

**Naïve Bayes Modeling Example:
Estimating *Your* Hidden Grade From More Forthcoming Classmates' Statements**

You're shy and don't want to say whether you got an A. But many of your classmates are pretty forthcoming. Can we figure your grade out from what they say about themselves plus a handful of facts about you – with mathematical rigor?

Person	Passed the class?	Looked happy seeing grades?	GPA estimate?	Average grade of friends?	True grade
1	Yes	No	3.8	A	A
2	No	No	2.1	D	F
3	Yes	Yes	3.1	B	B
4	Yes	No	3.3	A	D
5	Yes	Yes	3.6	B	B
6	Yes	No	4.0	A	A
7	Yes	Yes	3.7	A	A
8	Yes	Yes	3.2	A	B
9	Yes	Yes	3.1	B	B
10	No	No	1.8	D	F
11	Yes	No	3.3	B	A
12	Yes	No	3.6	A	B
13	Yes	Yes	2.7	B	C
14	No	No	3.1	C	F
15	Yes	Yes	1.9	C	D
99 (YOU)	Yes	Yes	3.9	B	????

To get a mathematically justifiable prediction of your grade, we tally up the counts:

Passed	Yes	No
A	4	0
Not A	8	3

Happy	Yes	No
A		
Not A		

GPA	>3.5	3.0-3.5	2.5-3.0	1.5-2.5	<1.5
A					
Not A					

Friends'	A	B	C	D	F
A					
Not A					

Then we calculate two Naïve Bayes scores for person #99 (you!), whose grade we want to predict:

Getting an A: $P(\text{Yes} | A) * P(\text{Yes} | A) * P(>3.5 | A) * P(B | A) * P(A)$
 $\frac{4}{4} = 1.0 * \underline{\hspace{1cm}} * \underline{\hspace{1cm}} * \underline{\hspace{1cm}} * \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Not getting an A: $\underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Given the observed data and our Naïve Bayes model, which target class (A or not A) is most likely?