Variants of Naive Bayes

1. Bernoulli Naive Bayes
2. Multinomial Naive Bayes
3. Gaussian Naive Bayes.

* for different types of data, different variants are used.

1. Bernoulli Naive Bayes

Independent variable: Bernoulli dist $\longrightarrow \{0,1\}$

$\rightarrow$ features follows bernoulli distribut, use Bernoulli Naive bayes.

f_1	f_2	f_3	y
M	Yes	Good	Yes
F	NO	Best	No
M	Yes	Good	Yes
F	NO	Best	No

$\Rightarrow$

f_1	f_2	f_3	y
1	0	1	1
	0	1	
0	1	0	0
1		0	1
0	1	0	0

$\Rightarrow$ Sparse matrix (often leads to overfitting)

(maximum no of 0's and 1's)

$\Rightarrow$ Bernoulli Naive Bayes

2. Multinomial Naive Bayes

$\rightarrow$ Used when inputs are text data

Email classification $\Longrightarrow$ spam/ham

Input $\rightarrow$ Email body	y (output)
$\rightarrow$ You got a discount	Spam
$\rightarrow$ Millions of Rs you won	Spam
$\rightarrow$ offer letter	Ham

$\Downarrow$

Numerical values $\Longrightarrow$ Using NLP technique

$\Downarrow$

Vectors

1. Tf-Idf
2. Bow
3. Word2Vec.

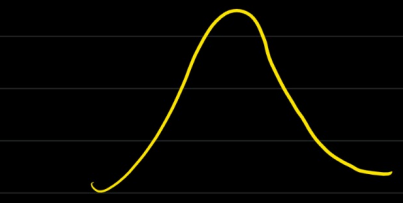
* Multinomial and Bernoulli Naive Bayes is used for text data in Natural Language Processing.

③ Gaussian Naive Bayes

⇓

Normal distⁿ

→ if the features are continuous and following Normal distribution ⇒ GNB



Age	Salary	Fraud
26	50	1
27	60	0
–	–	–
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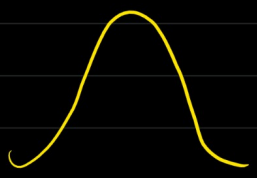

Iris data

* $X_1 X_2 X_3 - - X_n$

few features $(X_1 X_2)$ → Bernoulli dist

few features $(X_3 - - X_n)$ → Gaussian | N.D

→ Use that method which ever feature is higher in no.

Say { X_1, X_2 → Bernoulli dist
$X_3, X_4, X_5 - - X_n$ → Gaussian | Normal dist

↳ You will Gaussian Naive Bayes Classifier.