(Assignment - 5)

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Task 1:

Total 11 variables

A takes 8 values and B have 5 possible values

a) $8 * 5^{10}$

b) $P(B_i|A)$ will have $8 * (5-1) = 32$ values

$P(A)$ needs $8-1 = 7$ values

$P(B_1 \ldots B_{10}) = 32 \times 10 = 320$ values

Total space $= 320 + 7$

$= 327$ values

c) Yes it does.
The effect variables are not actually conditionally independent given the cause variable.

~~Task 2~~ Task 2:

h1 (prior 10%) → contains 100% cherry candies

h2 (prior 20%) → Contains 75% cherry and 25% lime candies

h3 (prior 40%) → contains 50% cherry and 50% lime candies

h4 (prior 20%) → contains 25% cherry and 75% lime candies

h5 (prior 10%) → contains 100% lime candies

* Solution attached in a Text File.

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Task 3:

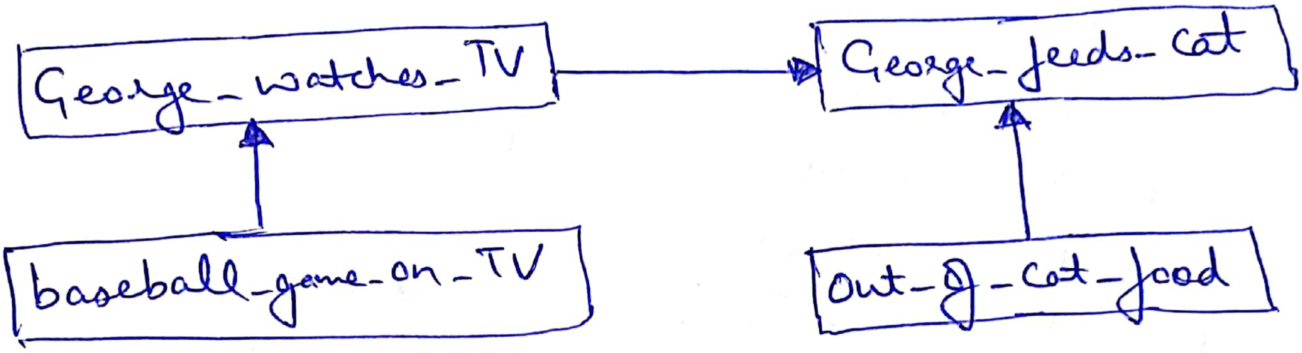
Variables are -

baseball-game-on-TV

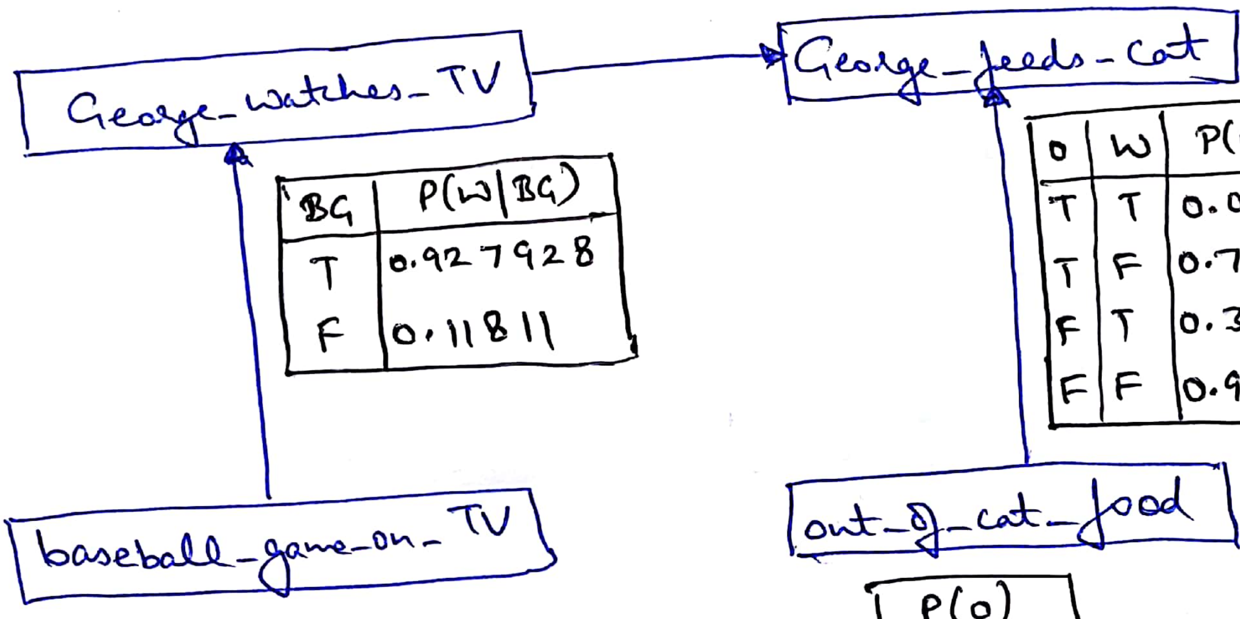
George-watches-TV

out-of-cat-food

George-feeds-cat



Task 4: (code attached with assignment)



BG	P(W|BG)
T	0.927928
F	0.11811

O	W	P(F|O,W)
T	T	0.04167
T	F	0.70642
F	T	0.31579
F	F	0.95876

P(BG)
0.30411

P(O)
0.16986

Task 5 :

P (BG)
0.30411

(baseball game)

BG	P(W|BG)
T	0.9279
F	0.1181

(watches game)

P(O)
0.1697

(out of cat food)

Feeds cat

O	W	P(F|O,W)
T	T	0.0417
T	F	0.7064
F	T	0.3156
F	F	0.9586

$$P(\text{not (George Feeds Cat)} \mid \text{Baseball Game on TV})$$

$$= \frac{P(\neg \text{George Feeds Cat} \wedge \text{Baseball Game on TV})}{P(\text{Baseball Game on TV})}$$

$$= 0.4054$$

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Task 6 :

a) Markovian blanket of L :

Parent of L : G

Children of L : P and Q

Other parents of children of L are : K and M

b) $P(C,H) = ?$

$= P(C|H) \cdot P(H)$

$P(C|H) = 0.6$

$P(H) = P(H|C) \cdot P(C) + P(H|not(C)) \cdot P(not(C))$

$= 0.6 \times 0.6 + 0.1 \times (1-0.6)$

$= 0.36 + 0.1 \times 0.4$

$= 0.36 + 0.04$

$= 0.40$

$P(C,H) = 0.6 \times 0.4$

$= 0.24$

c) $P(O|not(J), E) = ?$

$$= \frac{P(O) * P(E) * P(not(J)|O,E)}{P(O) * P(E) * P(not(J)|O,E) + P(\neg O) * P(E) * P(not(J)|\neg O,E)}$$

$P(J) = P(J|E) \cdot P(E) + P(J|E) \cdot P(E)$

$= 0.4 \times 0.4 + 0.3 \times 0.6$

$= 0.82$

$P(o) = P(J)\,P(o|J) + P(\bar{J})\,P(o|\bar{J})$

$= 0.2 \times 0.82 + 0.82 \times 0.18$

$= 0.308$

$P(o|not(J), E) =$

$$\frac{0.308 \times 0.4 \times 0.6}{0.308 \times 0.4 \times 0.6 + 0.692 \times 0.4 \times 0.6}$$

$$= \frac{0.07392}{0.07392 + 0.16608} = \frac{0.07392}{0.24}$$

$$= \underline{\underline{0.308}}$$