UNIT-1

1. Why python is interpreted language?Name few interpreted languages
A. python is an interpreted language (that means a python program is executed one line at a time).
Few interpreted languages :
Java script,
Ruby,
Perl,
Php,
Python,etc..

2.Name few Python features
A. 1. Python is easy to learn than other programming languages
2.Lesser code is required to solve a problem than C and C++
3.Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc).

3.Why python is dynamically typed language?
A.We need not to specify the Datatype of the variable. So,it is called dynamically typed language.

4.What are logical operators in python?
A. AND - true if both the operators are true
Syntax : x and y
OR - true if either of the operands is true..
Syntax : x or y
NOT - true if operand is false.
Syntax : not x

5.Indentation ?
A. python uses the indentation to highlight the block of the code.whitespace is used for indentation in python.if a block has to be more deeply nested it is simply indented further to right.

```
Statement
        If condition:
            If condition:
 Else:
         Statement
       Statement
```

6. Type casting?
A. conversion of a variable from one data type to another data type is known as type casting.

```
Ex :  a=int(input("enter num 1:" ))
      b=int(input("enter num 2:"))
      c=a+b
      Print("sum of "a","b",is : ",c)
```

7.Data types in python?

A. LISTS : •lists are used to store multiple items(values) in a single variable.

- Lists are ordered,mutable,and allow duplicate values.
-

TUPLE: Tuple is of 4built data types in python used to store collection of data.
•Tuples are ordered, immutable and allow duplicate values.
DICTIONARY: collection of "key-value" pairs
Siri={"age":26,"sai":2000,"height":5.7}
Age is key, 26 is value
•it should not have duplicate values.

8.input()?
A. input() function is used to read values from the keyboard.

```
Ex:Print("enter your favourite colour: ")
      Ilike=input()
      Print("i like : ", like)
```

9. Why is string immutable?
A. strings are immutable that means once it is assigned it can not be changed.

10.range()?
A. range() function returns a sequence of numbers starting from 0 by default and increment by 1 and stops before a specified number.

```
Example : a ="drumstick"
          a[0:3] = 'dru'
          a[-10:0] ='drumstick'
```

11.Membership operators?
A. IN - returns true if a sequence with the specified value is present in the object.
NOT IN - returns true if a sequence with the specified value is not present in the object.
Ex:

```
a='sai'
print('s' in a)
True
```

12.Identity operators?
A. IS - returns true if both variables are of the same object.
IS NOT - returns true if both variables are not in the same object.
Ex:

```
x = ["apple","banana"]
y = ["apple","mango"]
z = x
print(x is z)
print(x is y)
print(x is not y)
```

Output:-

```
True
False
True
```

13.for() ?
A.A for() loop is used for iterating over a sequence either it is list or tuple or dictionary.
EX : a= range(1,10,2)

```
        For i in a
        Print(i)
Output: 1
          3
          5
          7
          9
```

14. String slicing?
A. creating substrings in a string is known as sting slicing()
Ex:

```
        a="drum stick"
        >>> a[0]
        'd'
        >>> a[0:3]
        'dru'
        >>> a[-10:]
        'drum stick'
         >>> a[:6]
        'drum s'
```

15. ord(),chr()?
A.ord() - converts characters to an integer.
chr() - converts integer to character.
Ex:

```
        >>> chr(122)
        'z'
        >>> ord('A')
        6
```

16.What is a collection?name few
A . collections in python are containers that are used to store collections of data.
Ex: list,dictionary,tuple.

17.Why is the dictionary unordered?
A.
18.Differences between Tuple & List.
A .

LIST	TUPLE
1.Lists are used to store multiple items in a single variable.	1.Tuples are used to store multiple items in a single variable.
2.Lists are created using square brackets [ ].	2.They are created by using parathesis().
3.Lists are ordered , changeable,allow duplicate values.	3.Tuple is ordered and immutable(unchangeable).
4.Ex:- fruit= ["apple", "banana", "cherry"]	5.Ex:- fruit = ("apple", "banana", "cherry", "apple") "cherry")

UNIT-2

1. How do u define function?
A. A block of code to perform a particular task.

2.Uses of function?
A. The main use of function is REUSEABILITY and it avoids repetition in the code.

3.formal and actual arguments?
A. FORMAL - the arguments in function declarations are known as formal arguments.
ACTUAL -the arguments that are passed in a function are called as actual arguments.
Ex:

```
def sum(a,b):    #     a,b  are    formal arguments
      c=a+b
      print(c)
x=10
y=20
sum(x,y)    #    x,y     are    actual arguments
```

4.Difference between positional and keyword arguments?
A. Positional arguments must be included in the correct order.
Ex:-

```
      def mydata(age,sal,city,gen):
      print(age,sal,city,gen)
mydata(20,25000,"tokyo",'f')
```

Keyword arguments are included with a keyword and equals sign.
Ex:-

```
      def mydata(age,sal,city,gen):
      print(age,sal,city,gen)
mydata(city="tokyo",gen='f',age=20,sal=25000)
```

5.Can a function return multiple values at a time?
A. yes.. A function is not restricted to return multiple values at a time, it can return,zero,one,two,list,tuple or more values.
Ex:

```
      a=10
      b=[2,3,4,5]
      c="rossel leaves"
      d=12.45
      def multi():
            return a,b,c,d
```

```
w,x,y,z=multi()
print(w,x,y,z,sep=",")
```

Output:-
10,[2, 3, 4, 5],rossel leaves,12.45

6.Difference between local and global variables
A. LOCAL VARIABLES - Variables are declared inside the function,these variables can be used within that function only.
GLOBAL VARIABLES- Variables are declared Outside of the function, these variables can be used in any function of overall program.
Ex:

```
a=10#global variables
def eat():
    a=20#local to eat()
    print(a)
def vomit():
    print(a)
    eat()
vomit()
print(a)
```

7.Fruitful function?
A. a function that returns a value.
A fruitful function must be always return a value to where it is called from..
A fruitful function can return any type of values such as string,integer,boolean,etc..
Ex:

```
def square(val):
    return val*val
n=int(input("enter num:"))
result=square(n)
print("the suare of ",n," is:",result);
```

8.Recursive function?
A. a function calling by itself is called as recursive function.
Ex:

```
def factorial(x):
    if x == 1:
        return 1
    else:
        return (x * factorial(x-1))
num = 10
print("The factorial of", num, "is", factorial(num))
```

9.Displaying a string using recursion.

A. name=”svec”

Def show(i):

If i==5:

Return

Else:

```
        print(name(i),end=" ")
         show(i-1)
        print("\n")
```

10.Exception?name few examples

A. an abnormal event or situation which stops the normal flow of execution of a program or task.

Ex: ZeroDivisionError,IdentationError,KeyboardInterrupt,ValueError,IndexError,KeyError

11.What if an exception is uncaught?

A. if an exception is uncaught, the program terminates the flow of execution.

12. Use of try block?

A. try block allows you to test a block of code for errors.

13. Use of catch block?

A. it is used to test code for an error which is written in the try statement..

14.How to raise exceptions manually?

A. with the keyword raise..

```
try:
    raise value error
except value error:
    print("there was an exception)
```

15.Assert statement ?

A. assert statements are used to debug code and handle errors.

16.Class,object,attributes & methods?

A. Class : combination of objects which shares common properties

Object: It is an instance of class..

EX:

Class: fruit

Object: mango,apple,banana.

Attributes: price,colour,size,quality,

Methods: eat(),cut(),smell()

17 .How to create an object?

A.object name=function name()

eg:kiwi=fruit()

18.Use of " self " parameter?

A. We can access the attributes and methods of the class.

UNIT-3

1.How data science is useful in real life?

A.It is used to analyse the data, visualise the data.

- With Data Science, the data of teachers such as their qualification, student ratings, the effect of their teaching on the improvement of exam results, etc. are collected, analyzed, and used for further performance enhancement.
- In Airlines,Identifying potential customers to offer calculated discounts, instead of providing discounts to everyone
- The patient data is stored in databases and can be used in the future for the analysis of several medical conditions and the improvement of medical diagnosis and treatment.

2. Library or module?name few

A.Library is a collection of predefined related functions,variables and values.

Eg: math library,Numpy library,Pandas library etc...

3.Math library contains?

A.Math library consists of mathematics related functions such as follows:

functions: sqrt(), floor(), ceil(), pow(), cos() and values such as pi (3.14)

4. Importing a library mean ?

A.Reusing the pre-defined functions or variables which are already present in that library is called importing a library.

Eg: importing math library in the present program, we can reuse all the functions present in that library.

5. Need of Numpy,pandas & matplotlib library

A.Numpy is used for working with arrays.

Pandas is used for analysing data

Matplotlib is used for visualising data

6. Multi-dimensional arrays?

A.If an array requires more than one index to display the elements then that array is called a Multidimensional array.

Eg: a[3][3][3] is a multidimensional array.

7. Reshaping the array?

A.An array initialized once can be reshaped into dimensions of another array. This process is called reshaping an array.

Example: An array declared with size(3,2) can be reshaped into an array- of size(2,3).

8. What are axes in numpy?

A.There are two axes in numpy.They are:

Axis0: along column wise

Axis1: along row wise

9. Difference between series and data frame?

A.➢Series data resembles 1-D array.

Ex:-

```
a=p.Series(['sai','sam','ram'])
```

➢Dataframe is a 2-D array of data

Ex:-

```
a=n.array([[33,44,55],[100,90,35],[66,30,99]])
```

10. Visualizing data means?

A.Visualizing data means "Creating graphical representation of data".

11. Boxplot,histogram?

A.Box Plot represents the minimum, maximum and median elements in a sorted list. boxplot() is used in this plotting technique.

Histogram expresses the frequency count of the elements in a list. hist() is used in this plotting technique.It allows us to easily compare two sets of data.

12. Scatterplot?

A.Scatter Plot represents the relationship between two numerical variables.This function is present in matplotlib.pyplot library. scatter() function is used in this plotting technique.

13. Correlation matrix?

A.Correlation matrix gives the relation between two columns.If the column values increase(positive correlation) then it is represented by "positive number". Else(negative correlation), it is represented by "negative number".

14. Outlier?

A.The data which exhibits different behaviour from remaining data is called an outlier. Eg:a,b,c,2,d. In this example "2" is an outlier.

15. Difference between median and mode?

A.Median is the middle number of a sorted list.

Mode is the most commonly repeated number in the list

16. What are descriptive statistics of data?

A.Describing data using statistical values or summarising the data through certain numbers is called descriptive statistics of data.

Eg: mean,mode,median,variance,range.

17. Difference between standard deviation and variance?example

A.Both are almost equal. It tells how the elements in the list differ from mean of the data.

Ex:-

```
import numpy

values = [6,6,6,6,6,6,6]

x = numpy.std(values)

print(x)
```

Output:-

```
0 #because all values are same as mean value(6)
```

18. Measures of central tendency?

A.The measures of central tendency are mean and median.

19. Measures of variance?

A.The measures of variance are variance,standard deviation, range and quartiles.

20. Quartiles?

A.Quartiles are the values that separate the data into four equal parts.

21.Difference between package and Library(module)?

A.Library is a set of predefined related functions.Whereas, Package is a set of libraries(multiple libraries form a package).

UNIT-4

1.Discrete data?

A.Countable data is called Discrete data(number with out factional part).

Ex :

- Number of teeth 32
- Number Days in a week 7
- Count of male students in a class 31

2. Continuous data?

A. The data which is continuous(number with factional part).This data is measurable.

EX:

Height of a student 5.34

Temparature 32.6

4. Categorical data?

A.The data which is categorized.This data can be classified.

EX: (male,female),(yes,no) etc…

NOTE: Ordinal data?

It is also a type of categorical data. But,it will be in order.

Ex: low,medium,high.

5. Define pattern?

A.Pattern is a set of values of features.

35	35	pass

6.Define feature?

A.Features represent column labels.Here Hindi,Telugu features.

Hindi	Telugu	result
36	35	pass
40	34	fail
70	35	pass
34	29	fail
35	35	pass
80	30	fail

7.Difference between feature and pattern?

A. Features represent the column labels whereas, Pattern represents the row labels.

8.Difference among scalar,vector and matrix

A. Scalar: it represents a number.

Ex: 2

Vector: it represents 1D data.

Ex: [2,34,55,1]

Matrix: it is a combination of rows and columns.

Ex:[[1 2]

[5 3]]

9. How patterns are represented?

A.Patterns can be represented using Lists and arrays(matrices)

10. Machine learning?real time uses?

A. A machine learning is the technique which the machine learns with the help of given data(training data) is called Machine Learning. Machine learning is a part of Artificial Intelligence. Real time examples are:

Google Translator, Google maps, Self-driving cars etc..

11. Name a few python Libraries required to do machine learning tasks?

A.Numpy,Matplotlib,pandas, scikit-learn etc..

12. Difference between training data and test data?

A.Training data:The data with which the machine learns(The data with which machine is trained) is training data

Test data:The data with which the machine is tested is called test data.

13. Supervised learning? Techniques?

A.Machine learning from labelled data is called Supervised learning.Here, classification of data takes place.Few techniques are : Linear Regression, Logistic Regression, K-NN, Decision tree,Naive-Bayes etc ..

14. Unsupervised learning? Techniques?

A.Machine Learning without labels is called Unsupervised learning.Here grouping of data takes place instead of classification.Few techniques are : Clustering,Dimensionality reduction.

15. Why is clustering unsupervised learning?

A.In clustering, grouping of data takes place, without labels. So, it is an unsupervised learning technique.

16. Difference between classification and clustering?

A.Classification is categorising data.Eg:Classifying Pass or Fail.Whereas, clustering is grouping of data.Eg:Grouping the mails as social,primary and spam based on similarities of data.

17. Difference between linear regression and logistic regression

A.Linear regression is predicting output using a linear equation (y=mx+c).Whereas, Logistic regression is predicting the output using a logistic equation P(x)=1/1+e^-(mx+c).

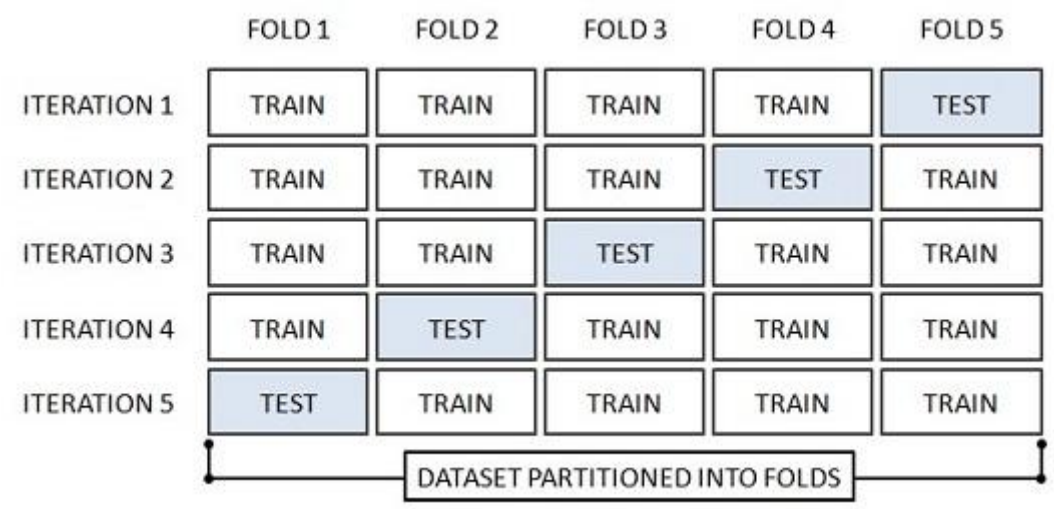
18. Confusion matrix?

A.It is a machine learning technique which predicts pass value as fail and vice versa.It tells us correctly predicted values and wrongly predicted values.confusion_matrix() function is used in this technique.

19. What are the different classification techniques?

A.Few classification techniques are:Linear regression, Logistic regression, K-NN, Decision tree, Naive-Bayes.

20. Cross validation?



21. Fitting the model?

A.Fitting the model means training the data for the machine.We use fit() function to train the data.

22. What is overfitted and underfitted machine learning model(program)?

A.Overfit: The machine learning technique understands the data well during training and predicts incorrectly during testing.

Underfit: The machine learning technique doesn't perform well during both training and testing.

23. Difference between overfitting and underfitting a model?

Overfitting: The machine learning technique understands the data well during training and predicts incorrectly during testing is called an overfitting model.

Underfitting: The machine learning technique doesn't perform well during both training and testing is called an underfitting model.

24. Binary and multinomial classification?

A.If there are only two labels then the classification is called Binary classification. Example: (Male,Female),(Yes,No)

If there are more than two labels then the classification is called Multinomial classification. Example:(Good,Bad,Not sure),(Small,Medium,Large) etc..

25. Regression mean?

A.Predicting the output is called Regression. It is a supervised learning technique.

26. Linear regression model ?

A.Predicting the output using linear equations is called Linear Regression model.

Y=MX+C

experience	salary($)
1	10
2	40
2	20
4	80

Here, Experience is input(X) and salary is output(Y)

27. Difference between variance and covariance?

A.Variance: how the elements differ from the mean

Covariance: It tells how much two variables change together

28. Logistic regression model?

A.Predicting the output using a logistic equation.

P(x)=1/1+e^-(mx+c)

We import Logistic Regression() from sklearn.linear_model

29. What is the Naive-Bayes model?

A.It is a machine learning technique that classifies the data using probability distributions.

30. In K-Nearest Neighbors what does k refer to?

A."K" refers to the no.of neighbours.

31. K-means is used for?

A.K-means is a machine learning technique used for grouping (clustering) the given data.

32. In K-means what does k refer to?

A."k" refers to the number of clusters to be provided.

33. What is partitional clustering?

A.It is the process of combining(forming) given data into relevant (similar) groups(clusters) without any overlapping of clusters.

Example: Male, Female.

34. What is Hierarchical clustering?

A.It is the process of combining(forming) given data into relevant (similar) groups(clusters) with overlapping clusters.

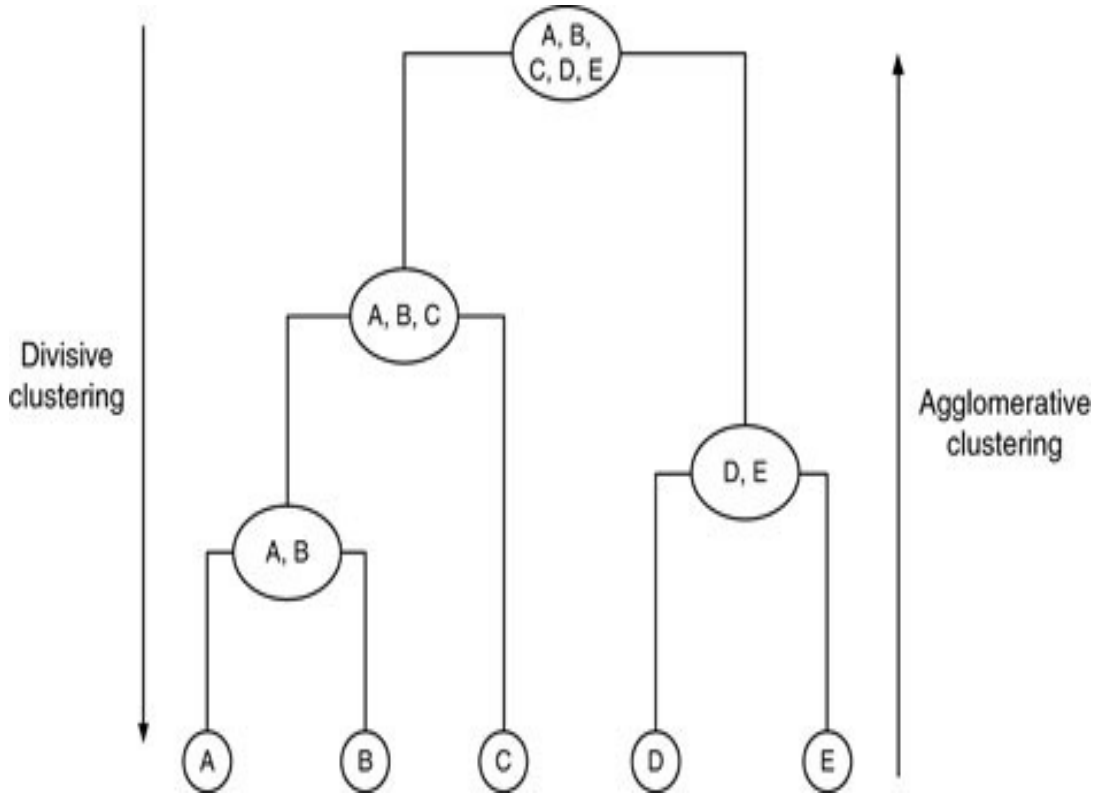
35. Types of Hierarchical clustering?

A.1)Agglomerative clustering:

It is Bottom up clustering

2)Divisive clustering:

It is Top down clustering



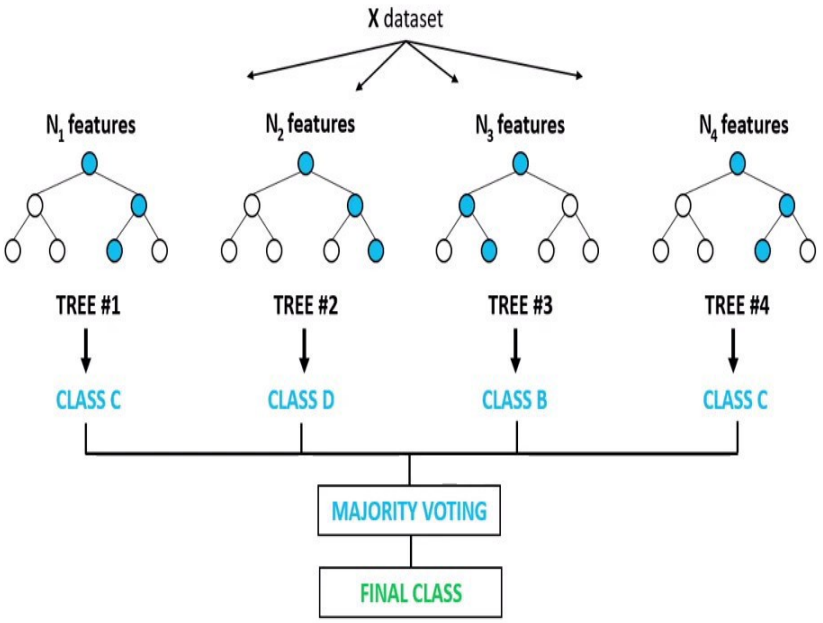
36. Decision tree?

A.It is a machine learning technique which classifies the data using Entropy(generally).

37. Random forest?

A.It is a Collection of Decision trees used to make final decision.

In the below example the final decision is “ClassC”.



38. What are the attribute(features) selection measures for Decision tree construction

A.Information gain or entropy,Gini Index,Gain Ratio

39. Conditional probability?

40. What are the Ensemble learning techniques?

- Boosting
- Bagging

41. Boosting?

42. Bagging?

43. How to test the performance of a classifier?

A.The performance of a classifier is tested using Confusion matrix ,Accuracy, Recall and Precision

44. Cost function(loss function) of Linear regression model?

A.It is a function or measure used to assess the amount of error generated by a machine learning technique.

45. Differentiate Lazy and eager machine learning techniques?

46. Curse of Dimensionality?

A.If there are more number of attributes (Dimensions or columns) in given tabular data,then it becomes difficult to analyze or to process It.

47. What are Dimensionality reduction techniques?

- Feature selection:

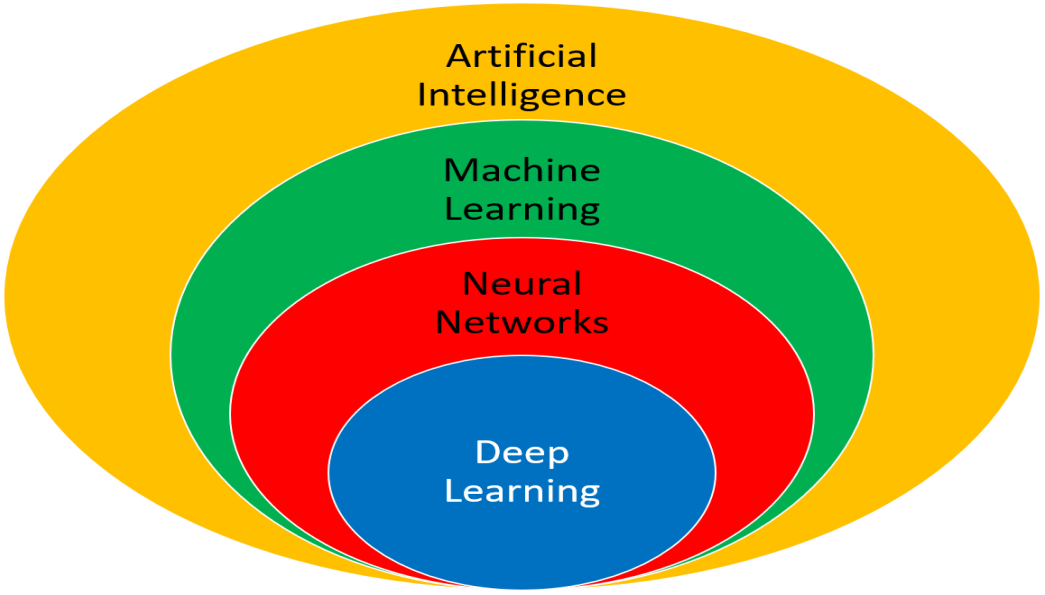
  We find a subset of the original set of variables or features, to get a smaller subset that can be used to PREDICT output

- Feature extraction(projection):

  This reduces the data in a high dimensional space to a lower dimension space, i.e. a space with lesser no. of dimensions.

48. Define Artificial intelligence?

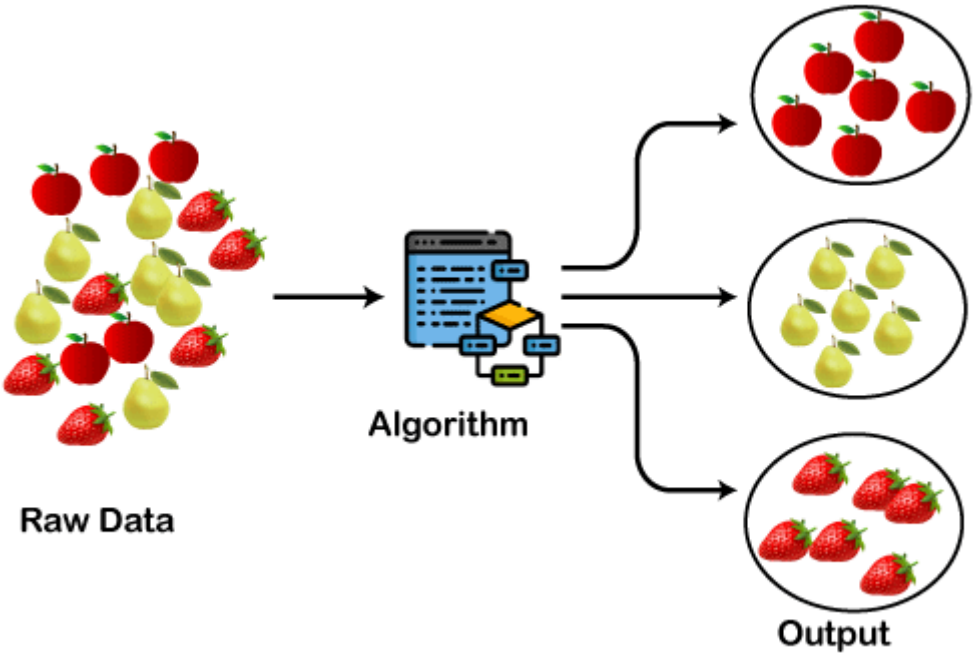
A.Artificial Intelligence is the science of mimicking human brain functions with computers and other machines such as robots. It includes self-learning, problem-solving, and so forth.



49.How is human learning different from machine learning?

A.Human learning is based on observation and experience whereas, machine learning is based on data(training data).

50 Applications of clustering?



- The clustering algorithms are widely used for the identification of cancerous cells
- Search engines also work on the clustering technique. The search result appears based on the closest object to the search query.
- It is used in market research to segment the customers based on their choice and preferences.
- It is used in the biology stream to classify different species of plants and animals using the image recognition technique.

51 Different clustering algorithms?

- K-Means algorithm
- DBSCAN Algorithm
- Agglomerative- Hierarchical algorithm:

52 What are the different unsupervised learning algorithms

Cluster analysis

Dimensionality reduction

Association analysis

Association analysis	
transaction	**items purchased**
1	sweet corn,butter,lays
2	bath soap,shampoo,eggs
3	sweet corn,butter,cheese,potato

4	oil,paste,brush
5	wheat,paste,brush
6	apple,orange,paste,brush
7	pear,surf excel,sweet corn,butter

UNIT-5

NOTE:

A NETWORK IS A COLLECTION OF THINGS TO DO A PARTICULAR TASK

Eg

COLLECTION OF COMPUTERS CONNECTED TOGETHER VIA CABLE OR WIRLESS MEDIUM, FORM A NETWORK

Network of “neurons” is called Human Brain

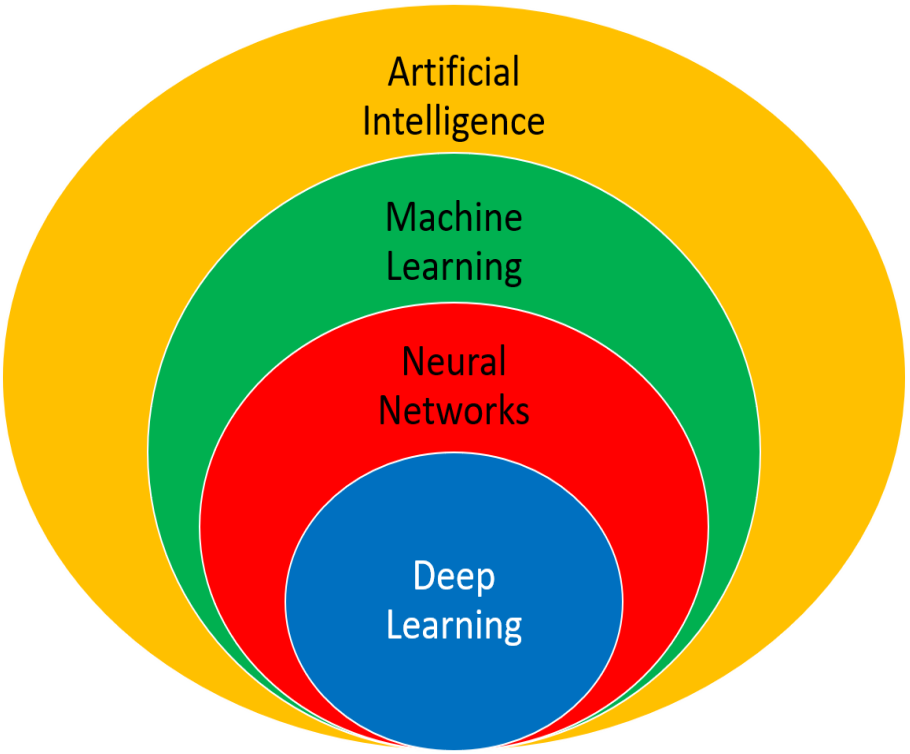
0 What is Deep Learning?

Deep Learning and neural networks tend to be used interchangeably in conversation, which can be confusing.

As a result, it’s worth noting that the “deep” in deep learning is just referring to the depth of layers in a neural network.

A neural network that consists of more than three layers—which would be inclusive of the inputs and the output—can be considered a deep learning algorithm.

A neural network that only has two or three layers is just a basic neural network.



1 Define Neural network?

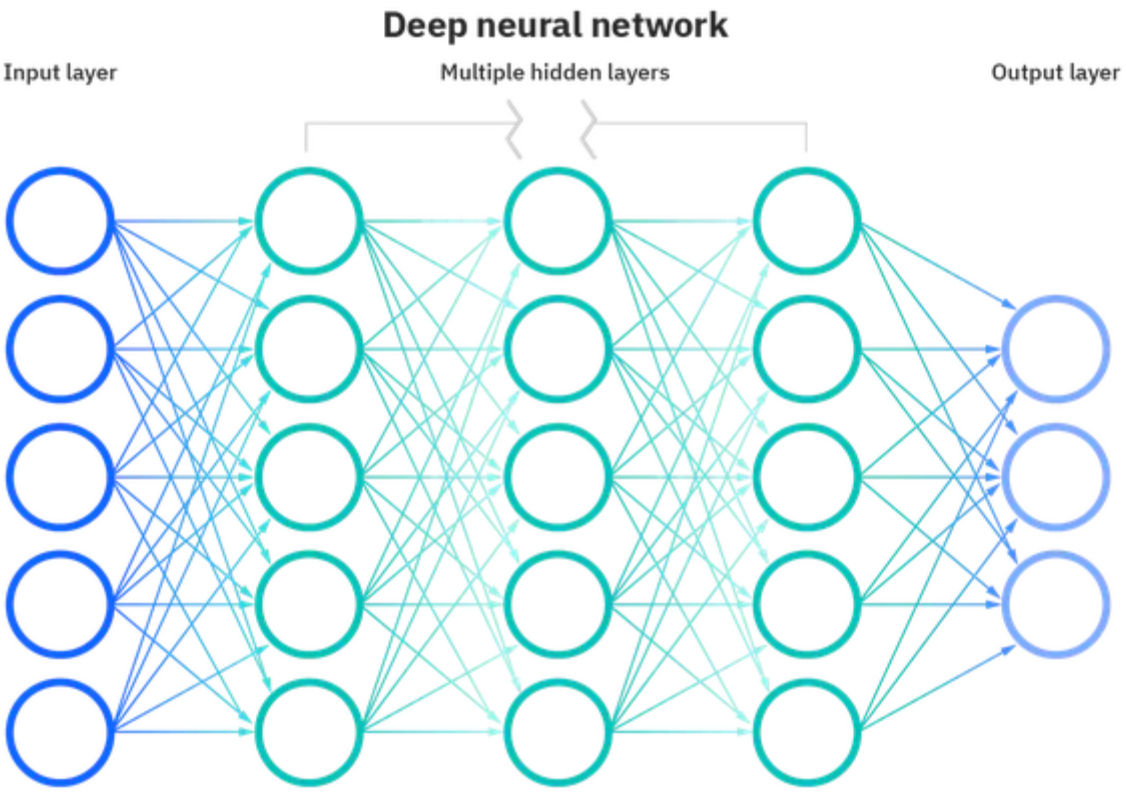
It is a large collection of connected items (artificial neurons) and they are layered upon each other

Neural networks reflect the behavior of the human brain, allowing computer programs to recognize patterns and solve common problems in the fields of AI, machine learning, and deep learning.

Neural networks, also known as artificial neural networks (ANNs) or simulated neural networks (SNNs), are a subset of machine learning and are at the heart of deep learning algorithms.

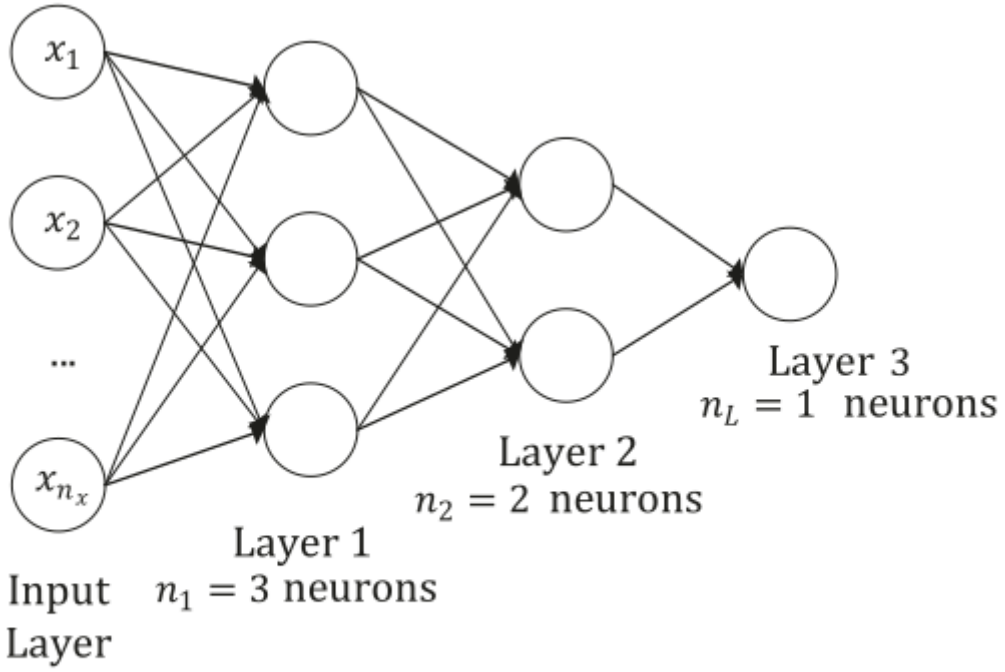
Their name and structure are inspired by the human brain, mimicking the way that biological neurons signal to one another.

A neural network is made up of layers, each of which can be thought of as having a number of "neurons.



2 What are the different types of neural networks?

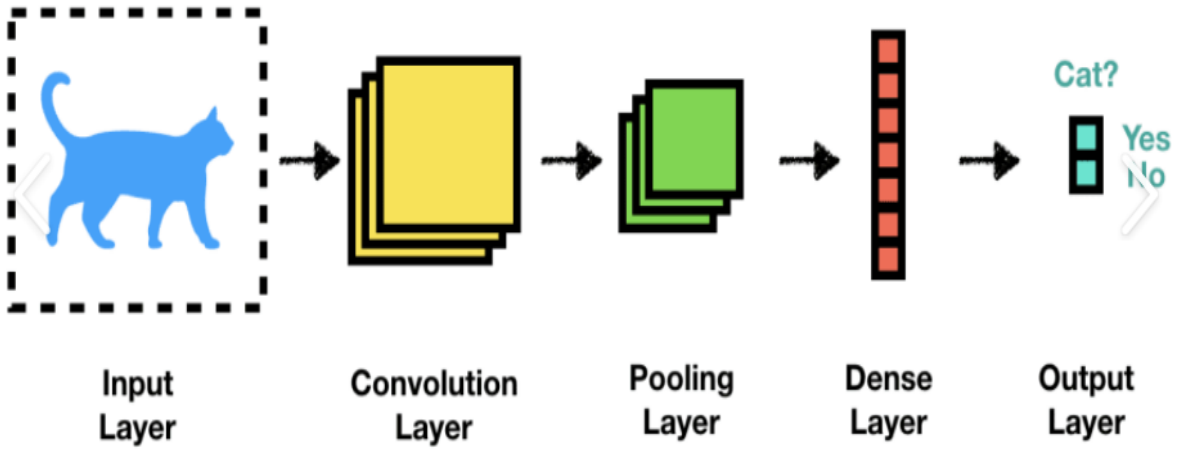
Feed-Forward Neural Network: Used for general Regression and Classification problems.



A *practical example of a feedforward neural network*

- **Convolutional Neural Network(CNN):** Used for object detection and image classification.

  CNNs are the standard neural net work architecture used for prediction when the input observations are images,



Recurrent Neural Networks(RNN): Used for speech recognition, voice recognition, time series prediction, and natural language processing.

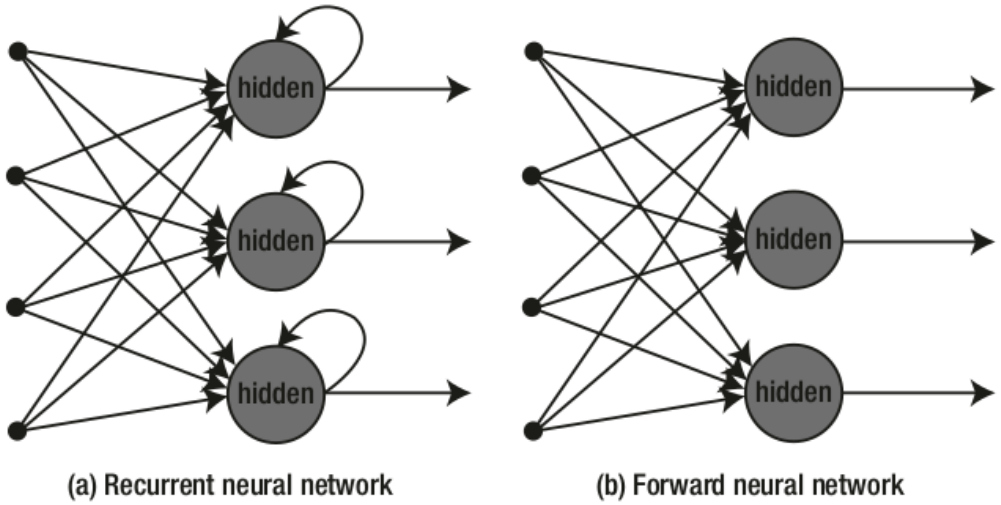
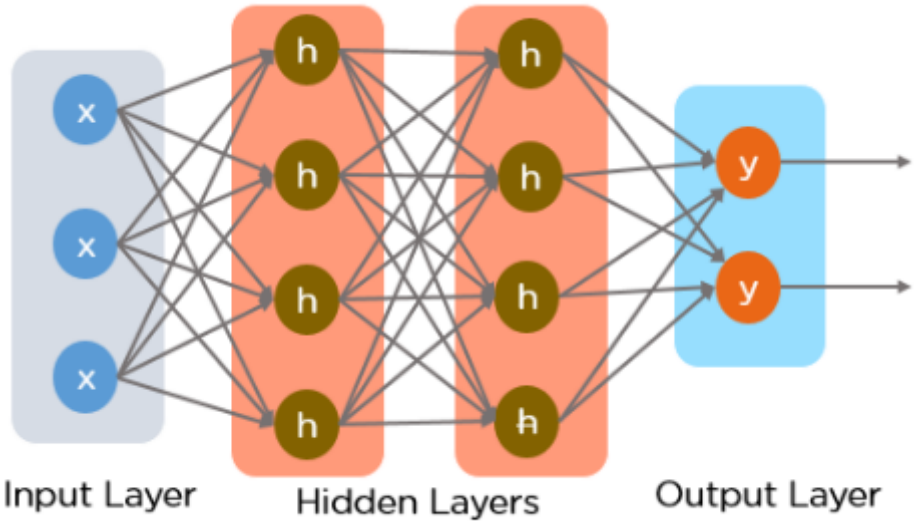
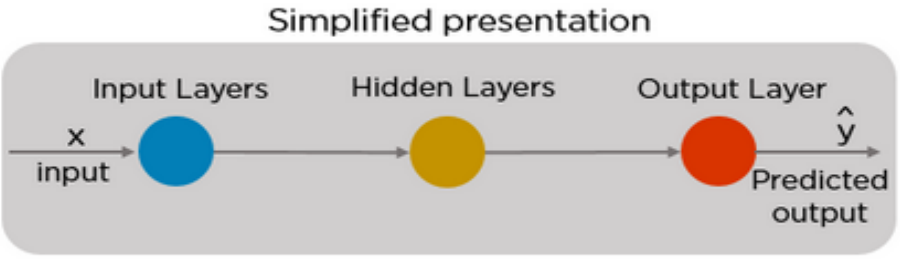


Figure 3-1. *Structural differentiation between a sample RNN and feedforward neural network*

3 What are Feedforward neural networks(multi-layer perceptrons (MLPs))?





4 Name few libraries required to do Deep Learning Tasks

- Tensor flow
- Keras
- PyTorch

5 LSTM?

Long Short-Term Memory Network (LSTM)

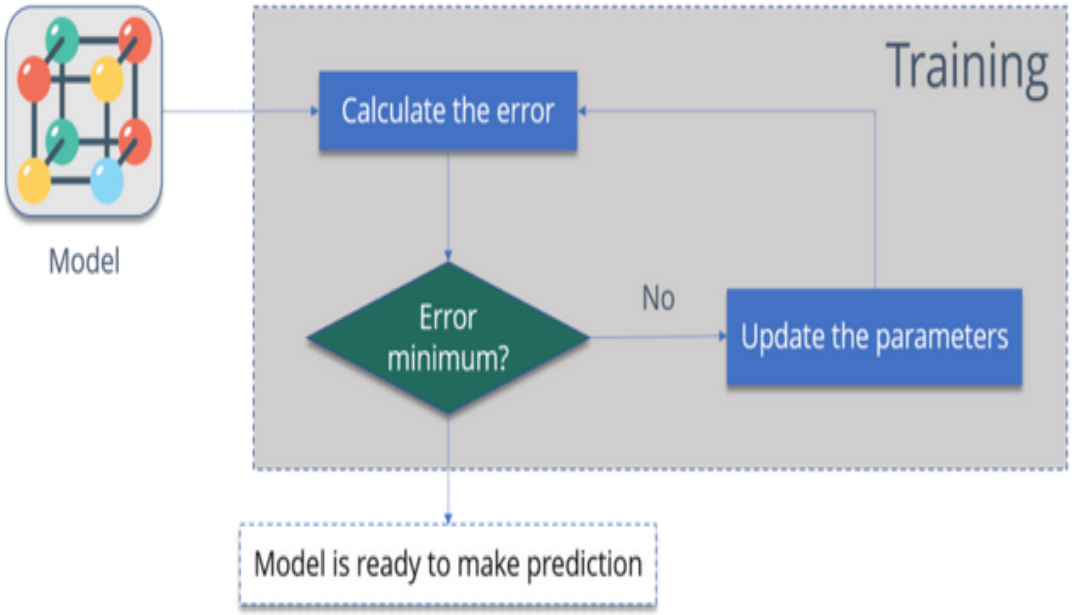
LSTMs are a special kind of RNN — capable of learning long-term dependencies by remembering information for long periods is the default behavior.

6. Applications of Deep learning

- Self-driving cars
- Google assistant,amazon's alexa,apples's siri(All are voice assistants)
- Robot-assisted surgery
- Image identification
- chatbot(A chatbot is a computer program that simulates human conversation through voice commands or text chats or both)
- Classifying hand written digits
- Video and audio classification

7. Back propagation?

Backpropagation is a supervised learning algorithm, for training Multi-layer Perceptrons (Artificial Neural Networks).



Calculate the error – How far is your model output from the actual output.

- **Minimum Error** – Check whether the error is minimized or not.
- **Update the parameters** – If the error is huge then, update the parameters (weights and biases). After that again check the error. Repeat the process until the error becomes minimum.
- **Model is ready to make a prediction** – Once the error becomes minimum, you can feed some inputs to your model and it will produce the output.

NOTE

- Machine Learning used for less complex tasks (such as predictive programs).
- Deep Learning is used for real complex applications, such as self-driving cars and drones.
-
-
-