LKP 10

Bayesian Network

1. Diketahui Graf Bayesian Network sebagai berikut :

P(IO) = 0.6

P(LO | IO) = 0.5
P(LO | ~IO) = 0.05

P(CO | IO) = 0.8
P(CO | ~IO) = 0.1
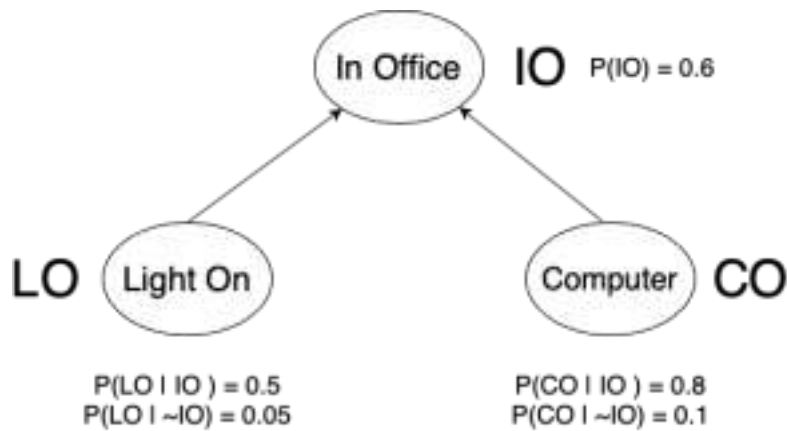
    a.   Berapa peluang Lampu Menyala, jika diketahui Komputer Menyala?
    b.   Berapa peluang Komputer Menyala, jika diketahui Lampu Menyala?

Peluang Lampu Menyala, jika diketahui Komputer Menyala

P(LO | CO) = ?

P(LO | CO) =   P(LO | CO, IO) * P(IO | CO) + P(LO|CO,~IO) * P(~IO| CO)

             P(LO | IO) * P(IO | CO) + P(LO|~IO) * P(~IO| CO)

             0.5 * 0.57 + 0.05 * 0.43

             0.30

P(IO | CO) = p(CO | IO) P(IO) / P (C0)

        0, 8 * 0.6 / 0.84

        0.57

p (C0) = p (CO / IO) + P (CO | ~IO) P(~IO)

        0.8 + 0.1 * 0.4

        0.84

Peluang Lampu Menyala, jika diketahui Komputer Menyala

P(CO | LO) = ?

P(CO | LO) =   P(CO | LO, IO) * P(IO | LO) + P(CO|LO,~IO) * P(~IO| LO)

             P(CO | IO) * P(IO | LO) + P(CO|~IO) * P(~IO| LO)

             0.8 * 0.57 + 0.1 * 0.43

             0.49

P(IO | LO) = p(LO | IO) P(IO) / P (L0)

        0.5 * 0.6 / 0.52

        0.57

p (L0) = p (LO / IO) + P (LO | ~IO) P(~IO)

        0.5 + 0.05 * 0.4

        0.52

2. Diketahui Graf Bayesian Network sebagai berikut :
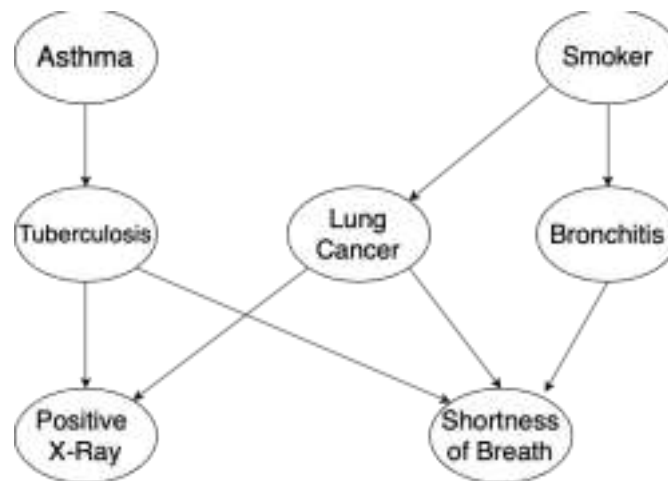
a. Berapa nilai P(Tuberculosis | Shortness of Breath, Positive X-Ray)?
Jawab :

P(Tuberculosis | Shortness of Breath, Positive X-Ray)

P(Shortness of Breath, Positive X-ray | Tuberculosis)*P(Tuberculosis)

 P(Shortness of Breath, Positive X-ray)

P(Shortness of Breath | Tuberculosis)*P(Positive X-ray | Tuberculosis)* P(Tuberculosis)

 P(Shortness of Breath | Tuberculosis)* P(Positive X-ray | Tuberculosis)* P(Tuberculosis)} + { P(Shortness of Breath | ~Tuberculosis)*P(Positive X-ray ~Tuberculosis)*P(~Tuberculosis)

b. Berapa nilai P(Positive X-Ray | Smoker)?
Jawab :

P(Xr + Sm)

= P(Xr | Tb, Lc, Sm) * P(Lc|Sm) * P (Tb) + P (Xr | ~Tb, Lc, Sm) * P (Lc, Sm) * P (~Tb) + P (Xr | Tb, ~Lc, Sm) * P (~Lc| Sm) * P (Tb) + P(Xr | ~Tb, ~Lc, Sm) * P (~Lc| Sm) * P(~Tb)

= P(Xr | Tb, Lc) * P(Lc|Sm) * P (Tb) + P (Xr | ~Tb, Lc) * P (Lc, Sm) * P (~Tb) + P (Xr | Tb, ~Lc) * P (~Lc| Sm) * P (Tb) + P(Xr | ~Tb, ~Lc) * P (~Lc| Sm) * P(~Tb)

3. Diketahui Graf Bayesian Network sebagai berikut :
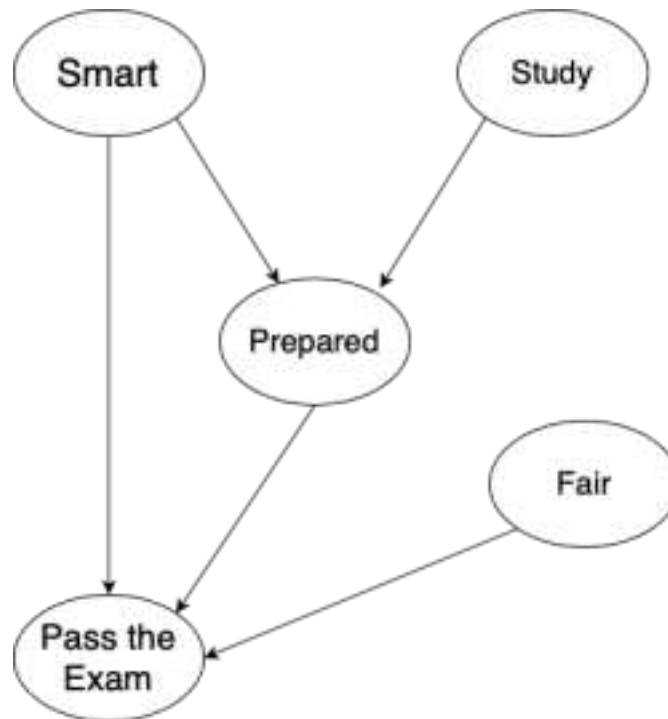
Jika diketahui seorang mahasiswa sudah Belajar (Study), berapa peluang mahasiswa tersebut akan Lolos Ujian (Pass the Exam)?

P (Pass | Study) =

P (Pass | Fair, Smart, Prepared) * P(Prepared| Smart, Study) * P(Smart) * P(Fair) +

P (Pass | ~Fair, Smart, Prepared) * P(Prepared| Smart, Study) * P(Smart) * P(~Fair) +

P (Pass | Fair, Smart, ~Prepared) * P(~Prepared| Smart, Study) * P(Smart) * P(Fair) +

P (Pass | ~Fair, Smart, ~Prepared) * P(~Prepared| Smart, Study) * P(Smart) * P(~Fair) +

P (Pass | Fair, ~Smart, Prepared) * P(Prepared| ~Smart, Study) * P(~Smart) * P(Fair) +

P (Pass | Fair, ~Smart, ~Prepared) * P(~Prepared| ~Smart, Study) * P(~Smart) * P(Fair) +

P (Pass | ~Fair, ~Smart, Prepared) * P(Prepared| ~Smart, Study) * P(~Smart) * P(~Fair) +

P (Pass | ~Fair, ~Smart, ~Prepared) * P(~Prepared| ~Smart, Study) * P(~Smart) * P(~Fair)