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ECE 448

HW4

Problem 1

1.)

Add up all 4 of the values within the $\neg A$ section

0.05 + 0.10 + 0.15 + 0.15 = 0.45

$P(\neg A) = 0.45$

2.)

Add up all 4 of the values within the B section

0.20 + 0.10 + 0.05 + 0.10 = 0.45

$P(B) = 0.45$

3.)

Calculate the probability of A given that B is true

$P(A|B) = P(A \wedge B)/P(B)$ "Bayes Rule"

$P(A \wedge B) =$ the summation of the 2 values that are in both A and B, so

0.20 + 0.10 = 0.30

$P(A \wedge B) = 0.30$

$P(B) =$ The summation of all 4 of the values within the B section

0.20 + 0.10 + 0.05 + 0.10 = 0.45

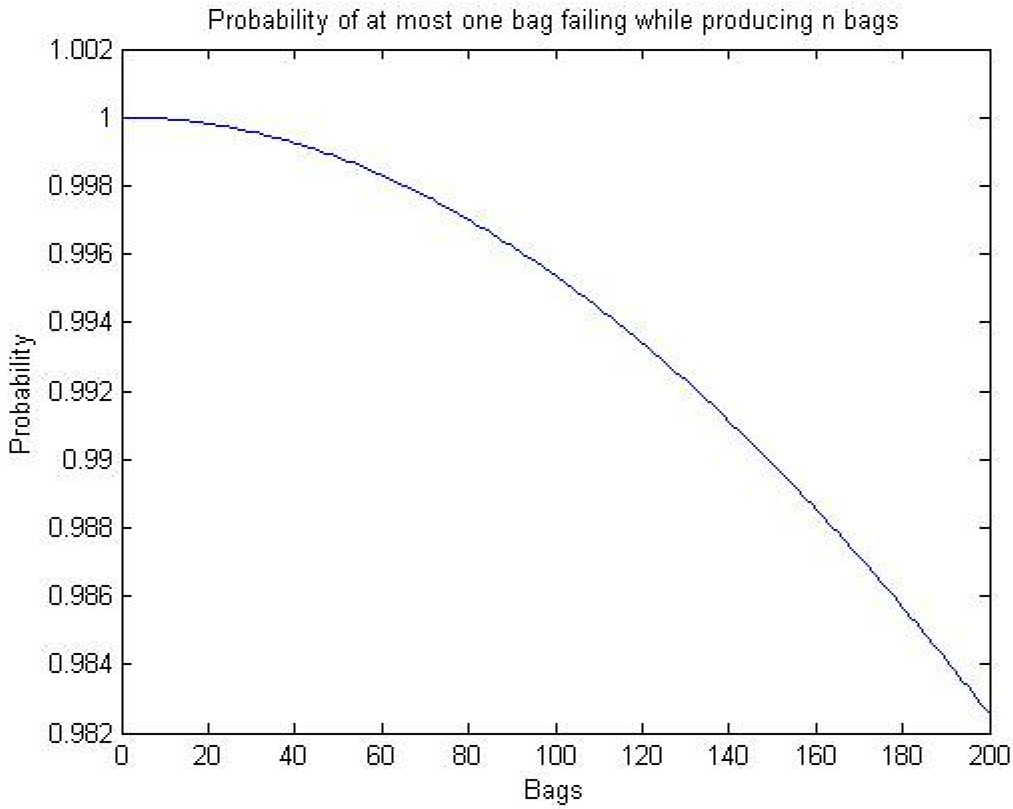
$P(A|B) = 0.30/0.45$

$P(A|B) = 0.6667$

Problem 2

1.)

$(1-\varepsilon)^{n} + n(1-\varepsilon)^{n-1} \geq 1-\delta$



2.)

The correct n can be found by looking at the value of n when the line reaches y = 0.99, since $\delta = .01$, so $1-\delta = 0.99$.

n = 150

Problem 3

The long term observed probability of raining is 1/10000. Since the predictability is 99%, this means that there is some unknown factor that causes a 1% change in rain that hasn't been observed yet. So the actual chance of there being rain is 1% different than the observed 1/10000. 0.99/10000 to 1.01/10000 . So the actual chance of rain is anywhere in between 0.000099 and 0.000101 .

Problem 4

$P(A,B \mid C) = P(A \mid C) P(B \mid C)$	using bayes rule, is equivalent to...
$P(A,B,C) / P(C) = (P(A,C) P(B,C)) / (P(C) P(C))$	cancel out one of the P(C) on each side...
$P(A,B,C) = (P(A,C) P(B,C)) / P(C)$	divide both sides by P(B,C)...
$P(A,B,C) / P(B,C) = P(A,C) / P(C)$	using the inverse of bayes rule…
$P(A \mid B,C) = P(A \mid C)$	Done