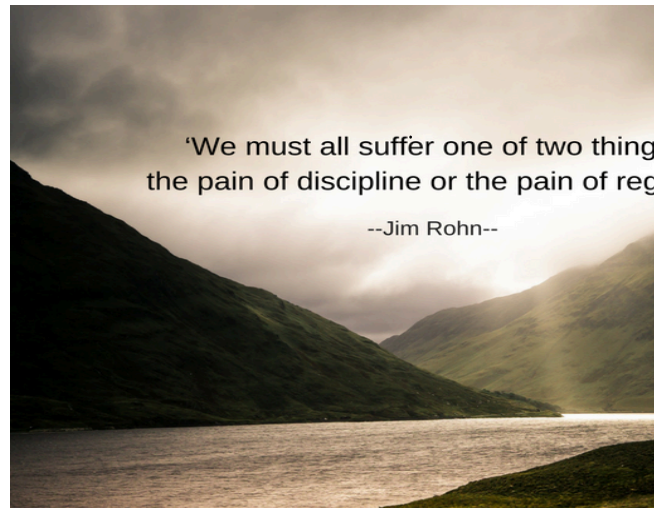


01. Linear Algebra - 1

Monday, 18 March 2024 8:59 PM

HI!!!



Start @ 09:07 PM

Module Overview:

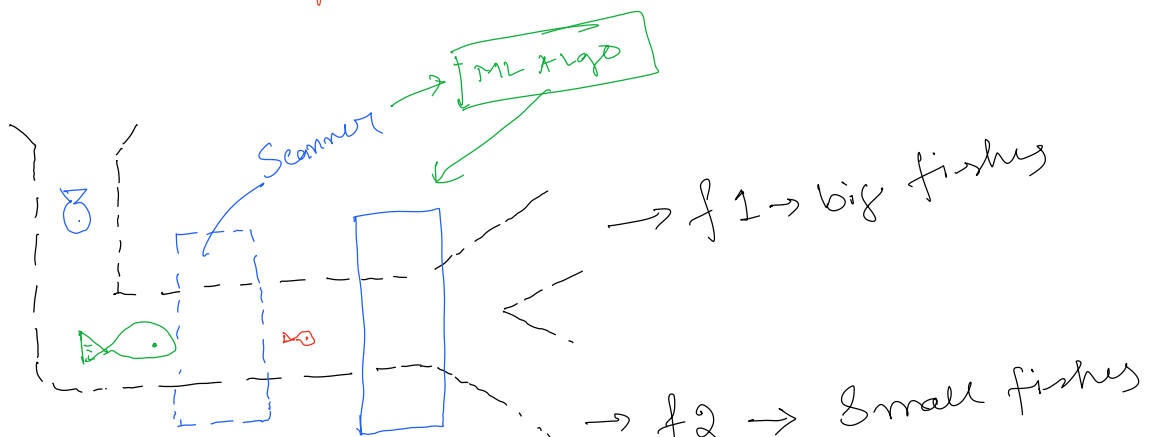
↳ Linear Algebra

↳ Co-ordinate Geometry

↳ Calculus

↳ Optimization

Fish Sorting Problem: → Binary - Classification



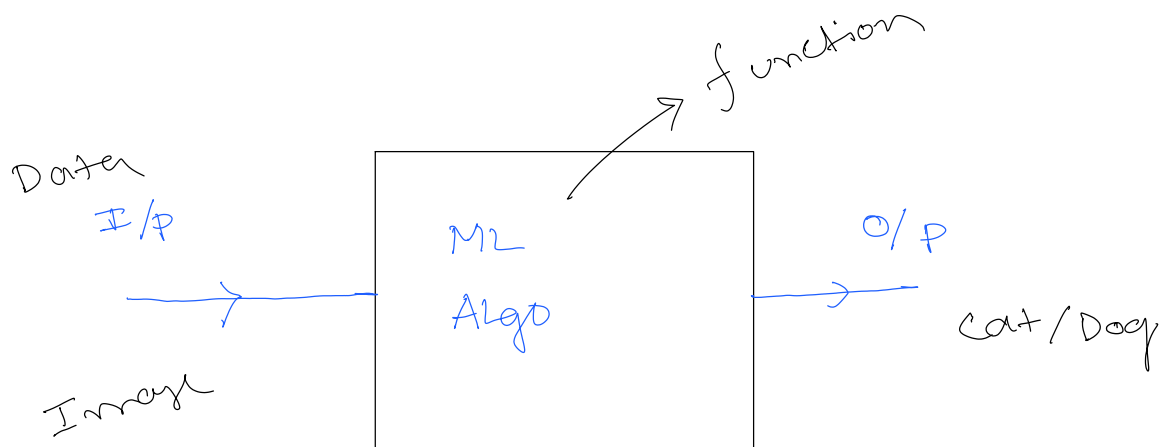
↓
Separator

← features →

H	L	Col	Type
20	300	R	f1
5	20	w	f2
	⋮		

→ Target / Dependent variable /

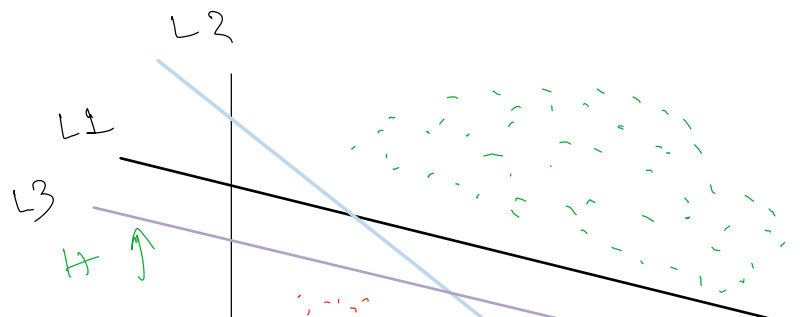
Independent variables



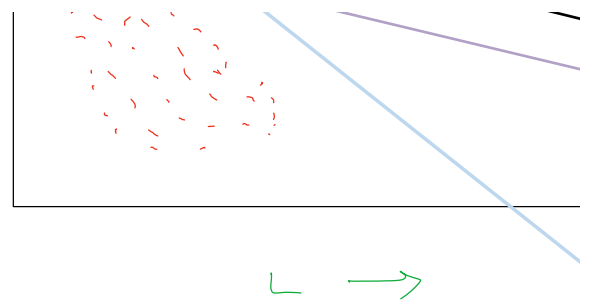
Supervised Learning.

1st step: Visualize the data

Q. What is the equation of line that is

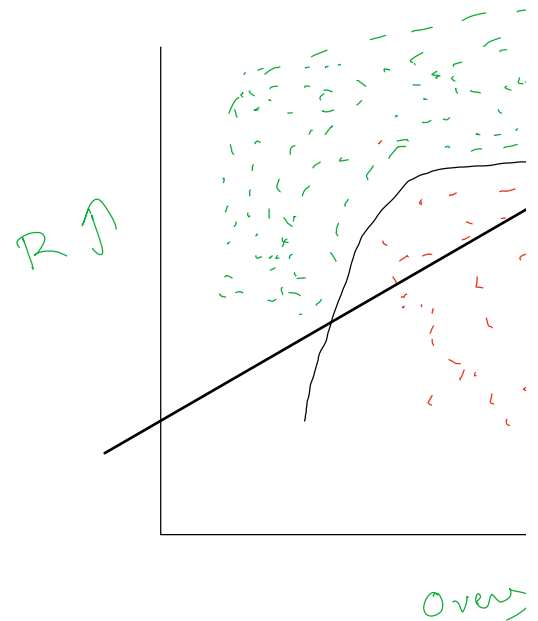


Separating the class?

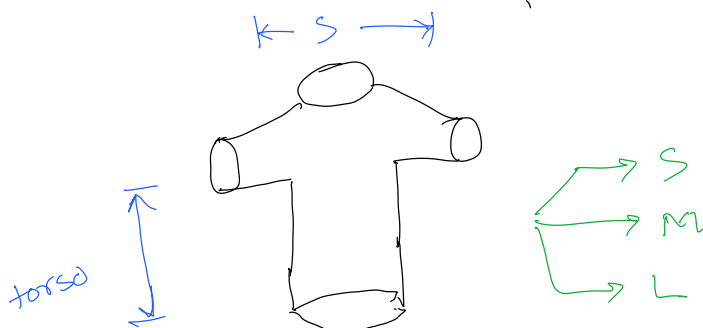


IIII IPL Win Prediction:
 ↳ Binary Classification Problem

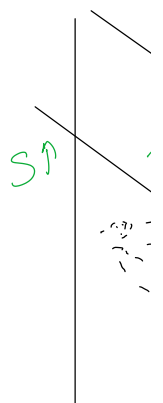
Runs	Overs	Outcome
90	5	W
90	15	L
18	1	W
30	7	L



IIII Example 3: T-Shirt Size Prediction



S	T	Type
61	40	S
62	38	S
70	50	M
80	60	L

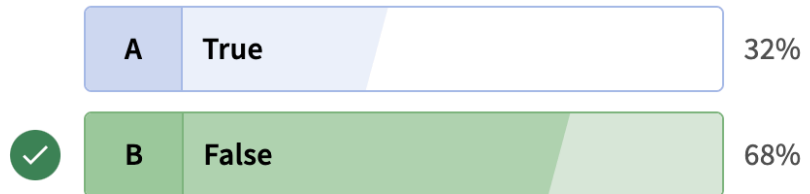


Multi-class Classification Problem

⊛ Note: When the target variable is ()
it is a classification problem.

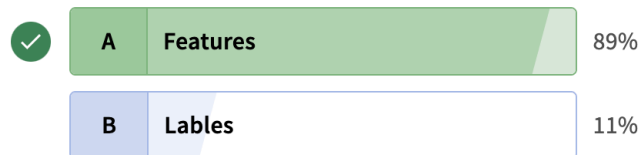
Features are dependent variables

85 users have participated



If the task is to classify whether the image is of a dog or a cat then the columns eyes, nose, ear.

140 users have participated



Process of Building a Machine Learning

a. Data Collection → Labeled data.

b. Data Visualization
 → Plot
 → PCA / t-SNE
 ↓
 this module

c. Choose a geometric structure
 separate the two classes.

2D \rightarrow 1D Line

3D \rightarrow 2D plane

4D \rightarrow 3D Hyperplane

5D \rightarrow 4D Hyperplane

n D \rightarrow $(n-1)$ D Hyperplane.

d. Choose a Loss / Gain function.

e. Training / Optimization.

When classifying images of animals from a nursery book, would this task typically be classification or a multiclass classification problem?

97 users have participated

A	Binary classification
✓	B Multiclass classification
C	Neither
D	It can be both binary and multiclass, depending on the approach

Co-Ordinate Geometry:

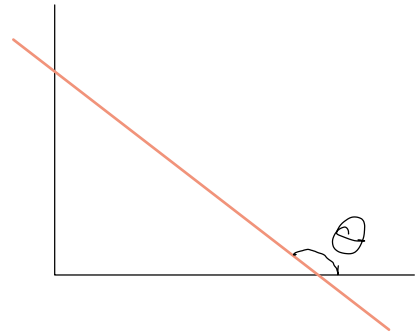
$$y = mx + c$$

\swarrow \searrow \nearrow \rightarrow \Rightarrow
 Input \rightarrow y -intercept. \Rightarrow Equation Lin

Output

slope

$$m = \tan \theta$$

 $-\alpha \text{ to } +\alpha$


General Equation of Line:

$$Ax + By + c = 0$$

$$\rightarrow w_1 x + w_2 y + w_0 = 0$$

\rightarrow weights.

$$\Rightarrow \frac{w_1}{w_2} x + y + \frac{w_0}{w_2} = 0$$

$$\text{or, } y = -\frac{w_1}{w_2} x - \frac{w_0}{w_2}$$

$$m = -$$

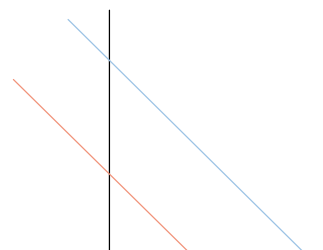
$$c = -$$

$$y = mx + c$$

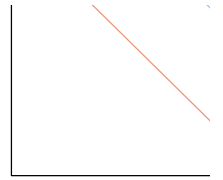
Q. When can I say 2 lines are parallel?

$$\Rightarrow \theta_1 = \theta_2$$

$$\tan \theta_1 = \tan \theta_2$$



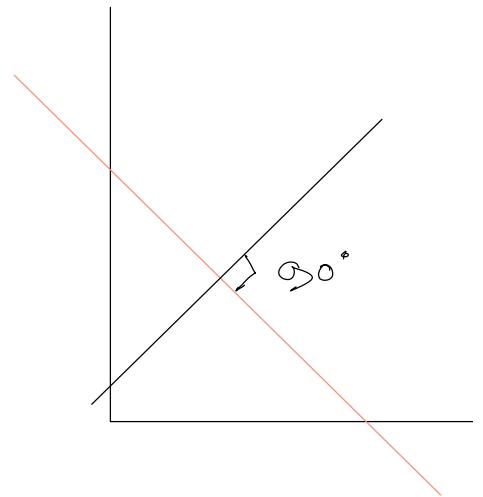
$$m_1 = m_2$$



Q. When do I say 2 lines are Perpendicular

\Rightarrow

$$m_1 \times m_2 = -1$$



In 2D: $w_1x_1 + w_2x_2 + w_0 = 0$

In 3D: $w_1x_1 + w_2x_2 + w_3x_3 + w_0 = 0$

In 4D: $w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4 + w_0 = 0$

In nD: $w_1x_1 + w_2x_2 + \dots + w_nx_n + w_0 = 0$

In the slope-intercept form of a linear equation, $y = mx + b$, which of the following statement being perpendicular to the x-axis?

69 users have participated

A Lines described by this form can be perpendicular to the x-axis for any value of 'm.'



B Lines described by this form are never perfectly perpendicular to the x-axis, regardless of

C Lines described by this form are always perfectly perpendicular to the x-axis, regardless of

D Lines described by this form are only perpendicular to the x-axis when 'm' is negative.

**For the equation of line $Ax+By+c=0$
what are A and B in the context of machine learning?**

1 user has participated

A	y-intercept	0%
B	Features	0%
<input checked="" type="radio"/> C	Weights	100%
D	Bias	0%

Half Spaces:

