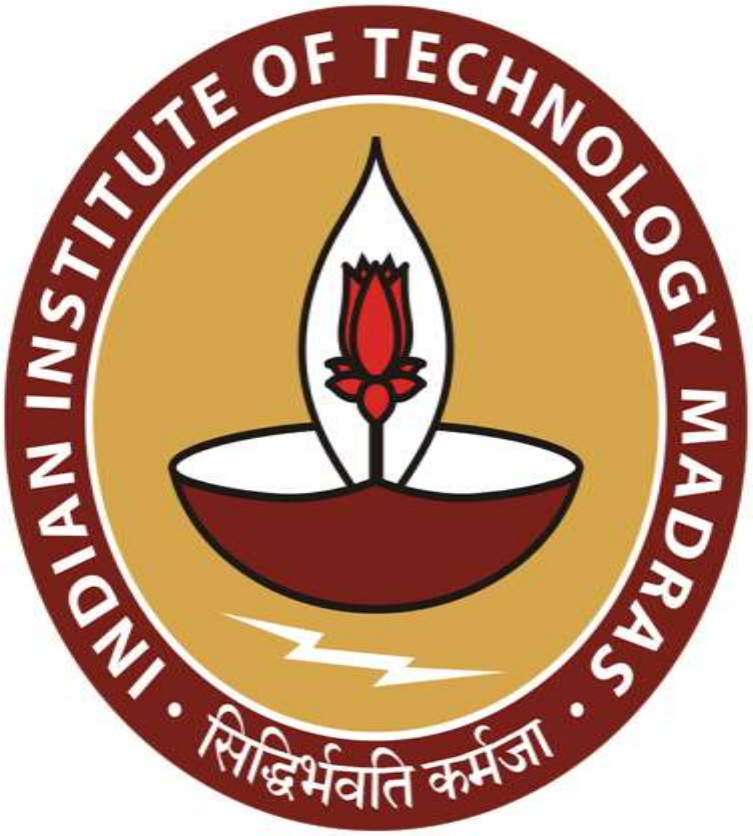

IIT Madras

ONLINE DEGREE

Statistics for Data Science 1
Professor. Usha Mohan
Department of Management Studies
Indian Institute of Technology, Madras
Week 7 Tutorial 6

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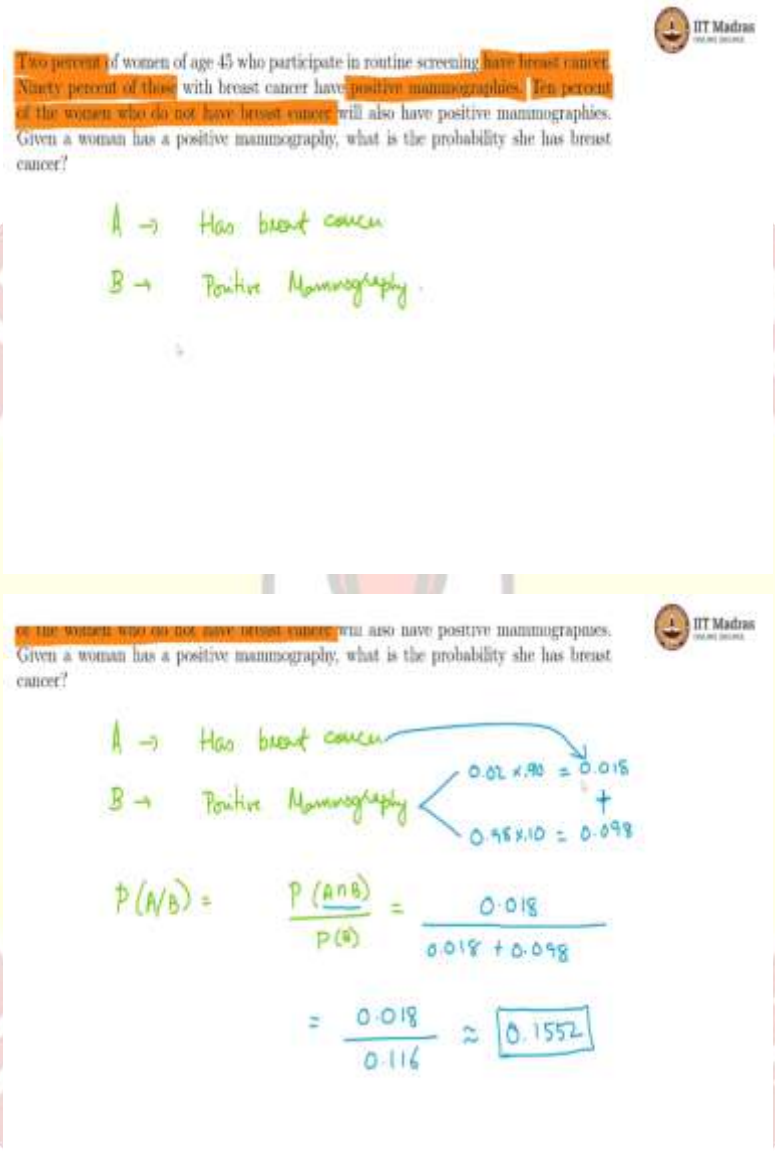

2 percent of women of age 45 who participate in routine screening have breast cancer, so 2 percent of the women have breast cancer and off them 90 percent of those with breast cancer have positive mammographic. And 10 percent of the woman who do not have breast cancer will show positive mammographic. Given that a woman has a positive mammography, what is the probability that she has breast cancer?

So, we are doing conditional probability here where one event is that the woman has breast cancer. And the other event is that the mammography is positive. So, positive mammography.

And what we are looking for is basically $P(A|B)$, which is essentially $\frac{P(A \cap B)}{P(B)}$. Now, we know $P(B)$ is affected by both people having breast cancer and not having breast cancer. So, people having breast cancer is 2 percent so 0.02. And of them 90 percent that is 0.9 show up was 2 mammographies and that gives us 0.018 and in the remaining cases of the 98 percent who do not have breast cancer, 10 percent show positive mammographies.

So, that gives us so that is point one, that gives us 0.098 This is a total probability of a mammography showing positive so that would be $P(B)$ = 0.018 + 0.098. And of them the $A \cap B$ case is this having breast cancer and having a positive mammography is this case which is $P(A \cap B)$ = 0.018. So, we will have $P(A|B)$ = 0.018/0.116. And that is roughly equal to 0.1552. So, this is the conditional probability of a woman who was given positive mammography having breast cancer and this pretty low. Thank you.