

Bayes Classifier Practice Problems:

1. Consider the following hypothetical data concerning student characteristics and whether or not each student should be hired.

Name	GPA	Effort	Hirable
Sarah	poor	lots	Yes
Dana	average	some	No
Alex	average	some	No
Annie	average	lots	Yes
Emily	excellent	lots	Yes
Pete	excellent	lots	No
John	excellent	lots	No
Kathy	poor	some	No

Use a Naive Bayes classifier to determine whether or not someone with excellent attendance, poor GPA, and lots of effort should be hired.

2. Imagine that you are given the following set of training examples. Each feature can take on one of three nominal values: a , b , or c .

$F1$	$F2$	$F3$	Category
a	c	a	+
c	a	c	+
a	a	c	-
b	c	a	-
c	c	b	-

a) How would a Naive Bayes system classify the following *test* example?

$$F1 = a \quad F2 = c \quad F3 = b$$

b) Describe how a 3-nearest-neighbor algorithm would classify Part a 's test example.

3. Two different real numbers, x and y , are picked (their distributions are unknown). You get to see one of them, say x and it is known that x is the larger (smaller) with probability $1/2$. Construct an algorithm that can decide if x is the larger, with error probability less than $1/2$, no matter what the distributions of x and y are. Using the Bayesian framework prove that your algorithm is correct.