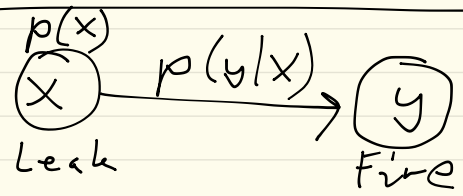


SAMBA ITT1
FINN LINDGRÖN
2015-01-26

BAYESIAN NETWORK THEORY

Bayesian Networks; Exploiting conditional indep.

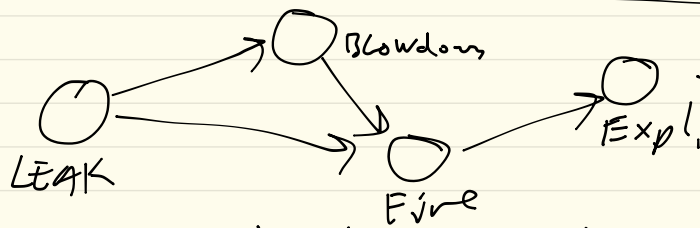
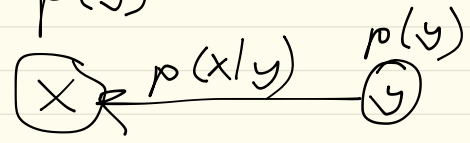
$p(x)$
 $p(y|x)$ Conditional distr
 $p(x,y)$ Joint prob



$$p(y) = \sum_x p(x,y) = \sum_x p(x)p(y|x)$$

Bayes formula:

$$p(x|y) = \frac{p(x,y)}{p(y)} = \frac{p(x)p(y|x)}{p(y)}$$

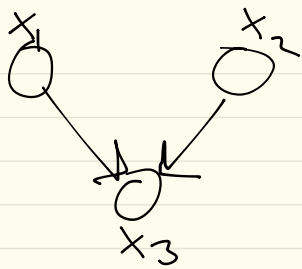


Directed Acyclic Graph

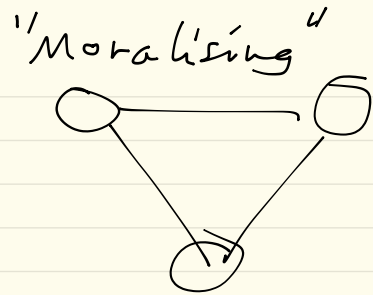
$Par(i) = \{j \mid \text{node } i \text{ depends directly on } j\}$

$$p(\{x_i\}) = \prod_i p(x_i | x_{Par(i)})$$

$$p(x_i | x_j, j \neq i) = \text{const.} \cdot p(x_i | x_{Par(i)}) \prod_{j: i \in Par(j)} p(x_j | x_{Par(j)})$$



$$p(x_2 | x_1, x_3)$$



Undirected graph
with neighbourhoods
 N_i

Markov property:

$$p(x_i | x_{j \neq i}) = p(x_i | x_j, j \in N_i)$$