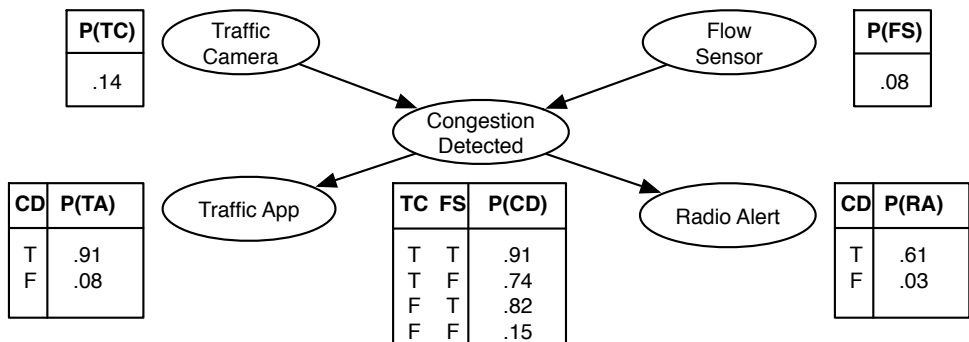


2. (a) Explain the four types of reasoning that can be done using probabilistic inference. [4]
- (b) Suppose that there are two independent sensors, *traffic camera (TC)* and *flow sensor (FS)*, for detecting congestion on road R. TC is 92% effective at identifying congestion when it is present, but has a 28% false positive rate. FS has a true positive rate of 71% and a 19% false positive rate. Suppose that the probability of congestion on R is 0.7. Which sensor returning positive is a better indicator of congestion, assuming only a single sensor is used? Justify your answer mathematically and give $P(\text{congestion}|TC)$ and $P(\text{congestion}|FS)$. [6]
- (c) Using inference by enumeration and the Bayesian network below, compute the probability of *Congestion Detected* given *Traffic App* and *Radio Alert* are true. [12]



- (d) Suppose that you are tasked with constructing a Bayesian Network for a traffic management system, and are given an ordered set of nodes $\langle X_1, X_2, \dots, X_n \rangle$. Describe how you would use Pearl's Bayesian Network construction algorithm to create the network. [3]