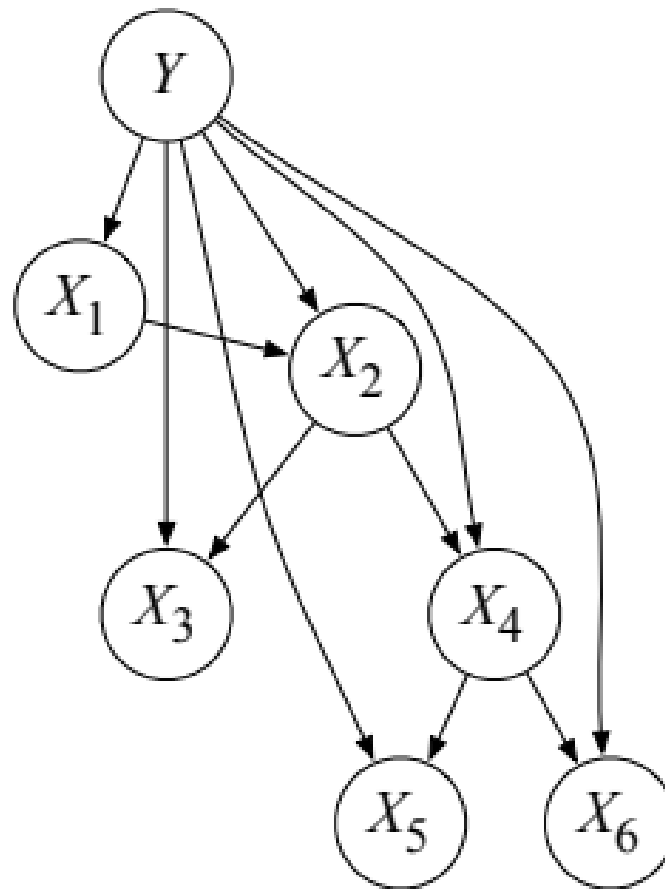# COMP90051
Statistical Machine Learning

Workshop Week 11

Xudong Han

https://github.com/HanXudong/COMP90051_2020_S1

Assume we observe all the variables X1 = x1, X2 = x2, . . . , X6 = x6 in the TANB above. What is the classification rule for the TANB? Your answer should be in terms of the prior probabilities and conditional probabilities in the TANB.

Y

X_1

X_2

X_3

X_4

X_5

X_6

Specify an elimination order that is efficient for the query $p(Y \mid X_5 = x_5)$ in the TANB above. How many variables are in the biggest factor induced by variable elimination with your ordering? Which variables are they?
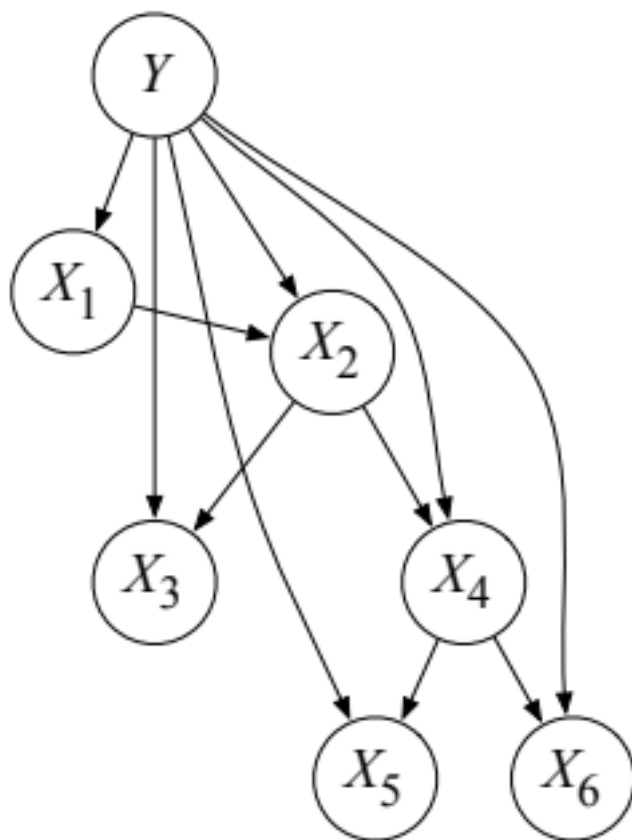
Specify an elimination order that is efficient for the query $p(Y \mid X_5 = x_5)$ in the TANB above. How many variables are in the biggest factor induced by variable elimination with your ordering? Which variables are they?
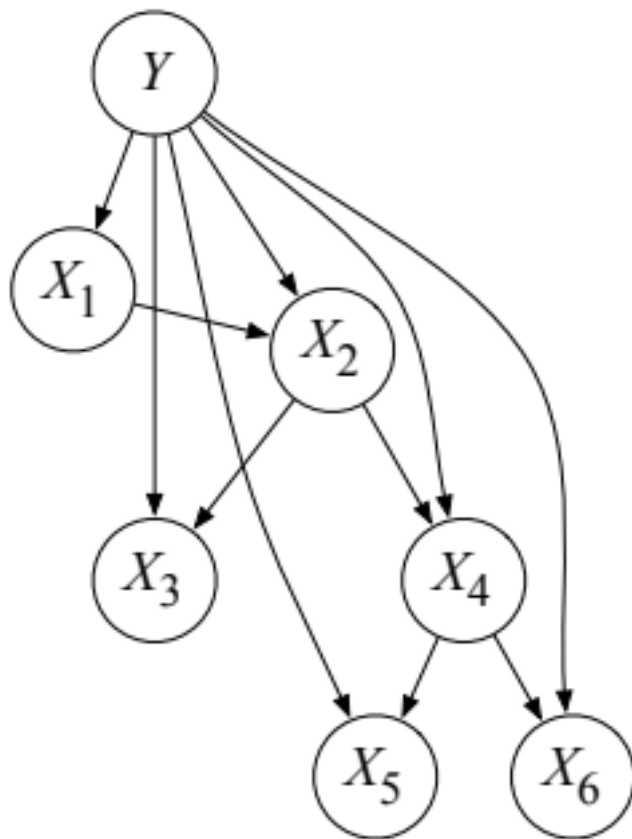
- $p(Y \mid X_5 = x_5)$
- Evidence nodes E
- Query nodes Q
- Elimination ordering I

Some functions in our algorithm

- $\delta(X_i, x_i)$: evidence potential, a function whose value is one if $X_i = x_i$ and zero otherwise.

- Given E is a set of indices of evidence nodes,

$$\delta(X_E, x_E) = \prod_{i \in E} \delta(X_i, x_i)$$

- $\phi_4(x_2, x_4) = p(X_4 | X_2, Y) p(x_5 | X_4, Y)$

- $m_4(X_2) = \sum_{X_4} \phi_4(x_2, x_4)$