

HW-7

1) $P(B, \bar{E}, A, J, \bar{M})$

$$P(B) * P(\bar{E}) * P(A | B, \bar{E}) * P(J | A) * P(\bar{M} | A)$$

2) $(0.001)(.998)(.94)(.90)(.38) = 2.53292 * 10^{-4}$

3) $P(E, J, M)$

① $P(B, E, A, J, M) = P(B) P(E) P(A | B, E) P(J | A) P(M | A)$

② $P(\bar{B}, E, A, J, M) = P(\bar{B}) P(E) P(A | \bar{B}, E) P(J | A) P(M | A)$

③ $P(B, E, \bar{A}, J, M) = P(B) P(E) P(\bar{A} | B, E) P(J | \bar{A}) P(M | \bar{A})$

④ $P(\bar{B}, E, \bar{A}, J, M) = P(\bar{B}) P(E) P(\bar{A} | \bar{B}, E) P(J, \bar{A}) P(M | \bar{A})$

① $(.001)(.998)(.95)(.90)(.70) = 1.197 * 10^{-6}$

② $(.999)(.002)(.29)(.90)(.70) = 3.650346 * 10^{-4}$

③ $(.001)(.002)(.05)(.05)(.01) = 5 * 10^{-11}$

④ $(.999)(.002)(.71)(.05)(.01) = 7.0929 * 10^{-7}$

⑤ $P(E, J, M) = 1.197 * 10^{-6} + 3.650346 * 10^{-4} + 5 * 10^{-11} + 7.0929 * 10^{-7}$
 $= 3.6694094 * 10^{-4}$

$$4) P(E|J, M) = \frac{P(E, J, M)}{P(J, M)} = \frac{3.6694094 \times 10^{-4}}{0.002084100239} = 0.1760668384$$

- 5) I had 1 million samples. The more samples we have, ~~the more~~ there is a better chance of getting the accurate probability calculations.
Overall, the more data we have the more accurate the model will be.