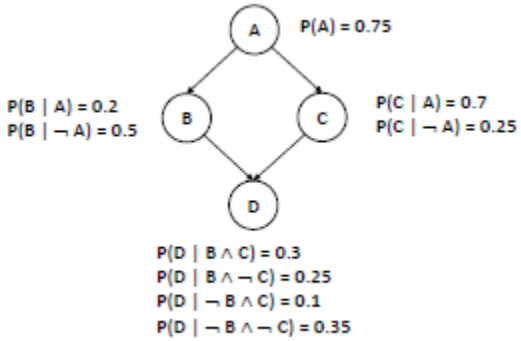
CSC384 Bayesian Networks

Problem 1

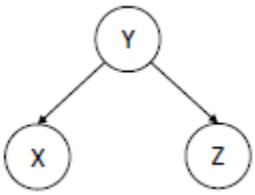
Consider the following Bayesian network. A, B, C, and D are Boolean random variables. If we know that A is true, what is the probability of D being true?



Solution

Problem 2.

For the following Bayesian network

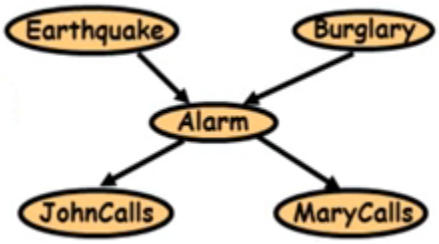


we know that X and Z are not guaranteed to be independent if the value of Y is unknown. This means that, depending on the probabilities, X and Z can be independent or dependent if the value of Y is unknown. Construct probabilities where X and Z are independent if the value of Y is unknown, and show that they are indeed independent.

Solution.

Problem 3.

Recall the burglary problem from the lecture.

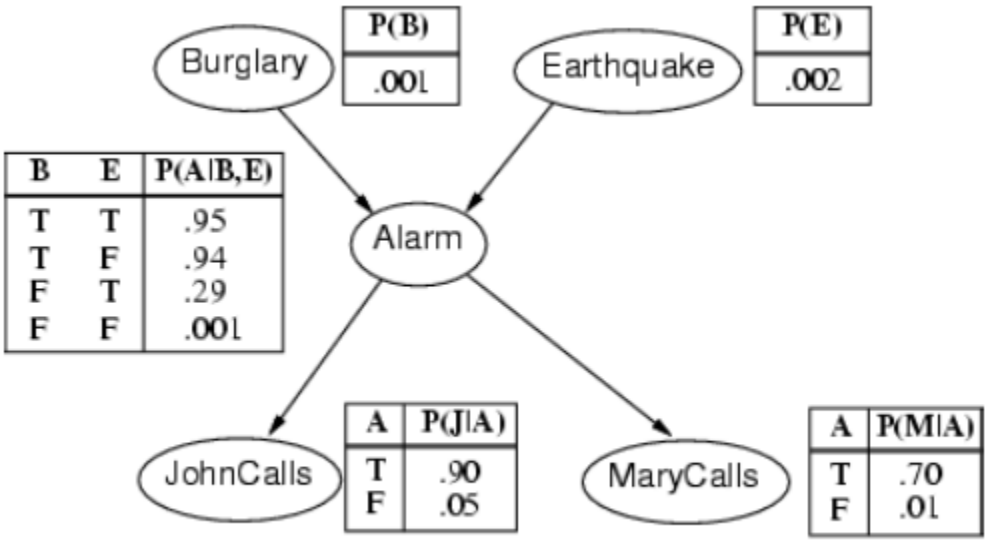


Following the last lecture, consider $P(J)$ where $J = JohnCalls$. Write a formal proof that M is irrelevant to the computation of $P(J)$.

Solution.

Problem 4.

Back again to the burglary example.



Use variable elimination to calculate $P(Burglary|JohnCalls = true, MaryCalls = false)$. Elimination order is E, A. Show all computations.

Solution