
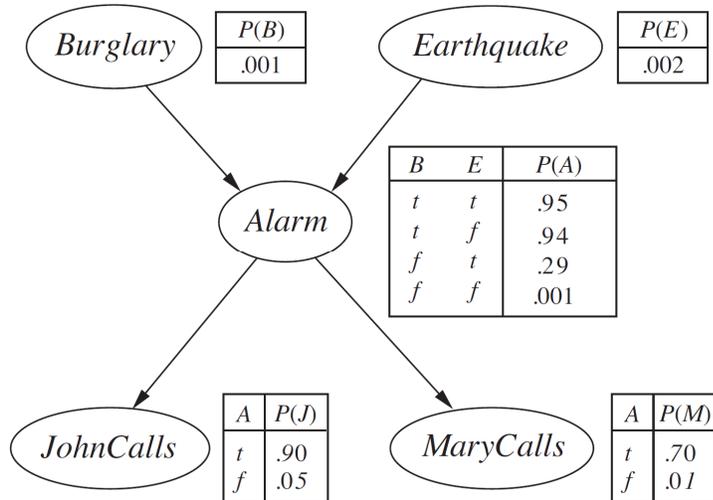
1) Bayesian Networks I

Based on two simple weather parameters, clear or cloudy sky, and rising for falling barometer, perceived in the morning, the weather in the afternoon (dry or rainy) shall be predicted. For the prediction based on classical probability, a complete joint probability distribution is needed as given in the following table:

Morning		Afternoon	Probability
X1: sky	X2: barometer	X3: rain?	P(X1,X2,X3)
Clear	Rising	Dry	0.40
Clear	Rising	Rain	0.07
Clear	Falling	Dry	0.08
Clear	Falling	Rain	0.10
Cloudy	Rising	Dry	0.09
Cloudy	Rising	Rain	0.11
Cloudy	Falling	dry	0.03

a)   How many events for the three variables exist for this joint probability distribution?

b)   Calculate P(X3=dry | X1=clear, X2=rising)

c)   Calculate P(X3=rain | X1=cloudy)

d)   What would you do, if the lowest row in the table is not given?

2) Bayesian Networks II

Consider the burglary/earthquake example from the lecture

	P(B)
Burglary	.001

	P(E)
Earthquake	.002

B	E	P(A)
t	t	.95
t	f	.94
f	t	.29
f	f	.001

Alarm

A	P(J)
t	.90
f	.05

JohnCalls

A	P(M)
t	.70
f	.01

MaryCalls

a) Calculate the missing unconditioned probabilities P(A), P(J), P(M)

b) Calculate P(J|A)

c) Calculate P(J|B)

d) Calculate P(B|J)

e) Calculate P(A|J,M)