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## **Assignment 5**

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1.0/1.0 point (graded)

Naïve	Raves	is hest	suited	for MI	annlica	tions	wherein
IVAIVE	Dayes	is best	Juiteu	IOI IVIL	applica	uons	VVIICICIII

	-				
the feature vectors	$\chi$ are	discrete,	response	is	discrete

$\cup$	the feature vectors	x are	discrete.	response	is co	ontinuous

$$\overline{\phantom{a}}$$
 the feature vectors  $\overline{x}$  are continuous, response is discrete

$$\bigcirc$$
 the feature vectors  $\overline{x}$  are continuous, response is continuous

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2

1.0/1.0 point (graded)

The Bayes principle is given as

$$\bigcap p(B|A) = \frac{p(A|B)p(A)}{p(B)}$$

$$\bigcirc p(B|A) = p(A|B)$$

$$\bigcirc p(B|A) = p(A|B)p(A)$$

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Submit

3

1.0/1.0 point (graded)

The Naïve Bayes assumption can be mathematically expressed as

$$\bigcap p(\overline{x} = \overline{v}) = \prod_{j=1}^{N} p(x_j = v_j)$$

$$\oint p(\overline{x} = \overline{v}|y = u) = \prod_{j=1}^{N} p(x_j = v_j|y = u)$$

$$\bigcap_{p(y = u, \bar{x} = \bar{v}) = \prod_{j=1}^{N} p(y = u, x_j = v_j)}$$

## 4

1.0/1.0 point (graded)

The prior probability  $p(x_j = 1|y = 1)$  can be evaluated using the formula

$$\bigcap_{\substack{\sum \\ j=1 \\ \sum \\ j=1}}^{N} 1(x_{j}(i)=1, y(i)=1)$$

$$\sum_{j=1}^{M} 1(y(i)=1)$$

$$\underbrace{ \sum_{i=1}^{M} 1(x_j(i)=1, y(i)=1)}_{\substack{N \\ \sum 1 1(y(i)=1)} }$$

$$\sum_{\substack{j=1\\ N}}^{N} 1\left(x_{j}(i)=1, y(i)=1\right)$$

$$\sum_{\substack{i=1\\ i=1}}^{M} 1\left(x_{j}(i)=1, y(i)=1\right)$$

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5

1.0/1.0 point (graded)

The probability p(y = 1) can be evaluated as



$$\bigcap_{\substack{\sum \\ i=1}}^{N} 1(y(i)=1)$$

$$\bigcap_{\substack{\sum \\ i=1}^{M} 1 \left( x_{j}(i) = 1, y(i) = 1 \right)} M$$

$$\begin{array}{c}
\sum_{i=1}^{M} 1\left(x_{j}(i)=1, y(i)=1\right) \\
N
\end{array}$$

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6

1.0/1.0 point (graded)

Given a new observation  $\overline{x} = \overline{v}$ , it can be labeled as belonging to the class y = 1 if

$$\bigcap_{j=1}^{N} p(x_{j} = v_{j}|y = 1) > \prod_{j=1}^{N} p(x_{j} = v_{j}|y = 0)$$

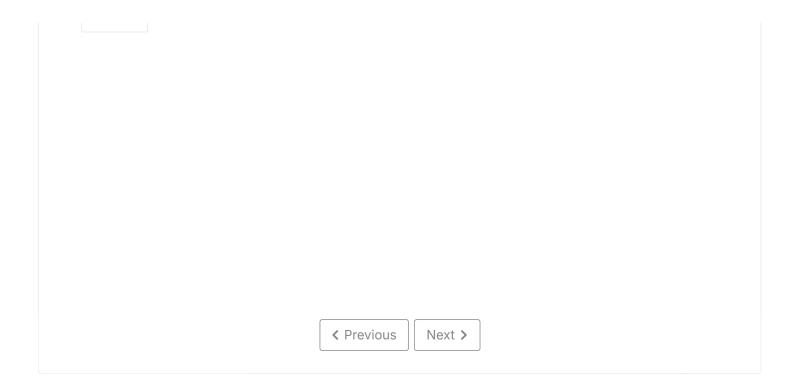
i=1		<i>i</i> =1				
	N					
$\prod_{i=1}^{n} p_i$	$(x_j = v_j   y = 1)$ $\prod_{j=1}^{n} p$	$\left(x_j = v_j   y = 0\right)$				
	p(y=1)	p(y=0)				
	p(y=1)	p(y=0)				
N П 2	$\frac{1}{p(x_j = v_j   y = 1)} > \frac{N}{\prod_{j=1}^{N} p(x_j = v_j   y = 1)}$	$p(y=0)$ $p(x_j=v_j y=0)$				
j=1	() j. / j=1	(1 10 )				
( N		1	·			
П	p(x = v   y = 1	$)\times p(y=1) > \prod_{j=1}^{N}$	$\int p(x) = v   y = 0$	$0) \times p(y=0)$		
j=1	( ) ].	) . O , j=	1 ( ) )	,		
. 4						
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•						
.0/1.0 poin	t (graded)					
		n be imported in	PYTHON as			
( ) fron	n sklearn.naive_b	ayes import NB				
	_	,				
fron	n sklearn.naive b	ayes import Gaus	sianNB			
	_	, ,				
fron	n sklearn import	GaussianNB				
	•					
fron	n sklearn import	NB				
<b>~</b>						
Submit						
3						
.0/1.0 poin		ow. What is the p	rior probability of	an accident occ	rurring?	
SNo.	Weather	Road	Traffic	Engine	Accident	
SINO.	condition	condition	condition	problem	Accident	
1	Rain	bad	high	no	yes	
2	snow	average	normal	yes	yes	
3	clear	bad	light	no	no	
4	clear	good	light	yes	yes	
5	snow	good	normal	no	no	
6	rain	average	light	no	no	
7	rain	good	normal	no	no	

SNo.	Weather condition	Road condition	Traffic condition	Engine problem	Accident
1	Rain	bad	high	no	yes
2	snow	average	normal	yes	yes
3	clear	bad	light	no	no
4	clear	good	light	yes	yes
5	snow	good	normal	no	no
6	rain	average	light	no	no
7	rain	good	normal	no	no
8	snow	bad	high	no	yes
9	clear	good	high	yes	no
10	clear	bad	high	yes	yes

1
4

 $\bigcirc \frac{2}{3}$ 

	* <del></del>
$\bigcirc$	$\frac{1}{3}$
/	
Sub	omit
	point (graded)
hat i	s the probability of good road condition given no accident for the data below  Weather Road Traffic Engine Accident condition condition condition problem
2 3	Rain bad high no yes snow average normal yes yes clear bad light no no
5 6	clear         good         light         yes         yes           snow         good         normal         no         no           rain         average         light         no         no
7 8 9	rain good normal no no snow bad high no yes clear good high yes no
10	clear bad high yes yes
$\bigcirc$	$\frac{1}{5}$
	<u>2</u> 5
	5
•	<u>3</u> 5
	4 5
~	
Sub	pmit
)	
	point (graded)
nsic	der the data given below. What is the machine learning problem it can be used to solve?
SNo.	Weather condition     Road condition     Traffic tengine condition     Accident condition       Rain     bad     high     no     yes
3 4	snow average normal yes yes clear bad light no no clear good light yes yes
5 6 7 8	snow         good         normal         no         no           rain         average         light         no         no           rain         good         normal         no         no           snow         bad         high         no         yes
9	snow bad high no yes clear good high yes no clear bad high yes yes
	Probability of determining accidents based on ambient conditions
	Probability of determining ambient conditions given accidents
	Probability of determining accidents irrespective of ambient conditions
	Probability of determining ambient conditions irrespective of accidents
~	
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