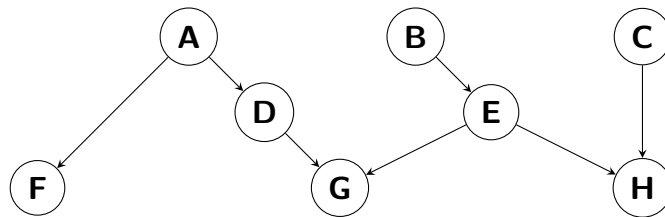


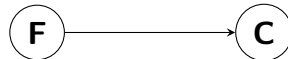
Machine Learning II

Problemas Tema 1

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- Nodo A:
 - Independiente de B, C, H, E
 - Dado D, F: independiente de B, E, C, H, G
- Nodo G:
 - Dados D, E: independiente de A, F, B, C, H
- Nodo E:
 - Dado B: independiente de A, D, F, C
 - Dados B, G, H, D, C: independiente de A, F



$$P(F) = 0.1 \rightarrow P(\neg F) = 0.9$$

$$P(C|F) = 0.8 \rightarrow P(\neg C|F) = 0.2$$

$$P(C|\neg F) = 0.3 \rightarrow P(\neg C|\neg F) = 0.7$$

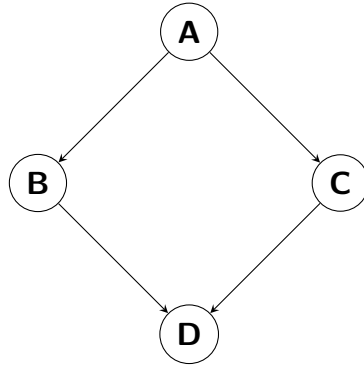
¿ $P(F|C)$?

$$P(F|C) = \frac{P(F, C)}{P(C)} = \frac{0.08}{0.35} = 0.2286$$

$$P(F, C) = P(F) \cdot P(C|F) = 0.1 \cdot 0.8 = 0.08$$

$$P(C) = \sum_f P(F, C) = \underbrace{P(F, C)}_{0.08} + P(\neg F, C) = 0.35$$

$$P(\neg F, C) = P(\neg F) \cdot P(C|\neg F) = 0.9 \cdot 0.3 = 0.27$$



$$P(A) = 0.75$$

$$P(\neg A) = 0.25$$

$$P(B|A) = 0.2$$

$$P(\neg B|A) = 0.8$$

$$P(B|\neg A) = 0.5$$

$$P(\neg B|\neg A) = 0.5$$

$$P(C|A) = 0.7$$

$$P(\neg C|A) = 0.3$$

$$P(C|\neg A) = 0.25$$

$$P(\neg C|\neg A) = 0.75$$

$$P(D|B, C) = 0.3$$

$$P(\neg D|B, C) = 0.7$$

$$P(D|\neg B, C) = 0.1$$

$$P(\neg D|\neg B, C) = 0.9$$

$$P(D|B, \neg C) = 0.25$$

$$P(\neg D|B, \neg C) = 0.75$$

$$P(D|\neg B, \neg C) = 0.35$$

$$P(\neg D|\neg B, \neg C) = 0.65$$

$$P(A, B, C, D) = P(A)P(B|A)P(C|A)P(D|B, C)$$

$$P(A, D) = \sum_b \sum_c P(A, B, C, D) = \sum_b \sum_c P(A)P(B|A)P(C|A)P(D|B, C)$$

$$P(D|A) = \sum_b \sum_c P(B|A)P(C|A)P(D|B, C) = \sum_b P(B|A) \underbrace{\sum_c P(C|A)P(D|B, C)}_{f_c(A, B, D)}$$

$$= \sum_b P(B|A)f_c(A, B, D)$$

$$= P(B|A)f_c(A, B, D) + P(\neg B|A)f_c(A, \neg B, D)$$

$$= 0.197$$

$$f_c(A, B, D) = P(C|A)P(D|B, C) + P(\neg C|A)P(D|B, \neg C) = 0.285$$

$$f_c(A, \neg B, D) = P(C|A)P(D|\neg B, C) + P(\neg C|A)P(D|\neg B, \neg C) = 0.175$$