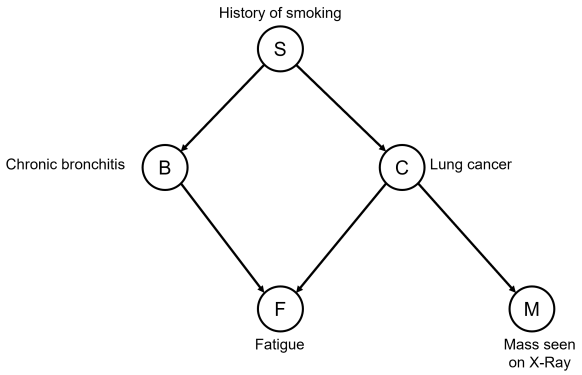
CSCD84: Artificial Intelligence

Worksheet: Bayesian Network

Q1

Consider the following Bayes Network. In this network, S = Smoker, B = Bronchitis, F = Fatigue, C = Lung Cancer, and M = Mass Detected.



(a) Write down the product decomposition of $\mathbb{P}(S, B, F, C, M)$ specified by this network.

(b) What is the elimination width of the ordering M, C, S, B, F (*i.e.*, first eliminating M, followed by C, etc)? elimination width of an ordering is defined as the maximum dimension of the factors generated by a given ordering.

(c) What is the elimination width of the ordering C, M, S, B, F?

(d) Which one of the two ordering is better to use when performing variable elimination?

Q2

In the following network determine if A and E are independent given the evidence

(a) A and E given no evidence?

(b) A and E given C?

(c) A and E given G,C?

(d) A and E given G,C,H?

(e) A and E given G,F?

(f) A and E given F,D?

(g) A and E given F,D,H?

(h) A and E given B?

(i) A and E given H,B?

(j) A and E given G,C,D,H,D,F,B?