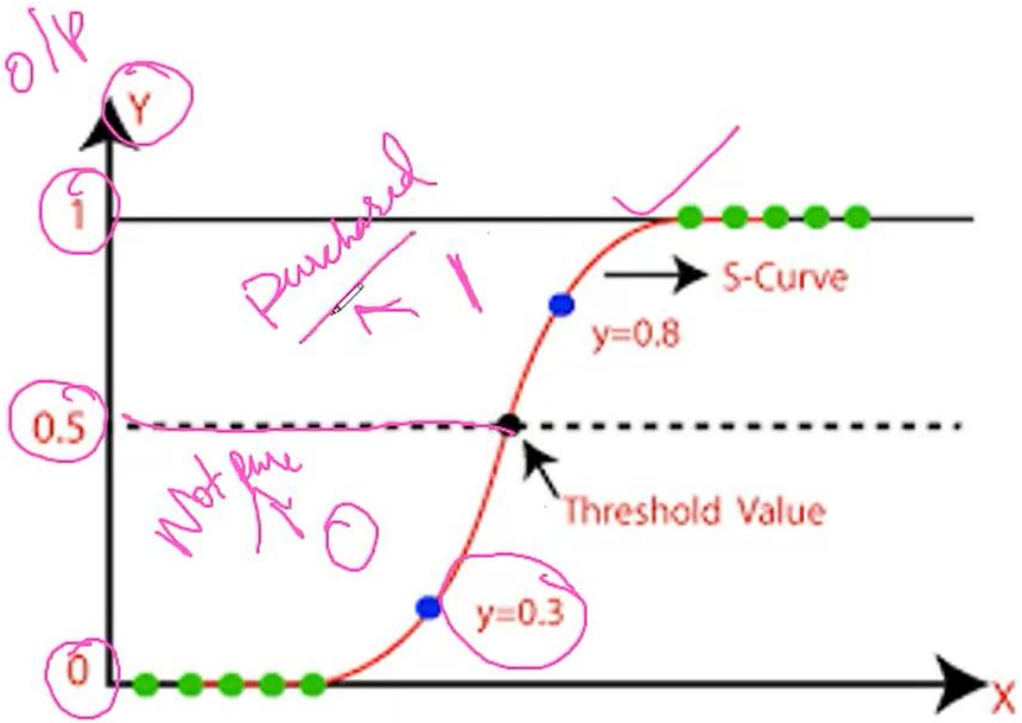
Pure Classification Algorithm

Logistic Algorithm



O/P

I/P

Sigmoid → classification

S

→ Sigmo

↓

binary classificat

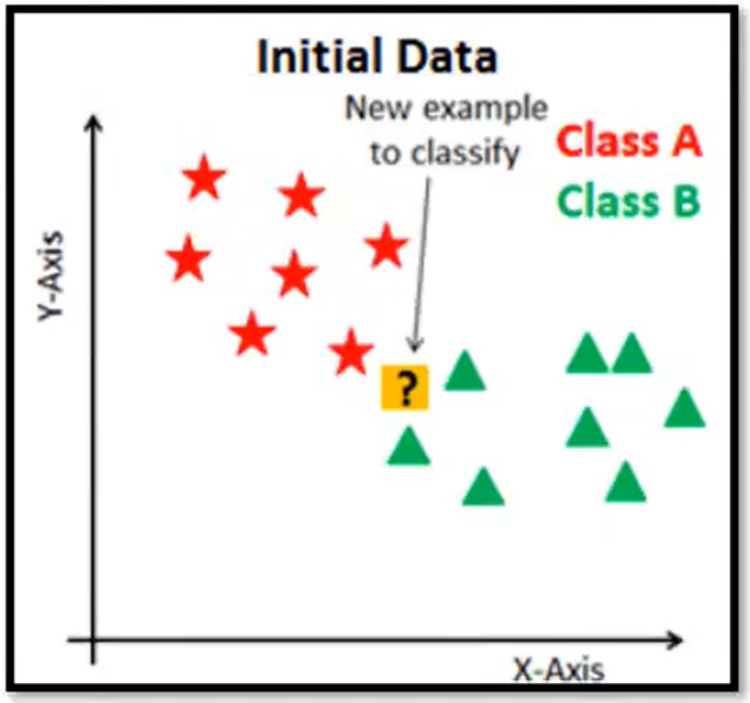
↓

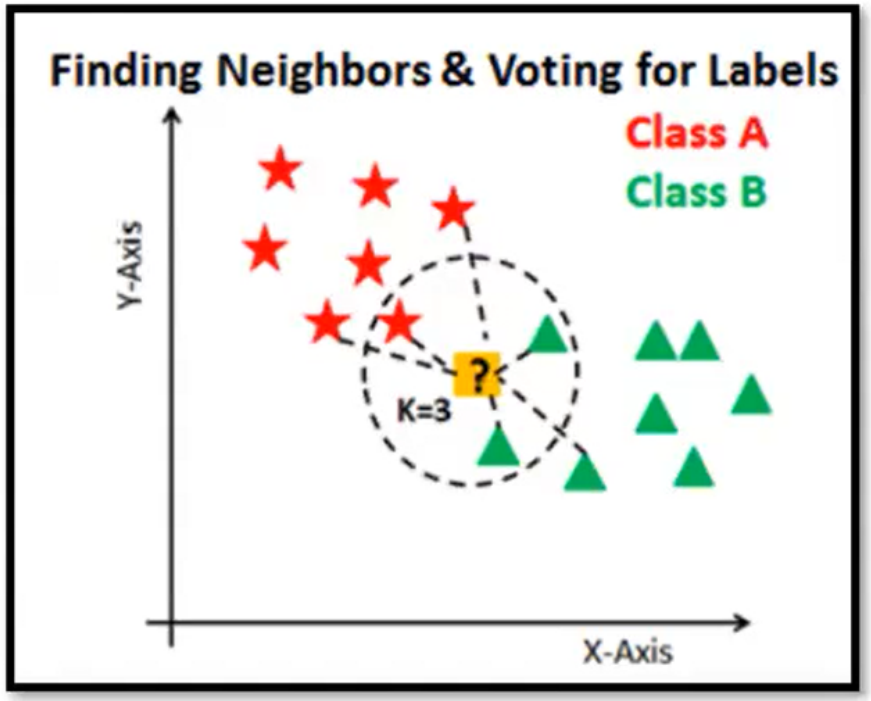
Pur / no P / N

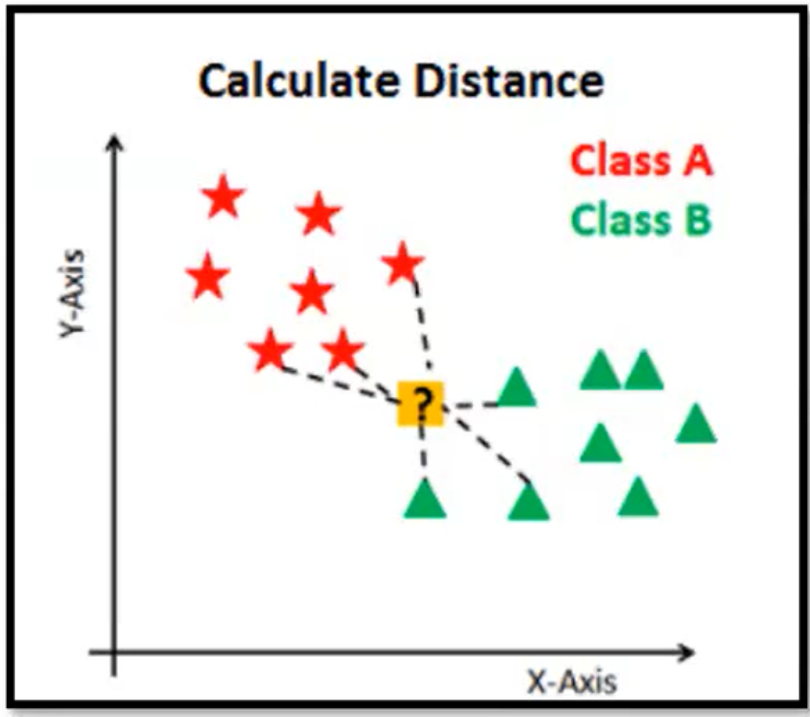
T / F

y / N

K-Nearest Neighbour







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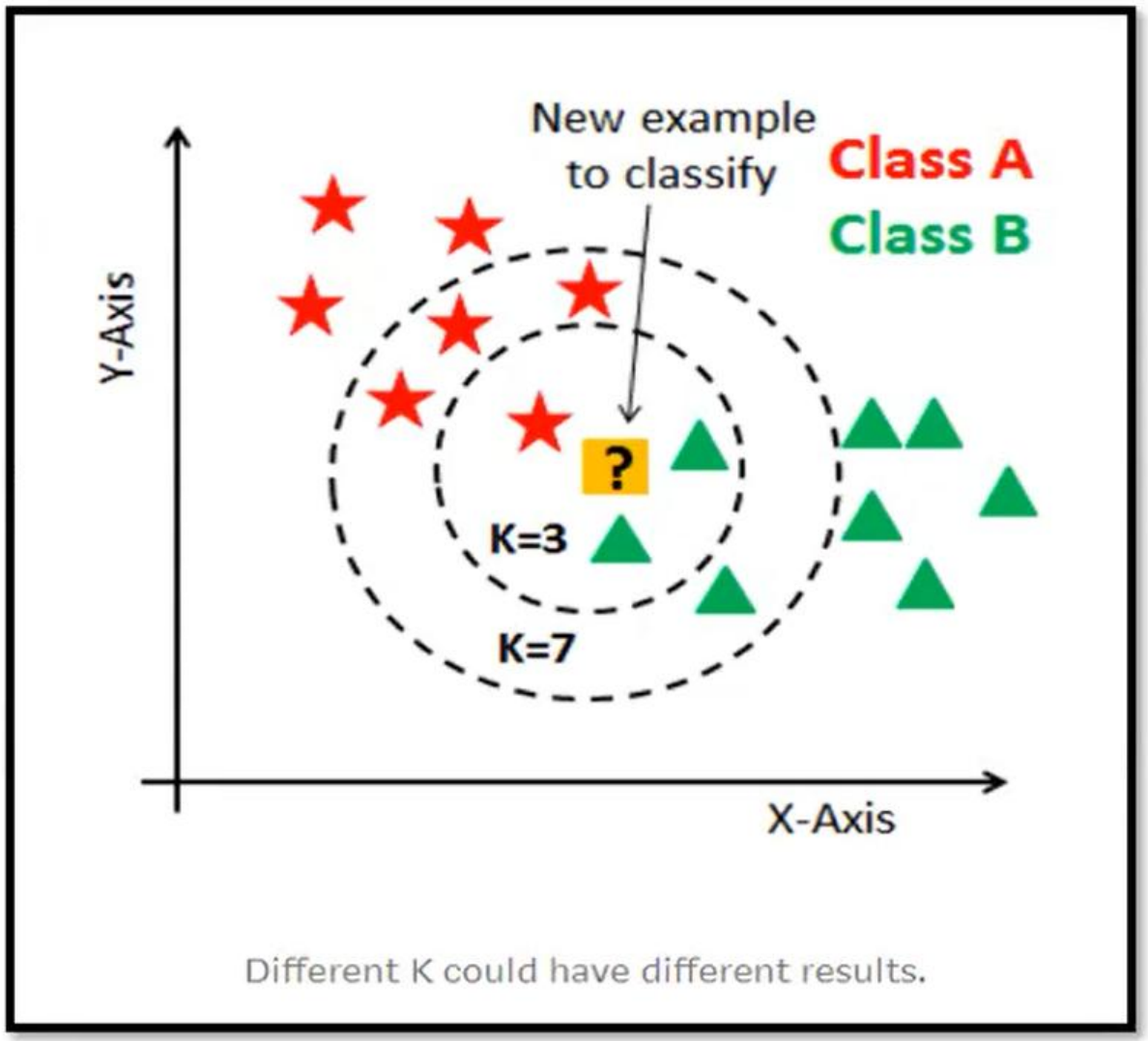
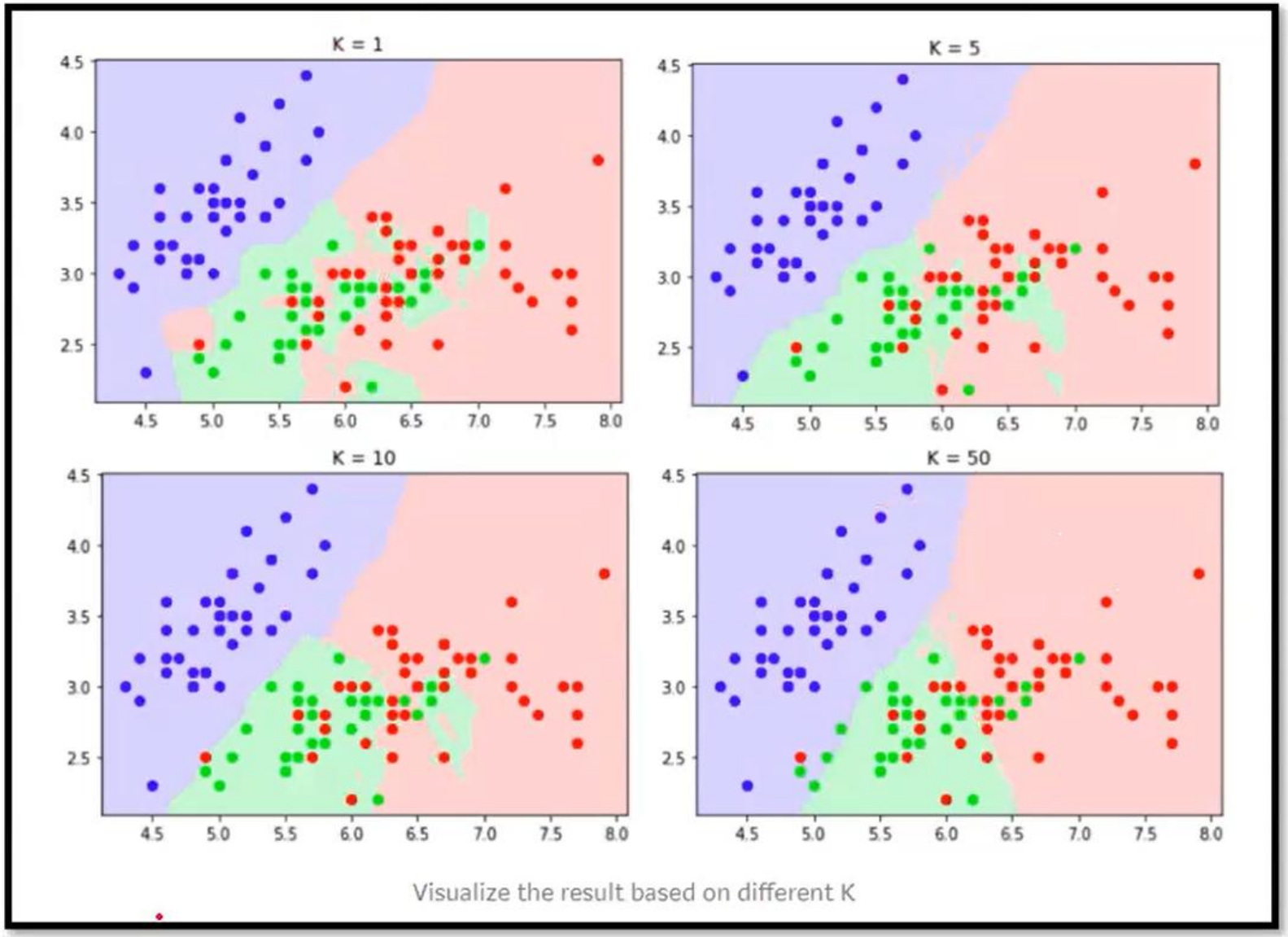
K-Nearest Neighbour



Different K could have different results.

K-Nearest Neighbour



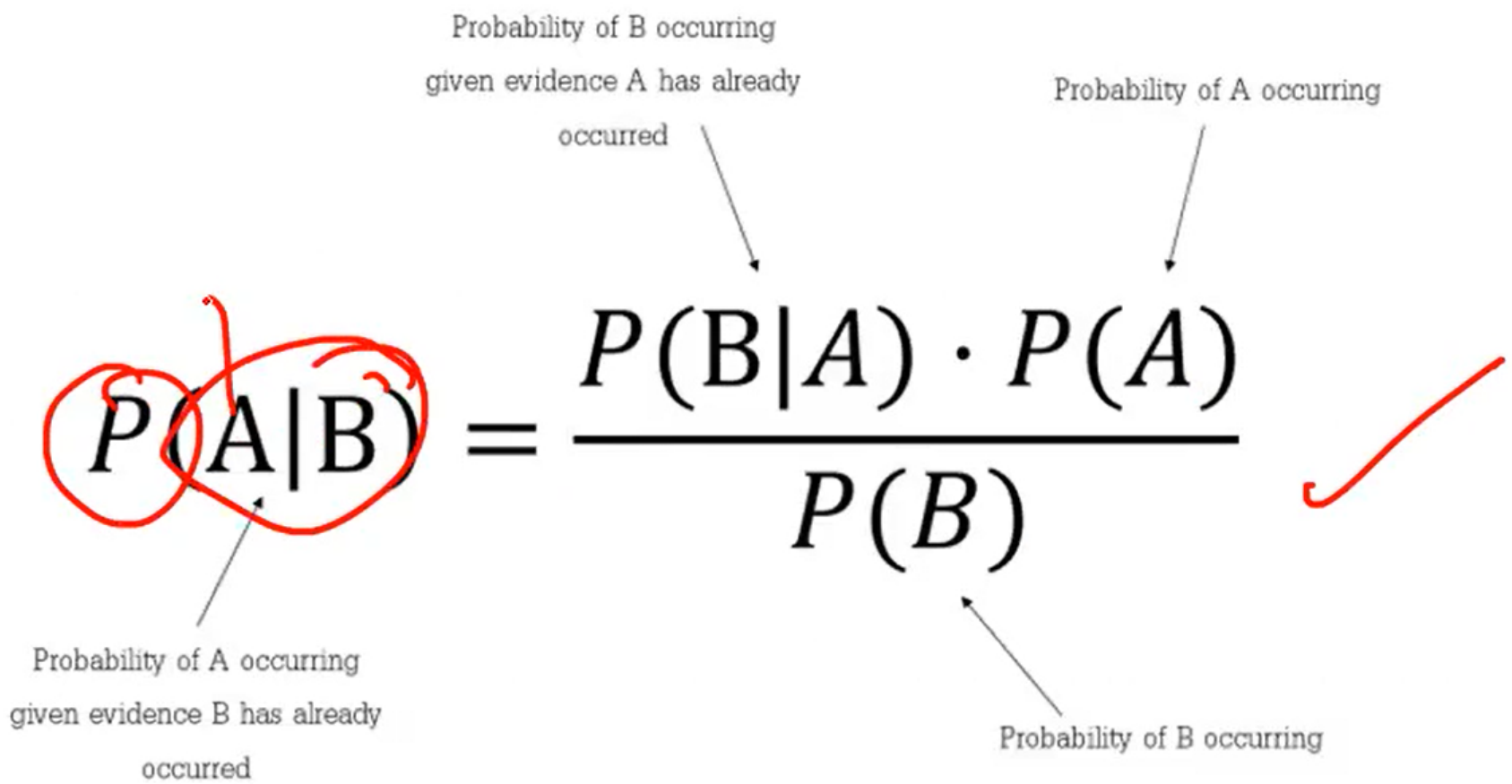
Visualize the result based on different K

Navies' Bayes

Naïve Bayes is a probabilistic machine learning algorithm based on the **Bayes Theorem.**

Conditional probability is a measure of the probability of an event occurring given that another event has (by assumption, presumption, assertion, or evidence) occurred.

Navies' Bayes



In simpler terms, Bayes' Theorem is a way of finding a probability when we know certain other probabilities.

Navies' Bayes

Assumptions

Independent → Each variable should not have any connection

Equal → All the variables are equally important

Navies' Bayes

Color	Type	Origin	Stolen
Red	SUV	Domestic	?

$$P(y|X) = \frac{P(X|y)P(y)}{P(X)}$$

The variable **y** is the class variable(stolen?), which represents if the car is stolen or not given the conditions. Variable **X** represents the parameters/features.

$$P(y|x_1, \ldots, x_n) = \frac{P(x_1|y)P(x_2|y)\ldots P(x_n|y)P(y)}{P(x_1)P(x_2)\ldots P(x_n)}$$

Navies' Bayes

xample No.	Color	Type	Origin	Stolen?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes
4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

Frequency Table

		Stolen?	
		Yes	No
Type	Sports	4	2
	SUV	1	3

Frequency Table

Likelihood Table

		Stolen?	
		P(Yes)	P(No)
Type	Sports	4/5	2/5
	SUV	1/5	3/5

Likelihood Table

		Stoten?	
		P(yes)	P(no)
Color	Red	3/5	2/5
	Yellow	2/5	3/5

		Stolen?	
		Yes	No
Origin	Domestic	2	3
	Imported	3	2

		Stolen?	
		P(Yes)	P(No)
Origin	Domestic	2/5	3/5
	Imported	3/5	2/5

Navies' Bayes

$$P(Yes \mid X) = P(Red \mid Yes) * P(SUV \mid Yes) * P(Domestic \mid Yes) * P(Yes)$$

$$= 3/5 * 1/5 * 2/5 * 1$$
$$= 0.048$$

		Stoten?	
		P(yes)	P(no)
Color	Red	3/5	2/5
	Yellow	2/5	3/5

$$P(No \mid X) = P(Red \mid No) * P(SUV \mid No) * P(Domestic \mid No) * P(No)$$

$$= 2/5 * 3/5 * 3/5 * 1$$
$$= 0.144$$

Since 0.144 > 0.048, Which means given the features RED SUV and Domestic, our example gets classified as 'NO' the car is not stolen.

Navies' Bayes

The zero-frequency problem

	Spam = *yes*	Spam = *no*
TimeZone = *US*	10	5
TimeZone = *EU*	0	0

Add 1 for avoid zero frequency

	Spam = *yes*	Spam = *no*
TimeZone = *US*	11	6
TimeZone = *EU*	1	1

3. Types of Regression
    1. 1. Linear Regression
    2. 2. Polynomial Regression
    3. 3. Logistic Regression
    4. 4. Quantile Regression
    5. 5. Ridge Regression
    6. 6. Lasso Regression
    7. 7. Elastic Net Regression
    8. 8. Principal Components Regression (PCR)
    9. 9. Partial Least Squares (PLS) Regression
    10. 10. Support Vector Regression
    11. 11. Ordinal Regression
    12. 12. Poisson Regression

1. Supervised learning

1.1. Linear Models

- 1.1.1. Ordinary Least Squares
- 1.1.2. Ridge regression and classification
- 1.1.3. Lasso
- 1.1.4. Multi-task Lasso
- 1.1.5. Elastic-Net
- 1.1.6. Multi-task Elastic-Net
- 1.1.7. Least Angle Regression
- 1.1.8. LARS Lasso
- 1.1.9. Orthogonal Matching Pursuit (OMP)
- 1.1.10. Bayesian Regression
- 1.1.11. Logistic regression
- 1.1.12. Generalized Linear Regression
- 1.1.13. Stochastic Gradient Descent - SGD
- 1.1.14. Perceptron
- 1.1.15. Passive Aggressive Algorithms
- 1.1.16. Robustness regression: outliers and modeling errors
- 1.1.17. Quantile Regression
- 1.1.18. Polynomial regression: extending linear models with basis functions