3) Explain the model of a Neural Network.

Ans   There are two types of Neural Network:-

   → Single artificial Neuron
   → Multi-layer ANN.

An neuron is the basic processing unit of the network.

Single Artificial Neuron

→ This neuron receives inputs from its preceding neurons (Processing elements), performs some non-linear weighted computation on the basis of those inputs, transforms the result into its output value and then passes on the output to the next neuron in the network.

→ x's are the inputs, w's are the weights for each input and y is the output
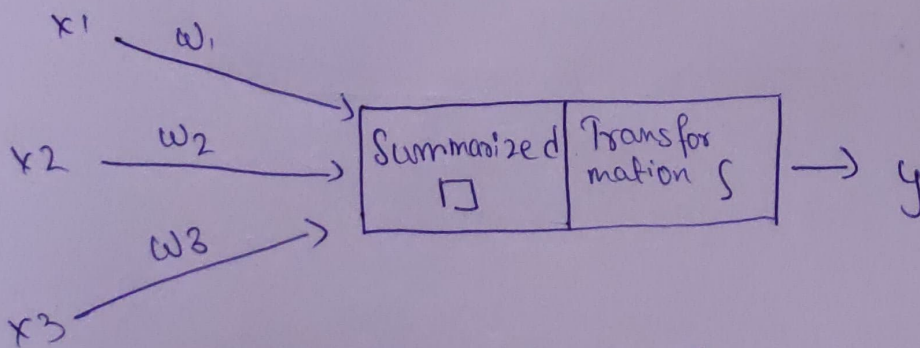
Model for a single Artificial neuron

Multi-layered Artificial Neural Network:-

→ In this type of model, there is atleast one input neuron, one output neuron and at least one processing neuron.

→ Such type of Network is a simple network comprising a single-stage computational unit.

→ Artificial Neural network may have multiple layers of processing elements in sequence. The layers of PEs could work in sequence, or they could work in parallel.
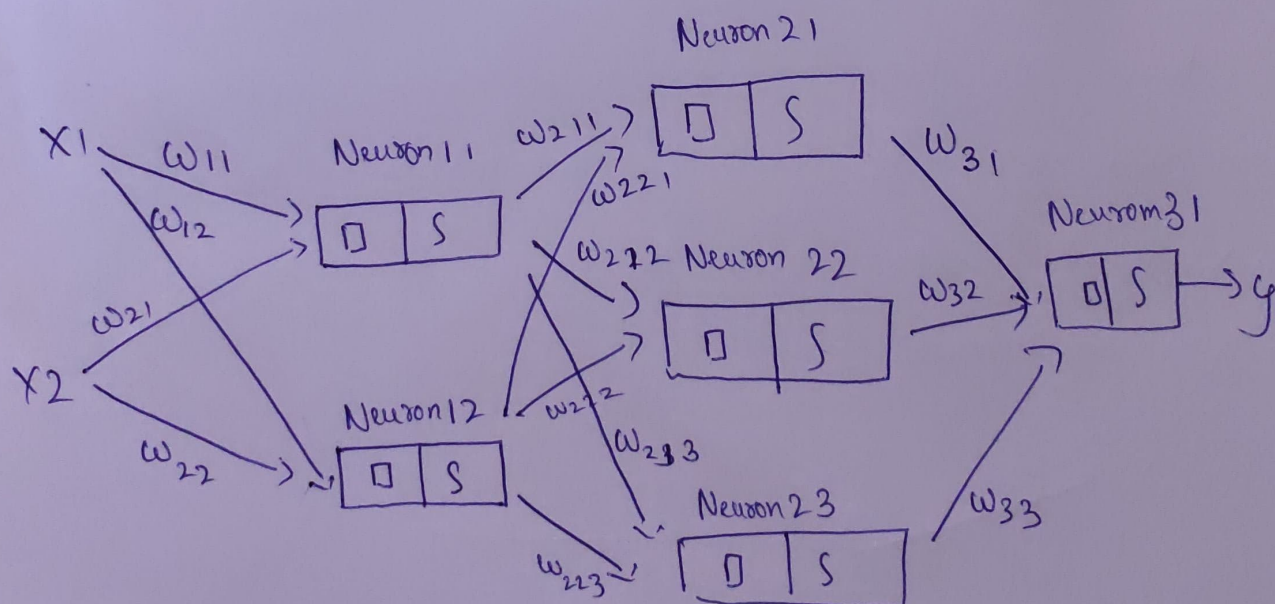
Model for a multi-layer ANN

-> The processing logic of each neuron may assign different weights to the various incoming input streams.

-> The processing logic may also use non-linear transformation such as a Sigmoid function from the processed values to the output value.

-> The neural network can be trained by making similar decisions over and over again with many training cases.

① Explain 3 step process of text mining techniques.

Ans

Text mining is a rapidly evolving area of research. As the amount of social media and other text data grows, there is a need for efficient abstract and categorization of meaningful information from the text. The first level of analysis is identifing frequent words. This creates a bag of important words. Text documents or smaller messages can be ranked on how they match to a particular bag of words.

The next level is identifing meaningful phrases from words.

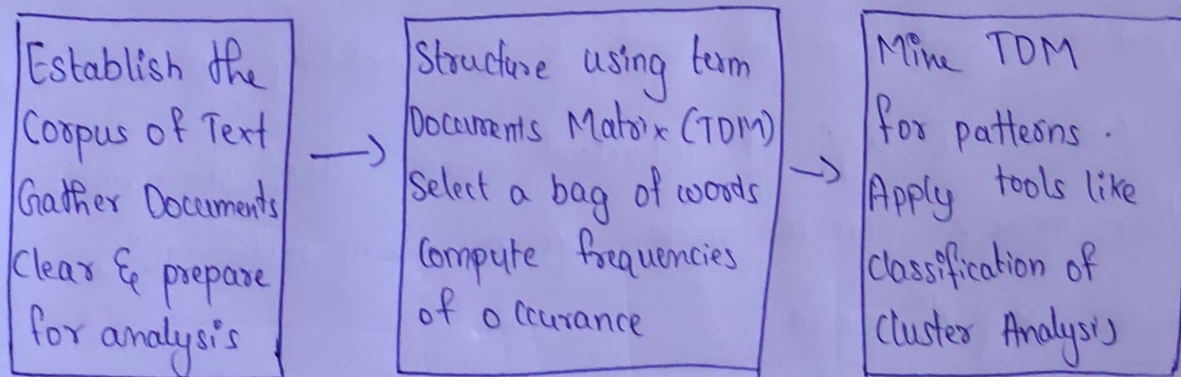Thus 'ice' and 'cream' and will be be two different Key words that often come together.

The next higher level is that of Topics. Multiple topic phrases above can be put into a common basket and is called as 'Desserts'.

The three steps in the text mining process are:

1) The text and documents are first gathered into a corpus and organised.

2) The corpus is then analyzed for Structure. The result is matrix mapping important term to source documents.

3) The Structured data is then analyzed for words structure, sequences and frequency.

Establish the Corpus of Text Gather Documents Clear & prepare for analysis	→	Structure using term Documents Matrix (TDM) Select a bag of words Compute frequencies of occurance	→	Mine TDM for patterns. Apply tools like classification of Cluster Analysis

3-step Text mining process

② Briefly explain Naive Bayes Technique (5)

Ans

→ Naive-Bayes is a conditional probability model for classification. The goal is to find a way to predict the class variable (y) using a vector of independent variables (x) i.e finding the function.

Ex:- X → y.

In probability terms, the goal is to find $P(y|x)$, i.e the probability of Y belonging to a certain class X.

Given an instance to be classified, represented by a vector $x = (x_1, ... x_n)$ representing 'n' feature. The Naive-Bayes model, to an instance, probability of belonging to any of the $\overset{k}{\wedge}$ classes. The class k with the highest posterior probability is the level assigned to the instance.

The posterior probability is calculated as a function of prior probabilities and current likelihood value as shown in equation below

$$P(C_k|x) = \frac{P(C_k)\, P(x|C_k)}{P(x)}$$

$P(C_k|x)$ → Posterior probability of class k, given predictor X

$P(C_k)$ → prior probability of class k

$P(x)$ → prior probability of predictor

$P(x|C_k)$ → Current likelihood of predictor given class

Simple classification example

Suppose a salon needs to predict the service

Simple Classification example

Suppose a salon needs to predict the service required by the incoming customer. only 2 services are offered → Haircut (R) and Manicure-Pedicure (M), value to be predicted is whether next customers will be for R or M.

The number of classes (K) is 2

first step is to compute prior probability.

Suppose in 1 year there are 2500 customers → R
and 1500 " → M

thus prior probability for next customer for $R = \dfrac{2500}{4000}$ oo $5/8$

III'y prior probability for next customer for $M = \dfrac{1500}{4000}$ or $3/8$

∴ The next customer would likely be R

Another way is suppose last 5 customers were for the services R, M, R, M, M orders thus recent probability for R is $2/5$ & for M is $3/5$ so based on this information, the next customer will be for M.

The NB predictor thus dynamically changes its prediction value based on the recent data

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