

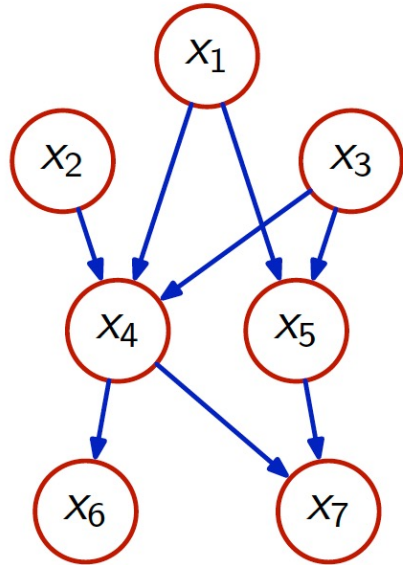
ARTIFICIAL INTELLIGENCE & CYBER SECURITY

BAYESIAN NETWORKS

Example

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Example



7 random variables

Joint probability is $P(x_1, x_2, \dots, x_7)$

The graph implies

$$P(x_1 \dots x_7) = \prod_{i=1}^7 p(x_i | \text{Parents}(x_i))$$

$$P(x_1 \dots x_7) = P(x_1) P(x_2) P(x_3) P(x_4 | x_1, x_2, x_3) P(x_5 | x_1, x_3) P(x_6 | x_4) P(x_7 | x_4, x_5)$$

In general, $2^7 - 1 = 127$ parameters for binary variables.

With this network: $1 + 1 + 1 + 8 + 4 + 2 + 4 = 21$