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CS1675

Assignment 8 Report

Due: 3/28/19

1a)

P(B=T, E=T) = P(A=a, B=T, C=c, D=d, E=T, F=f)

= ∑ ∑ ∑ ∑ P(A=a)*P(B=T)*P(C=c)*P(D=d|A=a, B=T, C=c)*P(E=T|C=c)*P(F=f|D=d)

2*2*3*2 = 24 addition terms

Number of additions: **23**

Number of multiplications: 5 mults*24 **= 120**

1b) ∑ ∑ ∑ ∑ P(A=a)*P(B=T)*P(C=c)*P(D=d|A=a, B=T, C=c)*P(E=T|C=c)*P(F=f|D=d)

= P(B=T) * $\sum_C$ P(E=T|C=c)*P(C=c) * [$\sum_D$ [$\sum_A$ [P(D=d|A=a, B=T, C=c)* P(A=a)] * $\sum_F$ P(F=f|D=d)]]

Number of additions: **17**

Number of multiplications: **23**

The number of additions and multiplications both decreased after interleaving products and sums which decreases the overall cost to compute.

2a)

P(pneumonia) =

T	F
0.02	0.98

P(fever|pneumonia)

pneumonia	T	F
T	0.90	0.10
F	0.60	0.40

P(paleness|pneumonia)

pneumonia	T	F
T	0.70	0.30
F	0.50	0.50

P(cough|pneumonia)

pneumonia	T	F
T	0.90	0.10
F	0.10	0.90

P(highWBC|pneumonia)

pneumonia	T	F
T	0.80	0.20
F	0.50	0.50

2b) Pneumonia= Pnm; Fever=F; Paleness=P; Cough=C; HighWBCcount=H

P(pnm = T|F = T, P = F, C = T, H = F) =

= P(F=T, P=F, C=T, H=F|Pnm=T)*P(Pnm=T) / [P(F=T, P=F, C=T, H=F| Pnm=T)* P(Pnm=T) + P(F=T, P=F, C=T, H=F| Pnm=F) *P(Pnm=F)]

= P(F=T|Pnm=T)*P(P=F|Pnm=T)*P(C=T|Pnm=T)*P(H=F|Pnm=T)*P(Pnm=T) / [P(F=T|Pnm=T)*P(P=F|Pnm=T)*P(C=T|Pnm=T)*P(H=F|Pnm=T)*P(Pnm=T) + P(F=T|Pnm=F)*P(P=F|Pnm=F)*P(C=T|Pnm=F)*P(H=F|Pnm=F)*P(Pnm=F)]

= (0.90)(0.30)(0.90)(0.50)(0.02) / [(0.90)(0.30)(0.90)(0.50)(0.02) + (0.60)(0.50)(0.10)(0.50)(0.98)]

= **0.141**

2c) P(Pnm=T|F=T, C=T) =

= P(F=T|Pnm=T) *P(C=T|Pnm=T)*P(Pnm=T) / [P(F=T|Pnm=T)*P(C=T|Pnm=T)*P(Pnm=T) + P(F=T|Pnm=F)*P(C=T|Pnm=F)*P(Pnm=F)]

= (0.90)*(0.90)*(0.02) / [(0.90)*(0.90)*(0.02) + (0.60)*(0.10)*(0.98)]

= 0.216