Naive Bayes Classifier

- a classification technique based on Bayes' Theorem
- Bayes' theorem is based on conditional probability. The conditional probability helps us calculating the probability that something will happen, given that something else has already happened.
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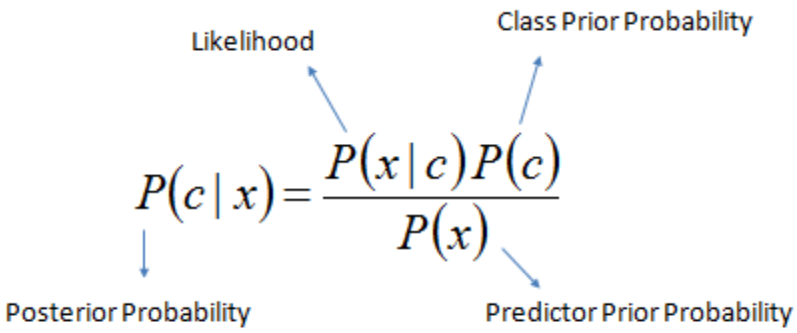
- Naive Bayes classifier assumes that all the features are unrelated to each other. Presence or absence of a feature does not influence the presence or absence of any other feature.
- or we can say, classifier assumes all the features are independent to each other.



The class with the highest probability is considered as the most likely class.

Let’s understand whole cinema by using following concepts:

Features

Outlook	Temperature	Humidity	Windy	Play
Rainy	Hot	High	False	No
Rainy	Hot	High	True	No
Rainy	Mild	High	False	No
Rainy	Cool	Normal	False	Yes
Rainy	Mild	Normal	True	Yes
Overcast	Hot	High	False	Yes
Overcast	Cool	Normal	True	Yes
Overcast	Mild	High	True	Yes
Overcast	Hot	Normal	False	Yes
Sunny	Mild	High	False	Yes
Sunny	Cool	Normal	False	Yes
Sunny	Cool	Normal	True	No
Sunny	Mild	Normal	False	Yes
Sunny	Mild	High	True	No

Now we need to predict label (play) on features

X=Rainy,Mild,High,True

First we need to get prob of Rainy for yes:

P(yes|Rainy)=(P(Rainy|yes).P(yes)) / P(Rainy)

Then prob of Mild:

P(yes|Mild)=(P(Mild|yes).P(yes)) / P(Mild)

Prob of High:

P(yes|High)=(P(High|yes).P(yes)) / P(High)

Prob of True:

P(yes|True)=(P(True|yes).P(yes)) / P(True)

Now Prob of All Input

P(Yes|Rainy,Mild,High,True)=P(yes|Rainy).P(yes|Mild).P(yes|High).P(yes|True)

Similarly,

P(No|Rainy,Mild,High,True)=P(no|Rainy).P(no|Mild).P(no|High).P(no|True)

Higher Probability wins

P(yes|Rainy)=((2/5) . (9/14)) /(5/14)=.25714/.35714=.7199

P(yes|Mild)=((4/6) . (9/14)) /(6/14)=.428571386/.428571429=.99999

P(yes|High)=((3/7) . (9/14)) /(7/14)=.251/.5=.502

P(yes|True)= ((3/6) . (9/14)) /(6/14)=.3214/.4285=.75

P(yes)=.7199x.9999x.502x.75=.27101

P(no|Rainy)=((3/5) . (5/14)) /(5/14)=.2142/.35714=.599

P(no|Mild)=((2/6) . (5/14)) /(6/14)=.23807142/.428571429=.5555

P(no|High)=((4/7) . (5/14)) /(7/14)=.4081

P(no|True)= ((3/6) . (5/14)) /(6/14)=.3214/.4285=.75

P(no)=.599x.5555x.4801x.75=.119829

Hence Given Sample belongs to YES class