We have a problem!

CUSTOMER CHURN

If a providers want to increase its revenue they needs more subscriber but keep existing customer is more important than having new ones. So providers want to know which customer should cancel his service. we call this as churn.

Solutions

The dumb solution

Call each customer up, ask for their reviews and understand their problems.
If the telecaller feels the cutomer might drop, offer them promotions.

Resources required: Lot of telecallers and time.

The smart solution

Data collection: Customer details: CRM system.
　　　　　　　　Internet usage (download and upload): Router data
　　　　　　　　Bills from data base
Use AI algorithm for predictions
Resources: Less time, Fewer telecallers to call up the target consumer.

Heres our smart solution.

Naive Bayes Classifier

By: Gaurav Kamath

Karthik Pai

What is Naive Bayes

-> Algorithm comes under supervised learning and is mainly used to solve classification problems.

-> It is an algorithm that learns the probability of every object, its features, and which groups they belong to. It is also known as a probabilistic classifier.

-> Based on Bayes theorem.
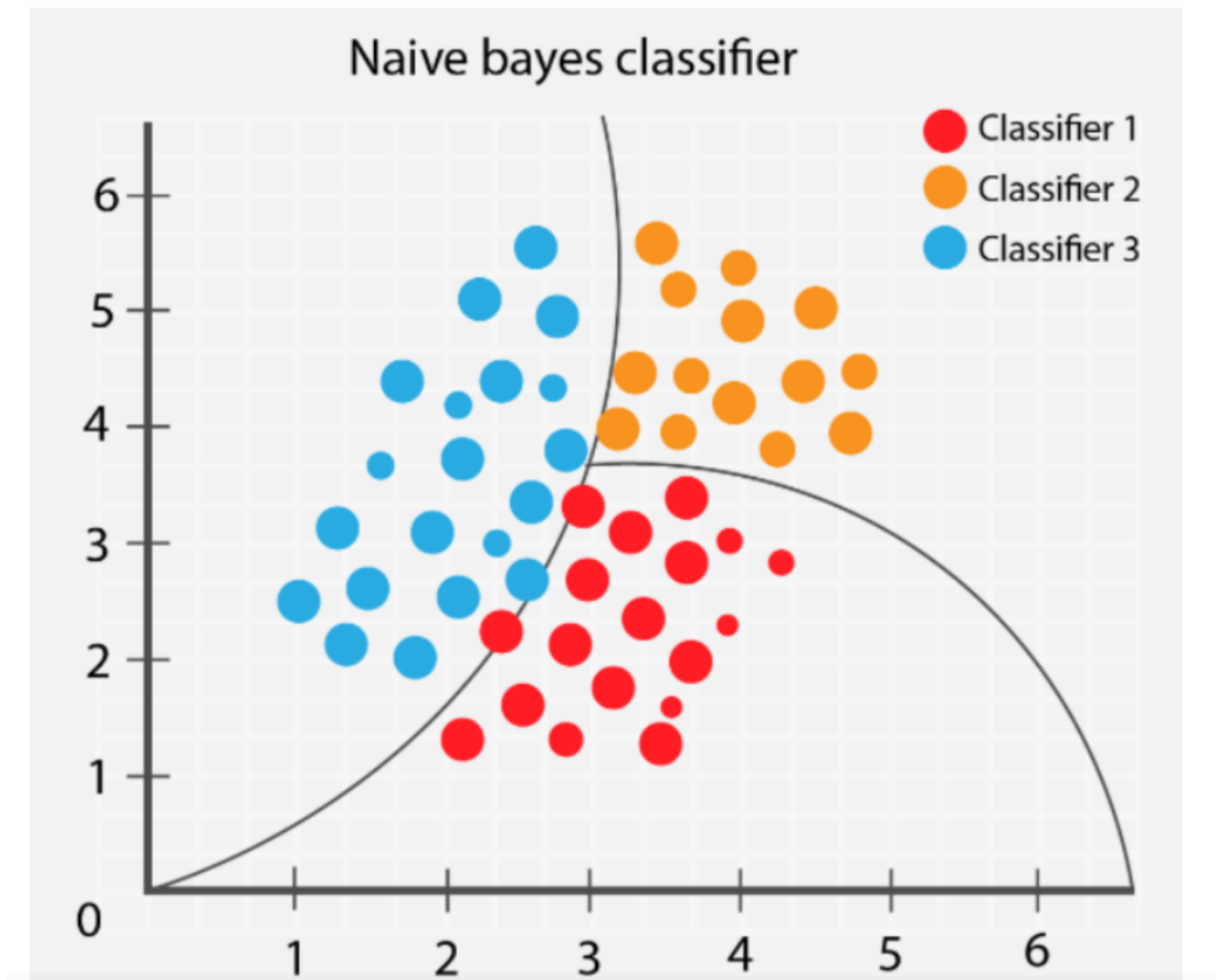
How does Naive Bayes work

$$P(A|B) = P(A) \times \frac{P(B|A)}{P(B)}$$

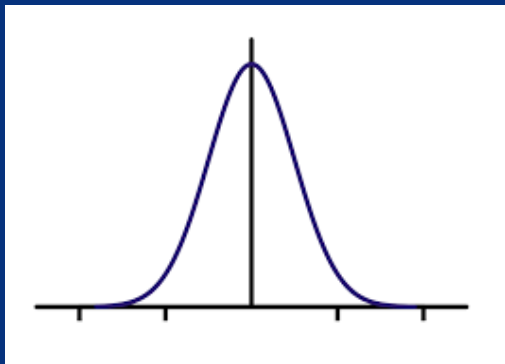posterior — prior — likelihood / marginal
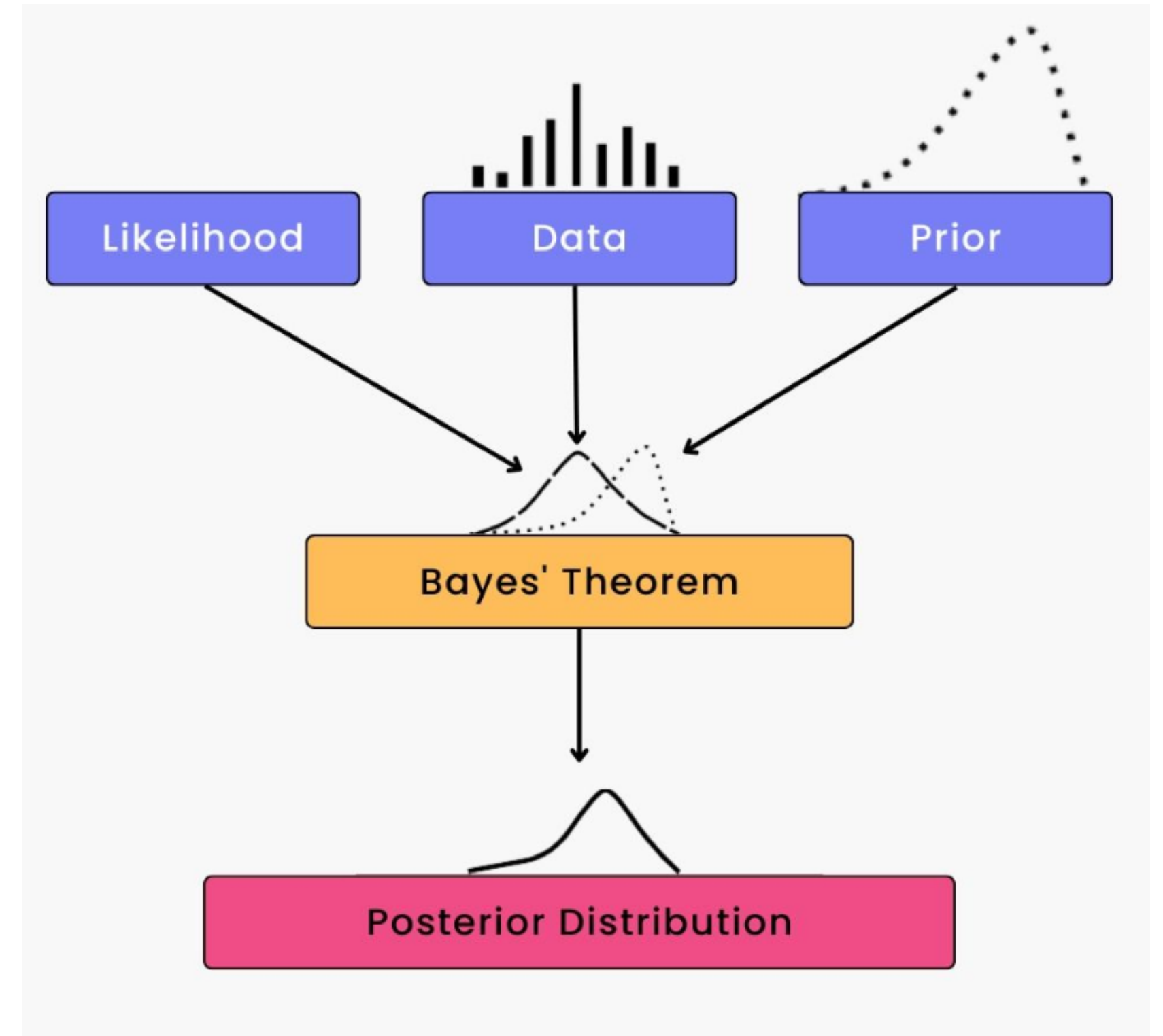
How does Naive Bayes work

- **Transform the given dataset into frequency tables.**

- **Generate a Likelihood table by determining the probabilities of the given features.**

- **Apply Bayes theorem to determine the posterior probability.**

Dataset

| id	is_tv_subscriber	is_movie_package_subscriber	subscription_age	bill_avg	reamining_contract	service_failure_count	download_avg	upload_avg	download_over_limit	churn
15	1	0	11.95	25	0.14	0	8.4	2.3	0	0
18	0	0	8.22	0		0	0	0	0	1
23	1	0	8.91	16	0	0	13.7	0.9	0	1
27	0	0	6.87	21		1	0	0	0	1
34	0	0	6.39	0		0	0	0	0	1
56	1	1	11.94	32	1.38	0	69.4	4	0	0
71	0	0	8.96	18	0	0	21.3	2	0	1
84	0	0	5.48	14		1	0	0	0	1
94	0	0	8.54	0		0	0	0	0	1
112	0	0	8.33	0		0	0	0	0	1
166	1	1	8.44	17	0	0	9.9	1.1	0	1
174	1	1	11.93	10	1.28	0	10.6	0.6	0	0
213	0	0	6.64	10		0	0	0	0	1
222	0	0	5.53	14		0	0	0	0	1
270	0	0	6.97	23	0.28	0	0	0	0	1
288	1	1	11.93	18	1.8	0	1	0	0	0
291	1	0	11.93	22	0.01	1	10.6	2.4	0	0
417	0	0	6.45	40		0	0	0	0	1
475	0	0	6.81	14		0	0	0	0	1

Types of Naive Bayes

Gaussian Naive Bayes

Optimal Naive Bayes
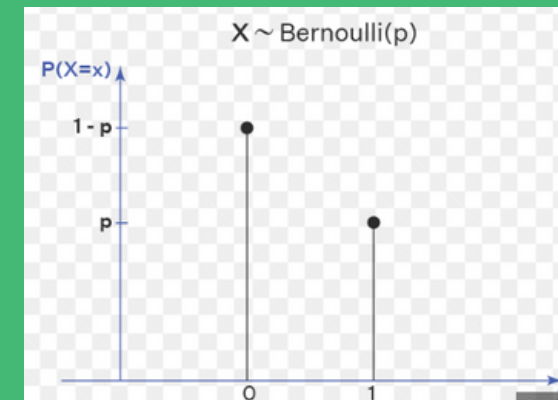
Bernoullli Naive Bayes
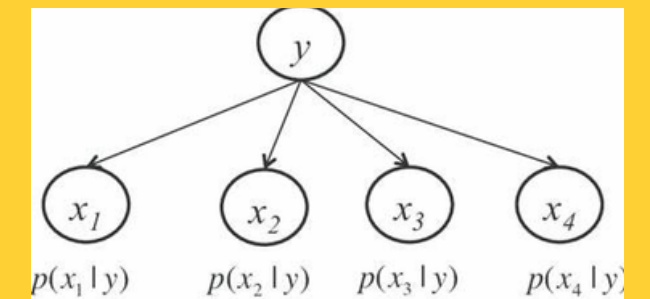
Multinomial Naive Bayes

Implementation

- **Data Pre-processing**
- **Fitting Naive Bayes to the Training set**
- **Predicting the test result**
- **Determining test accuracy of the result**
- **Visual analysis of the training set result**
- **Visual analysis of the test set result**

Advantages

- **Less complex**

- **Scales well**

- **Can handle high-dimensional data:**

Disadvantages

- **Subject to Zero frequency**

- **Unrealistic core assumption**
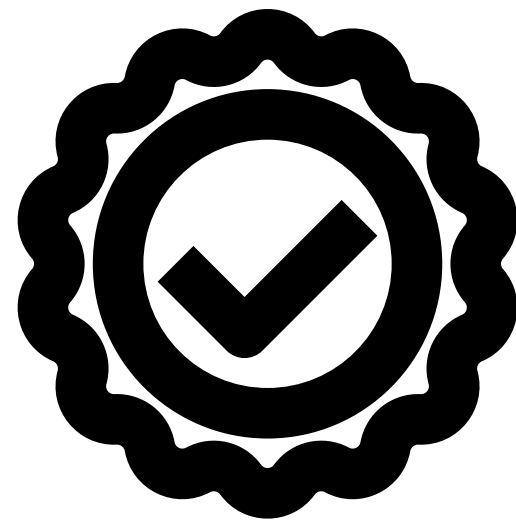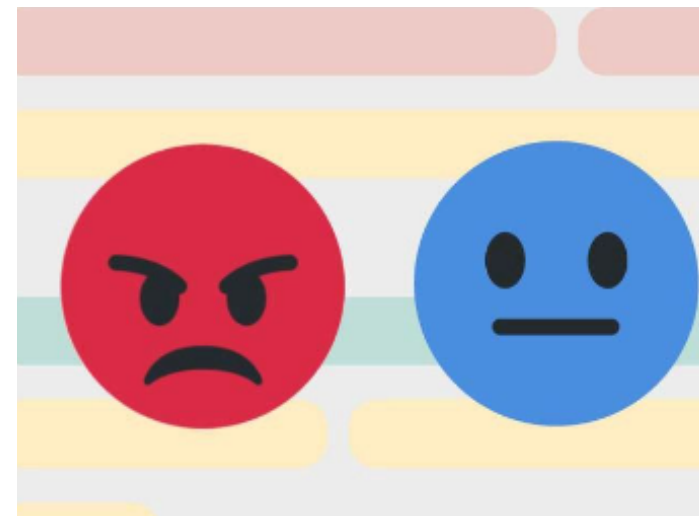
Applications of Naive Bayes

01

Mental state predictions:

02

Recommendation systems

03

Sentiment analysis

04

Spam filtering.