MACHINE LEARNING

NAÏVE BAYES CLASSIFIER

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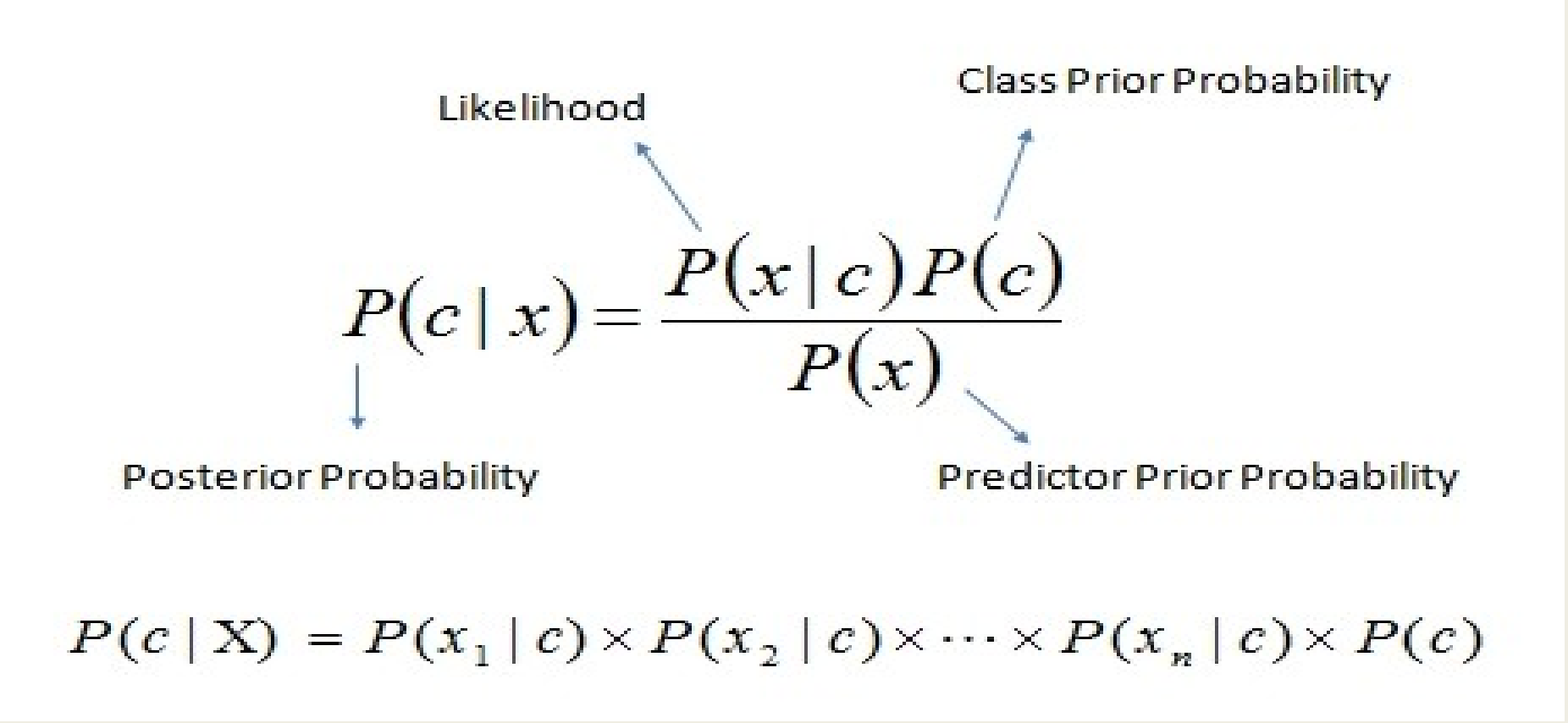
Naïve Bayes Classifier

- **classification** is the problem of identifying to which of a set of categories (sub-populations) a new observation belongs, on the basis of a training set of data containing observations (or instances) whose category membership is known.
- **probabilistic classifier** is a classifier that is able to predict, given an observation of an input, a probability distribution over a set of classes, rather than only outputting the most likely class that the observation should belong to.
- Naïve Bayes classifier is a probabilistic classifier developed based applying Bayes theorem with independence assumption between features.
- Naïve Bayes classifier is a generative model.

Are you infected by Covid -19?

- Covid infects around 30% of the population.
- 70% of people who are tested are found positive.
- You are tested positive with an overall accuracy of testing = 80%

Naïve Bayes classifier formulation



Are you infected by Covid-19?

X1 Contact	X2 Symptom	X3 Test	C infected
Yes	Yes	Yes	Yes
Yes	Yes	No	Yes
Yes	Yes	No	No
No	Yes	Yes	Yes
No	No	Yes	No

X1 Contact	X2 Symptom	X3 Test	C infected
Yes	No	Yes	Yes
Yes	No	No	Yes
No	Yes	Yes	Yes
Yes	No	Yes	Yes
Yes	No	No	Yes

Are you infected?

- You are not in the contact of a covid positive, you have symptoms, you are tested negative,

- You are not in contact of a covid positive, you have no symptoms and you are tested negative.

Conditional probability table

P(x1 = T)
P(X2 = T)
P(X3 = T)
P(C = T)

X2\C	T	F
T		
F		

X1\C	T	F
T		
F		

X3\C	T	F
T		
F		

$$P(C = T / X1 = F, X2 = T, X3 = F)$$

$$P(C = T / X1 = F, X2 = F, X3 = F)$$