

An abstract graphic on a dark blue background featuring a complex network of white lines and dots. The dots are of varying sizes and are connected by thin white lines, creating a web-like structure that spans the width of the image. The overall effect is one of connectivity and digital technology.

Day 4 GNITS AI Workshop

Building a Shallow Network

Artificial Neurons

Activation Functions

Synaptic Weights

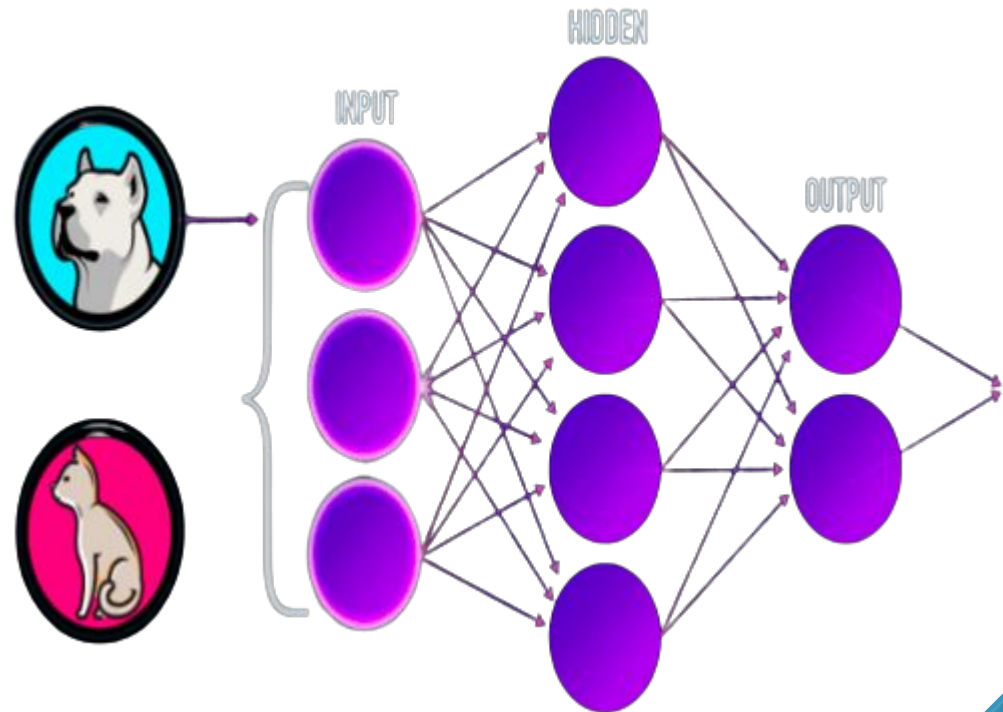
Bias

Layers

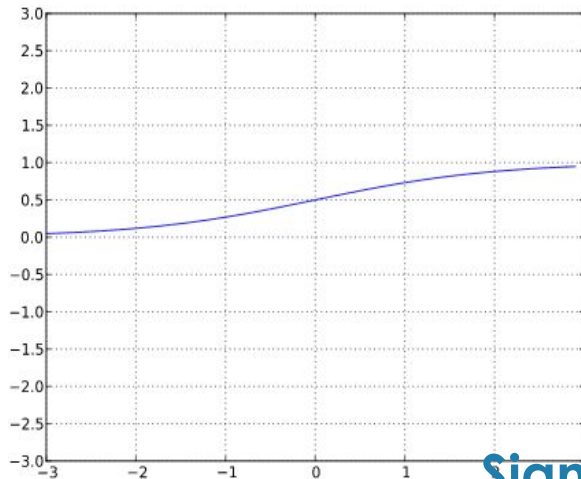
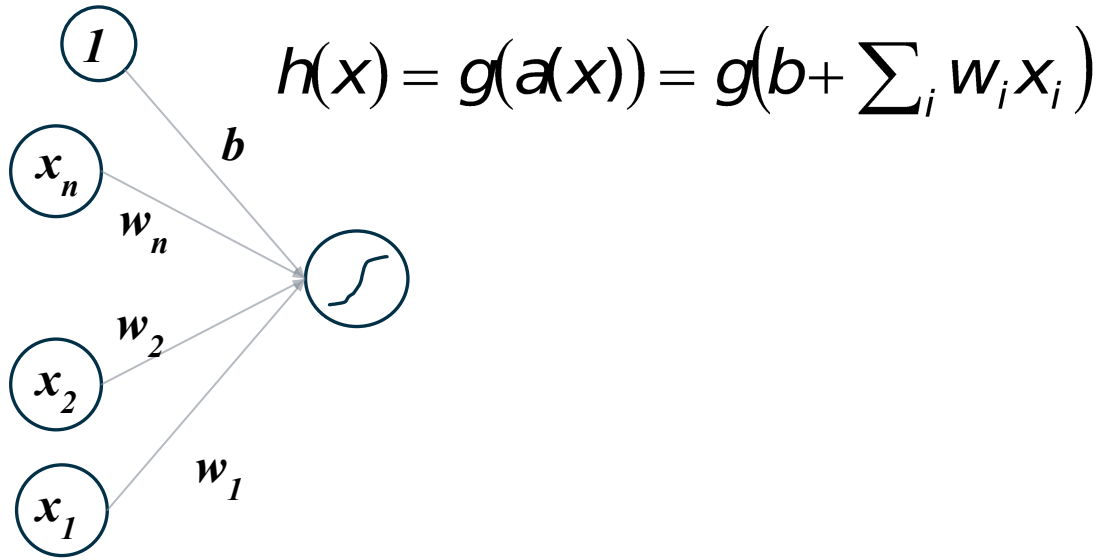
Data Normalization

Gradient Descent, Learning

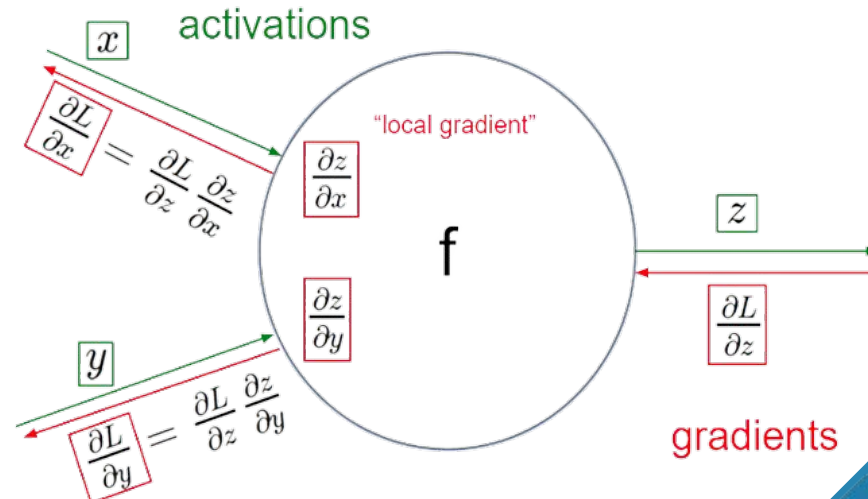
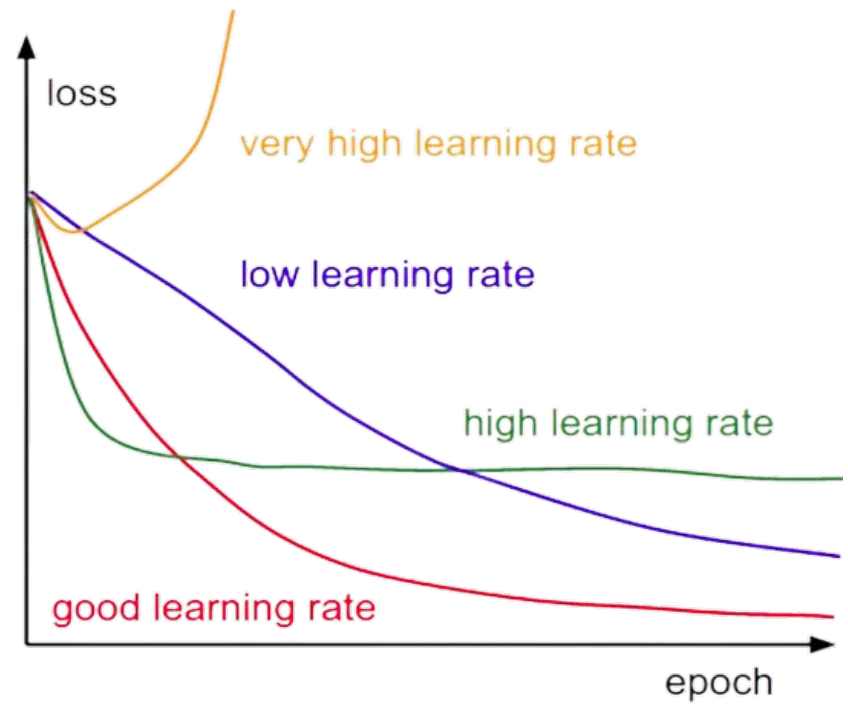
Rate and Loss Function



Building a Shallow Network



$$f(x) = \frac{1}{1 + e^{-x}}$$



Building a Shallow Network

Useful formulae

Sigmoid and derivative:

$$g(x) = \frac{1}{1 + e^{-x}}$$

$$g'(x) = g(x)(1 - g(x))$$

Update function for individual weights:

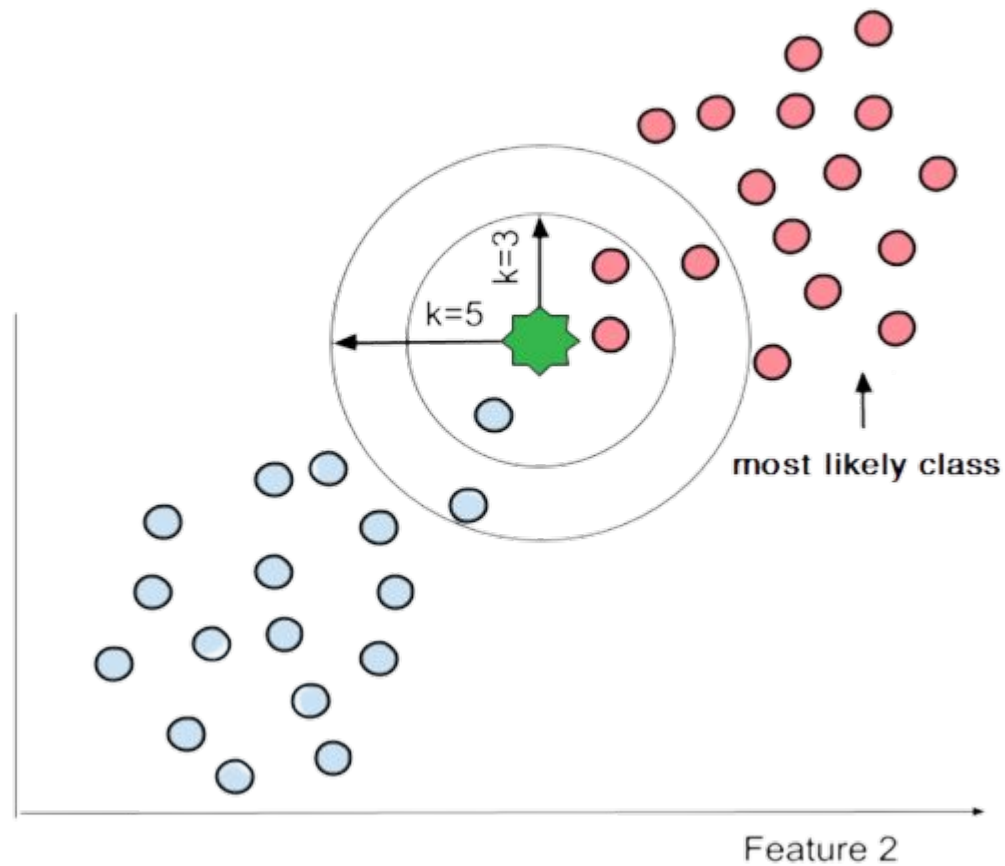
$$w_{i,j} = w_{i,j} + \alpha a_i \Delta_j$$

where:

$$\Delta_j = (y_j - h_j)g'(\sum_k w_{k,j}a_k) \quad \text{for output layer}$$

$$\Delta_j = g'(\sum_k w_{k,j}a_k) \sum_i w_{j,i} \Delta_i \quad \text{for other layers}$$

kNN Algorithm



“K Nearest neighbour is a simple algorithm that stores all the available cases and classifies the new data or case based on a similarity measure.”

kNN Algorithm

Recommender System

Industrial Application of KNN Algorithm



Samsung Galaxy M33 5G (Mystique Green, 8GB, 128GB Storage) | 6000mAh Battery | Upto 16GB RAM with RAM Plus | Travel Adapter to be Purchased Separately

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Samsung Galaxy M32 Prime Edition (Light Blue, 4GB RAM, 64GB) ★★★★★ 57,449
₹13,499.00 ✓prime



Redmi Note 12 5G Frosted Green 4GB RAM 128GB ROM | 1st Phone with 120Hz Super... ★★★★★ 1,735
Deal of the Day
₹17,999.00 ✓prime
List: ₹19,999.00 (10% off)



Samsung Galaxy S21 FE 5G (Graphite, 8GB, 128GB Storage) ★★★★★ 949
₹36,448.00 ✓prime



Spigen Tough Armor Back Cover Case for Samsung Galaxy Z Flip 3 (TPU + Poly Carbonat... ★★★★★ 3,044
Deal of the Day
₹3,484.00 ✓prime
List: ₹6,099.00 (43% off)

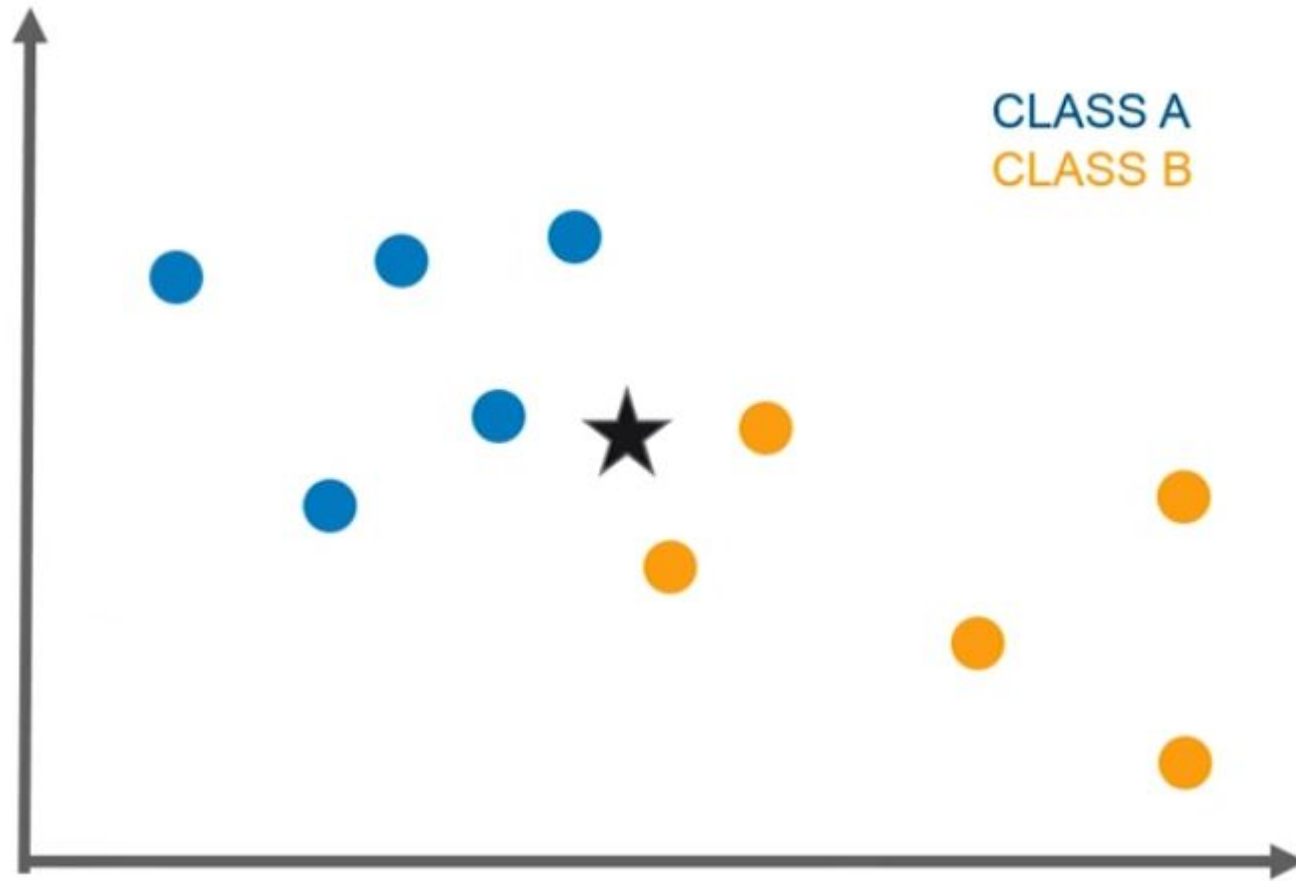


Redmi Note 11 (Horizon Blue, 4GB RAM, 64GB Storage) | 90Hz FHD+ AMOLED Display | Qu... ★★★★★ 53,109
₹11,999.00 ✓prime

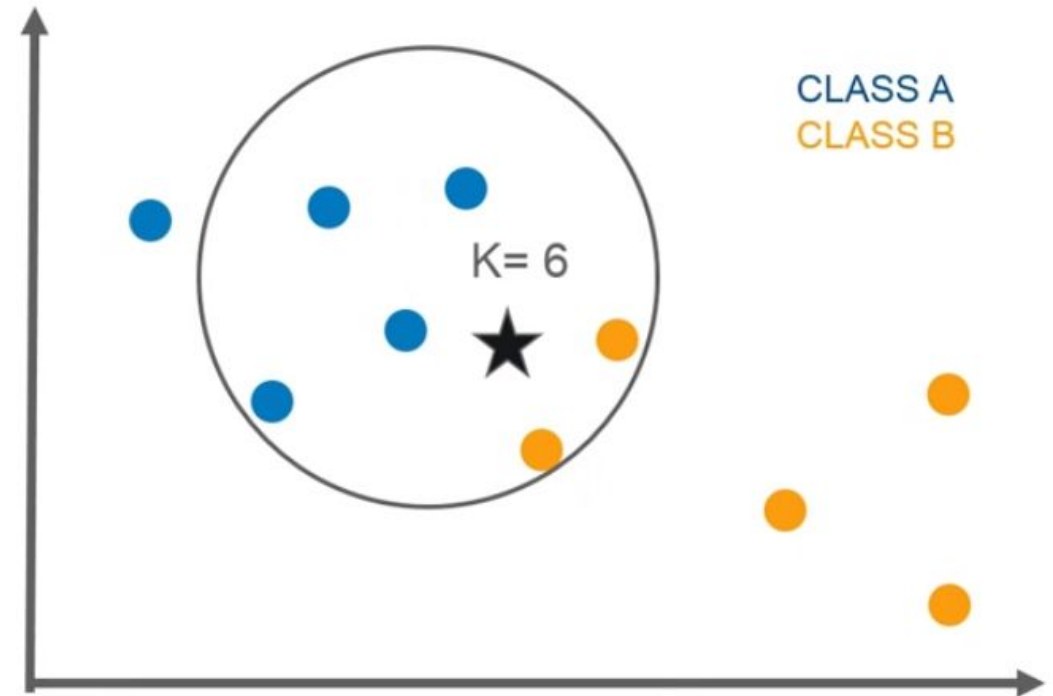
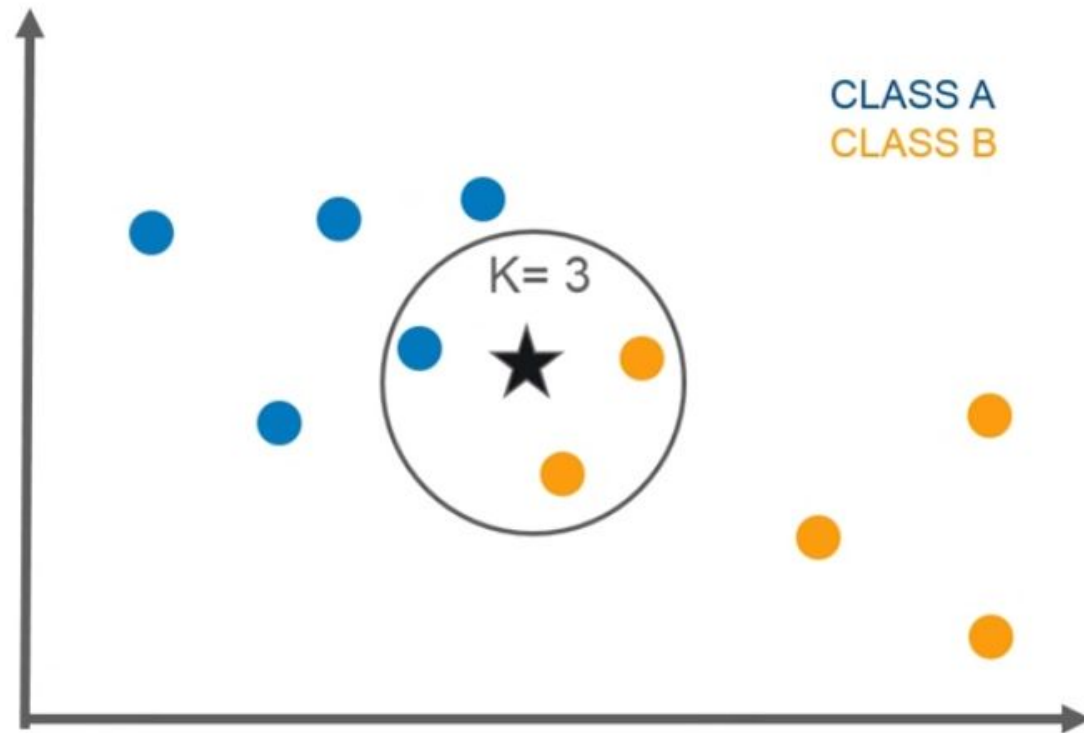


Redmi K50i 5G (Quick Silver, 6GB RAM, 128GB Storage) | Flagship MediaTek Dimensity ... ★★★★★ 7,617
₹23,999.00 ✓prime

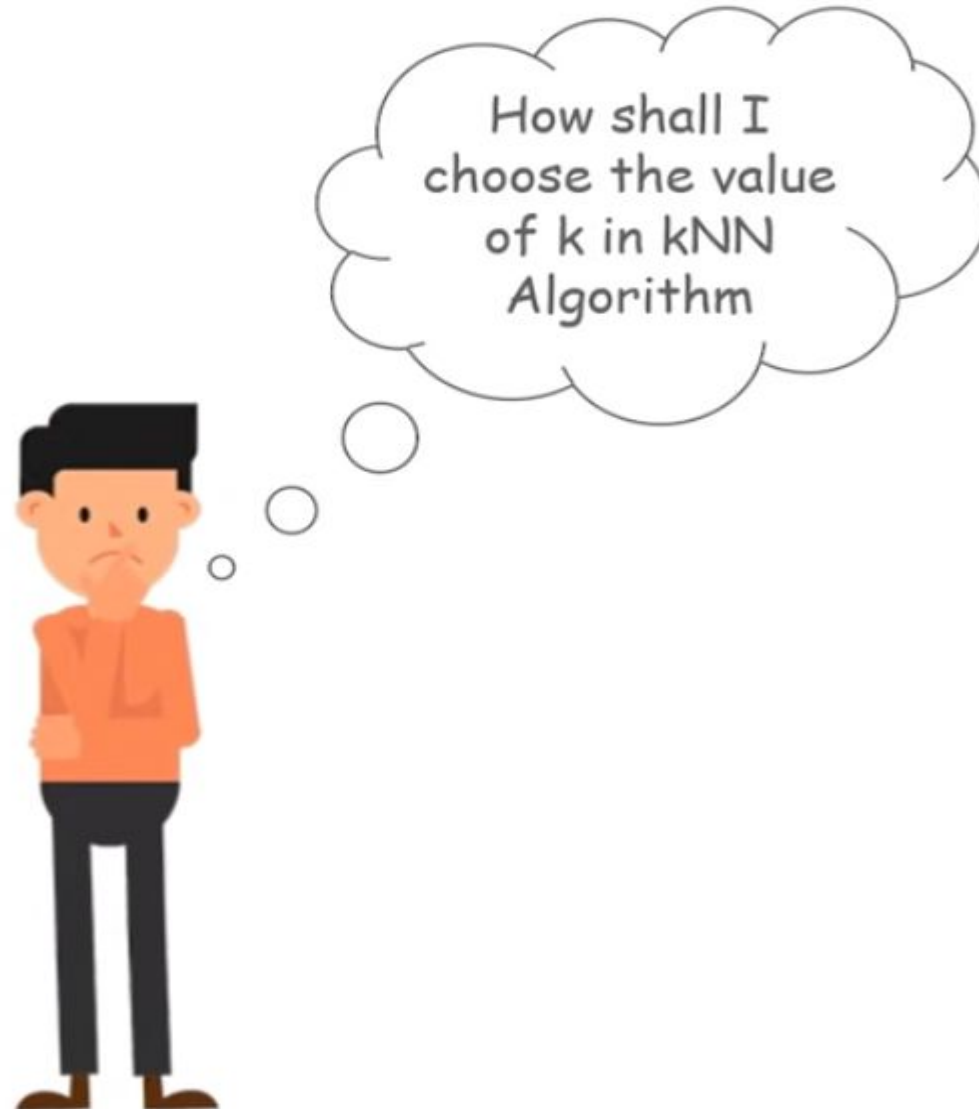
kNN Algorithm



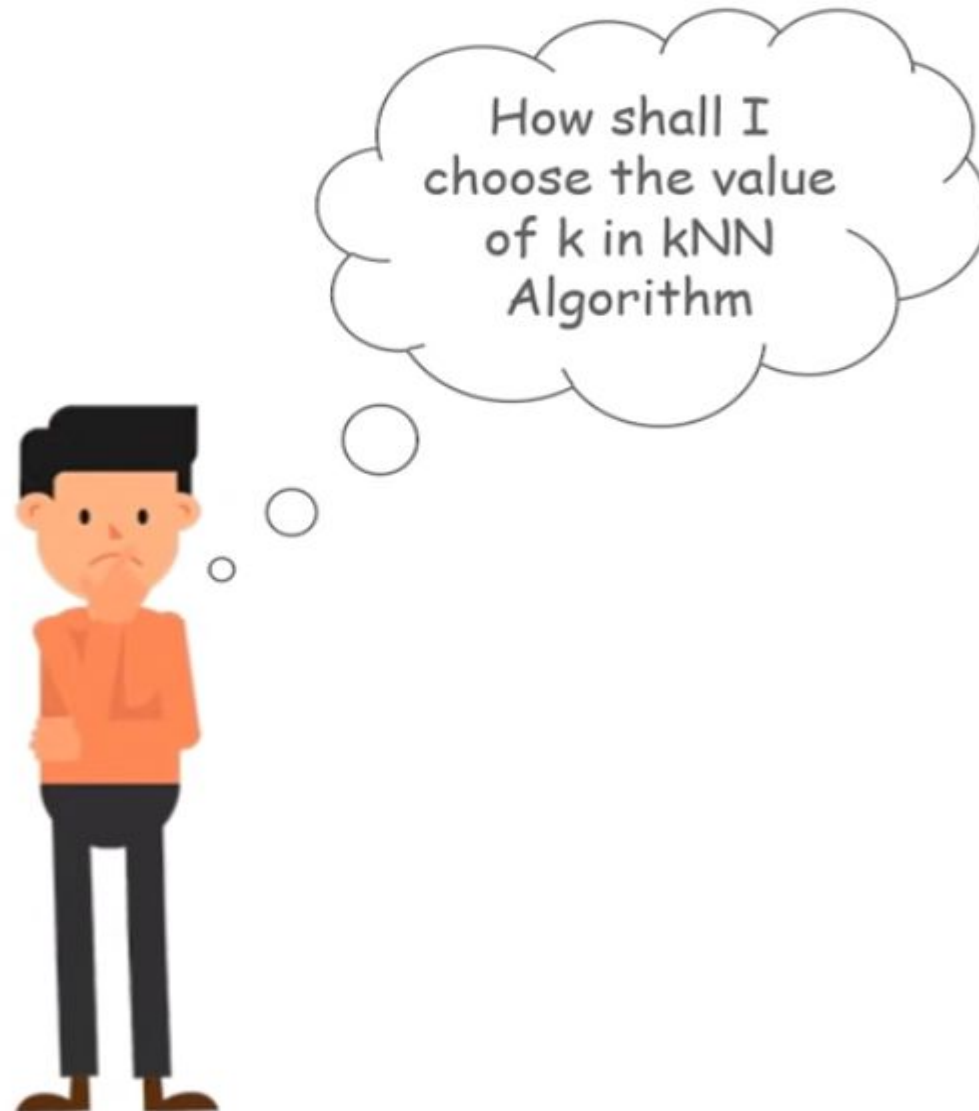
kNN Algorithm



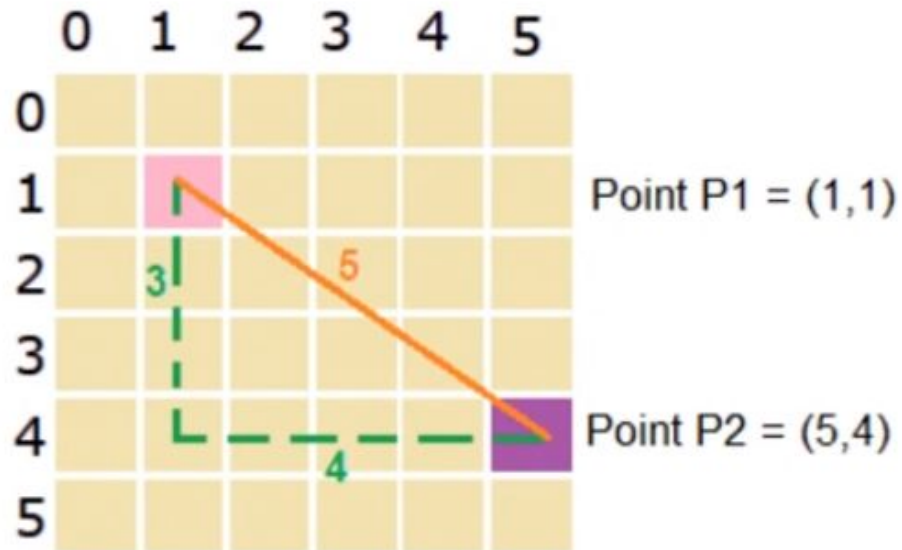
kNN Algorithm



k value



Distances



$$\text{Euclidean distance} = \sqrt{(5-1)^2 + (4-1)^2} = 5$$

$$\text{Manhattan distance} = |5-1| + |4-1| = 7$$



Lazy Learner

Relax and Take it Easy!



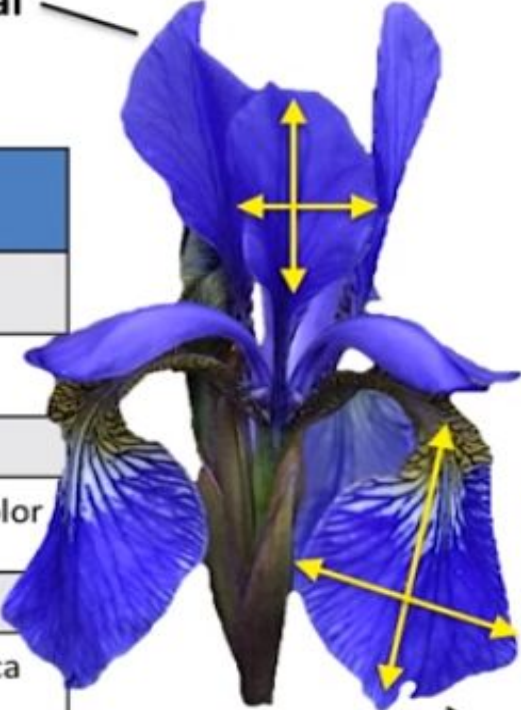
Dataset

Samples
(instances, observations)

	Sepal length	Sepal width	Petal length	Petal width	Class label
1	5.1	3.5	1.4	0.2	Setosa
2	4.9	3.0	1.4	0.2	Setosa
...					
50	6.4	3.5	4.5	1.2	Versicolor
...					
150	5.9	3.0	5.0	1.8	Virginica

Features
(attributes, measurements, dimensions)

Class labels
(targets)



\$ wget

<https://github.com/scikit-learn/scikit-learn/blob/4180b079f7709fe5ab8d32a11438116dc8957715/sklearn/datasets/data/iris.csv>

Questions ?