AI – Machine Learning Developer course

Ashok Kumar S
Assistant Professor/CSE,
MSAJCE

Artificial Intelligence

- It is first coined in 1956, but it is only a theoretical concept
- In 1990's and 2000's, we started using neural networks for machine learning
- In 2006, the term Deep learning is coined for 1st time which overcomes the limitations of machine learning. From 2010, deep learning is used commercially

Artificial Intelligence applications

- AI is a capability of a machine to imitate intelligent human behaviour(i.e) the way human thinks, decide and work while solving the problem.

Applications

- **Image recognition:**
  - If an vehicle exceeds a speed limit, it is difficult for a human to monitor and note down the number plate of vehicle, since millions of vehicles pass through.
  - Inorder to solve it, we can use machine/camera to capture number plate picture and convert into text
  - Authenticate the signature of person
- **Self driving cars** which avoid road accidents
- **Speech recognition**
  - Search using voice like google assistant, amazon alexa etc
- **Natural Language Processing**
- **Recommendation in social media and in ecommerce websites**
- **Stock market predictions**

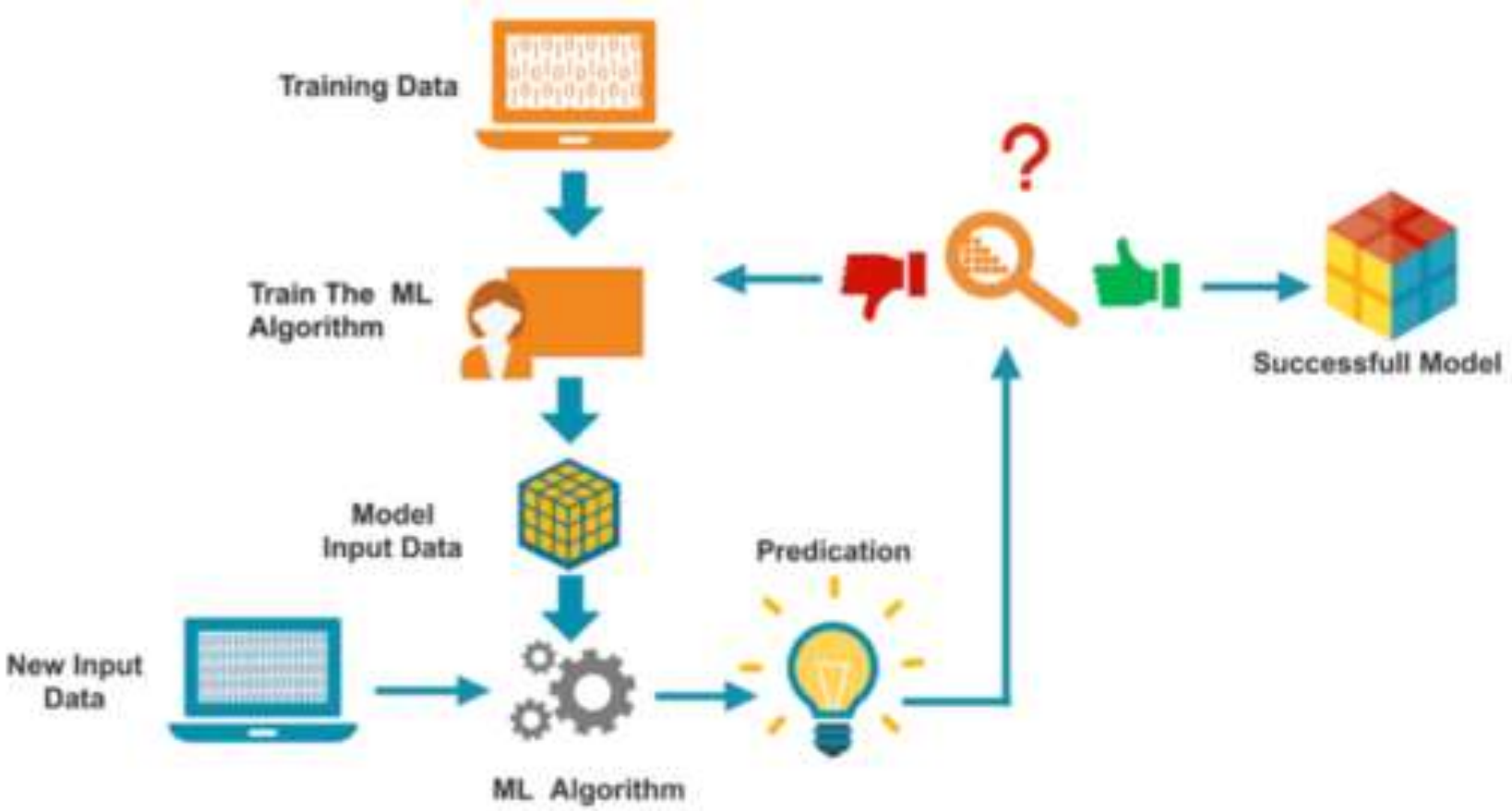
Artificial Intelligence applications

- It is used in places where humans cant reach, like deep ocean, navigation in mars. In those places machines which are small enough can do a task
- Hollywood movies like terminators, matrix is based on AI

Machine Learning(ML)

- ML is a subset of AI, which provides computers with an ability to learn without being explicitly programmed.
- ML is a technique in which the machine will learn from the data, so that it gets trained. So, when a new input is given to a machine it will make predictions.
- Actually, the input data is split into training and testing data. Training data is used to train the machine and testing data is to test the accuracy of prediction
- The accuracy of the prediction depends on various factors like cleanliness of the data(implies shouldn't contain missing values, outliers), identification of relevant important features from the dataset

Machine learning



Types of machine learning

i) Supervised Learning

- In supervised learning, features of data is already known. (i.e) the label/outcome is already known.
- In supervised learning, we have a Input variables(x) and an output variable(y) and we use an algorithm to learn the mapping function from the input to output.

Types:

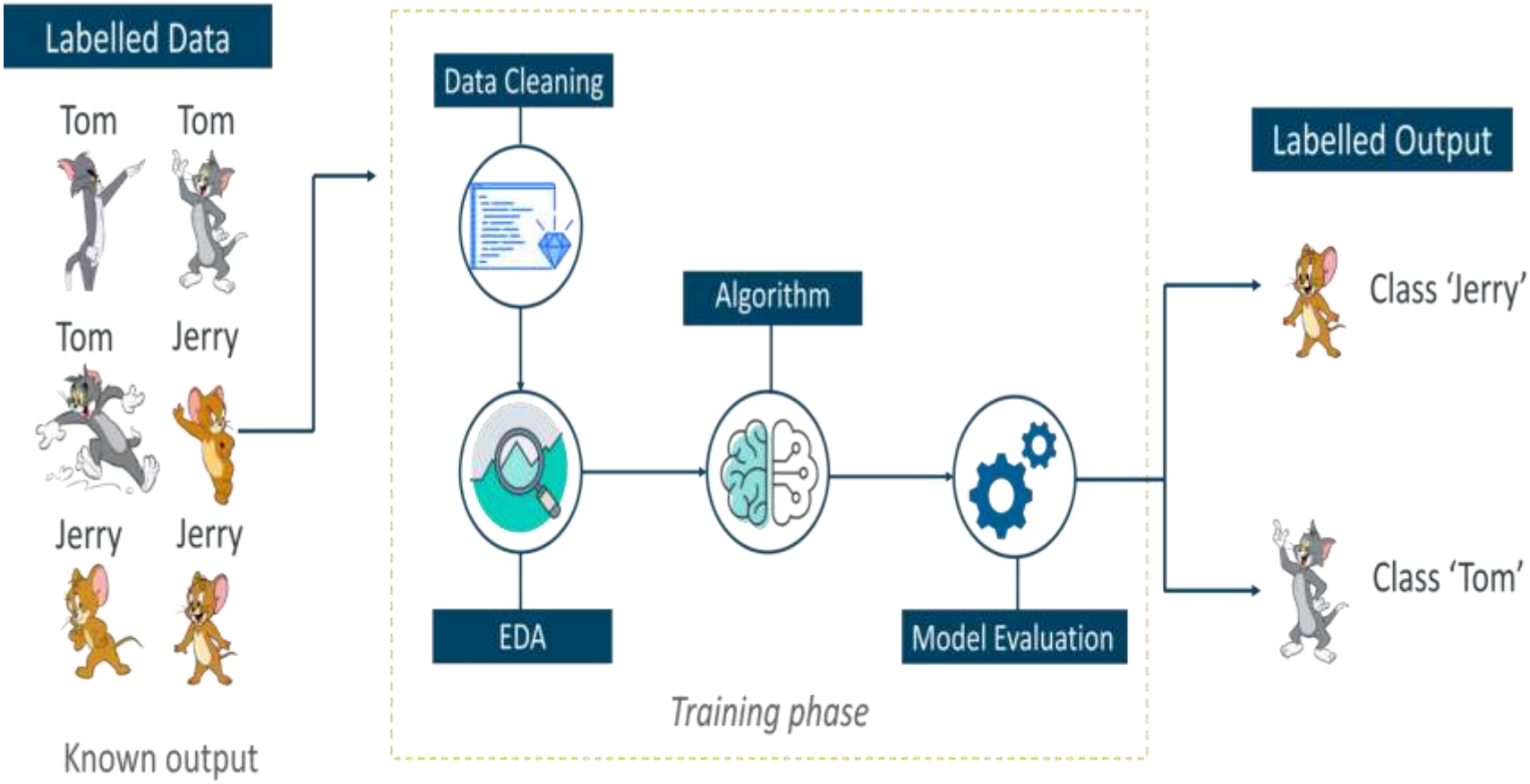
1) Classification

- It is based on discrete/categorical data
- Example: Email spam or ham filtering, Cat or dog, Hot or Cold, Win or lose etc

1) Regression

- It is based on continuous data
- Example: Temperature/humidity/wind of a place, Chance of winning etc

Classification example



Types of machine learning

ii) Unsupervised Learning

- In unsupervised learning, knowledge about the data is not already known. (i.e) label/outcome is not known.
- The input data is clustered based on certain parameters
- **Example:** Grouping of people based on their interests in buying certain products, location etc

iii) Reinforcement Learning:

- Machine learns by interacting with a space or environment. (i.e) Machine learns with experience
- **Example:** Human touching fire/current recognizes it and learns that he should not touch again
- Similarly, Machine will adopt some strategy and perform actions. It will compare the actual outcome with expected. Based on that, it will change the strategy and perform action until it gets desired outcome

Limitations of Machine learning

- It is not useful while working with huge data/high dimensional data
- For complex problems like handwriting recognition, it is a huge challenge for machine learning algorithms because it can't extract the features from the dataset automatically.
  - Suppose we need to predict, whether we have a match today or not? For this we need to consider features like, weather is sunny, windy, humidity. Suppose if we forgot to consider feature humidity, ML model can't able to generate missed feature
  - Human being need to understand the data and need to specify the features.So, there may be a possibility that important feature for predicting the outcome may be missed

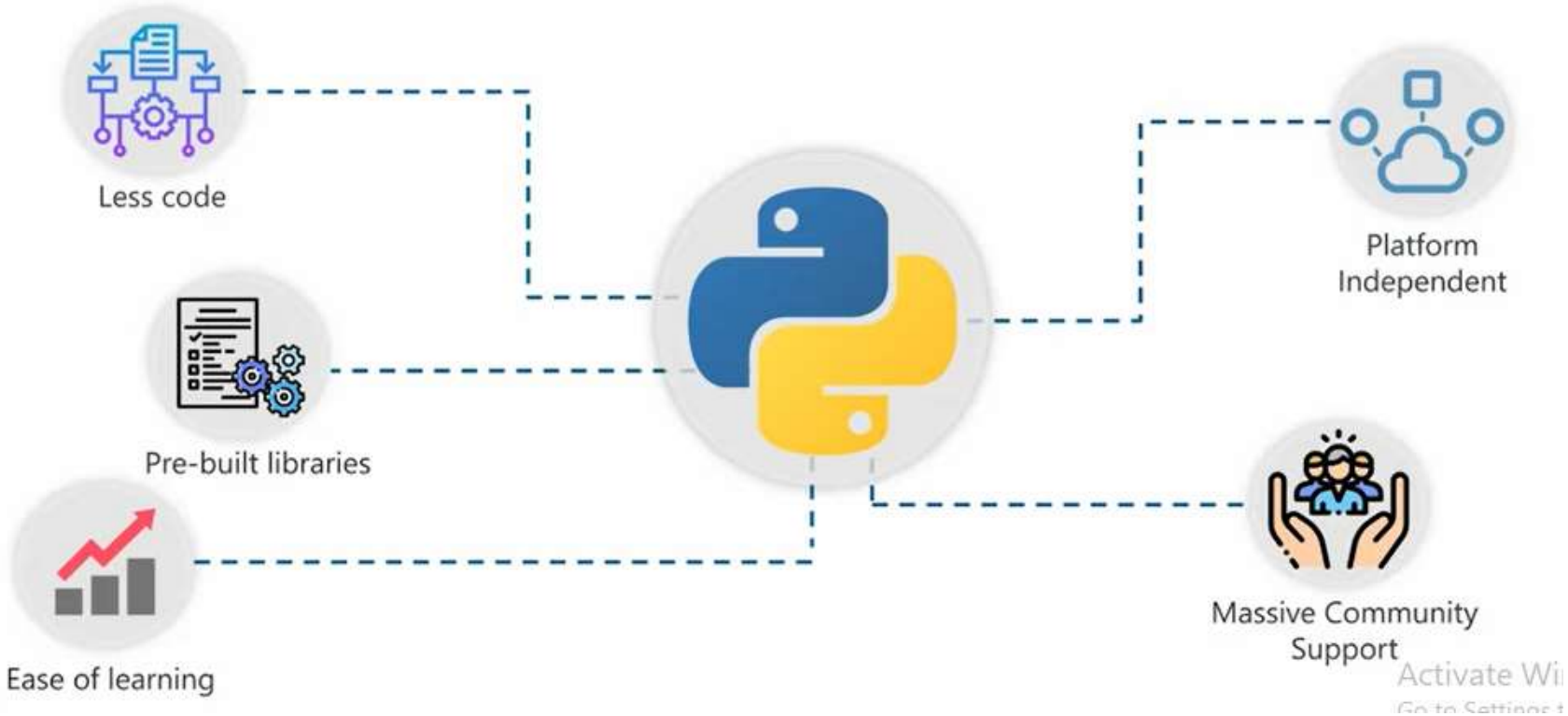
Deep learning

- Deep learning models are capable to generate the right features in which the output will depend on.
- Even though, the human forgot to add certain features, it will detect the missing feature and use it to predict the outcome
- Deep learning is implemented using neural networks

Applications

- Self driving car
- Automatic image caption generation
- Automatic language translation
- Game playing
- Voice controlled assistance

Why to use Python?



Python Welcome program

```
n=input("enter your name")
print("welcome",n,”to the AI ML developer course”)
```

```
print("welcome to ML course")
```
welcome to ML course

```
print('python is very much easy to use')
```
python is very much easy to use

```
print("""python is very
much useful
while working
with bigdata,
machine learning,
image processing""")
```
python is very
much useful
while working
with bigdata,
machine learning,
image processing

Basic commands

```
>>> print(4)
4
>>> print(5.5)
5.5
>>> print('h')
h
>>> a=10
>>> print(a)
10
b="thousand"
>>> b
'thousand'
```

```
>>> print(1+5)
6
>>> print(5*5)
25
>>> print()

>>> a
10
>>> b
'thousand'
>>> c='rupees'
>>> c
'rupees'
>>> print(b+c)
thousandrupees
>>> print(b+"+c)
thousandrupees
>>> print(b+' '+c)
thousand rupees
>>> print(b+' '+c, 'notes are banned')
thousand rupees notes are banned
```

Operators & its precedence

```
a=5
b=6
>>> print(a+b/3-4*12)
-41.0
>>> print(8/2*3)
12.0
>>> print(8*3/2)
12.0
>>> print((((a+b)/2)-4)*12)
18.0

>>> c=a+b
>>> d=c/2
>>> e=d-4
>>> print(e*12)
18.0
```

Python Strings

```
>>> course='python programming'

>>> print(course)

python programming
>>> print(course[3])

h
>>> print(course[0])

p
>>> print(course[-1])

g
>>> print(course[-3])
i
```

```
python    programming
0123456 789…
>>> print(course[0:4])
pyth
>>> print(course[5:9])

n pr
>>> print(course[:5])

pytho
>>> print(course[5:])

n programming
>>> print(course[-6:0])

>>> print(course[-6:-2])

ammi
>>> print(course[0:10:2])

pto  r
>>> print(course[2:15:4])
t gm
```

```
>>> numbers="1,2,3,4,5,6,7,8,9"

>>> print(numbers)

1,2,3,4,5,6,7,8,9
>>> print(numbers[0:4])

1,2,
>>> print(numbers[0::4])

13579
>>> print(numbers[0::3])

1,4,7,
>>> print("hello",5)

hello 5
>>> print("hello"*5)

hellohellohellohellohello
>>> print("hello"*(5-2))
hellohellohello
```

Finding a Substring

```
today="saturday"

>>> print("hai" in today)

False
>>> print("day" in today)

True
>>> print("am" in "programming")
True
```

Greatest of two numbers

```
a=input('enter value of a')
b=input('enter value of b')
if a>b:
    print(a,"is greater")
else:
    print(b,"is greater")
```

Greatest of two numbers using conditional operator

```
a=input('enter value of a')
b=input('enter value of b')
print(a if (a>b) else b,"is greater")
```

Greatest of three numbers

```
a=input('enter value of a')
b=input('enter value of b')
c=input('enter value of c')
if a>b and a>c:
    print(a,"is greater")
elif b>c:
    print(b,"is greater")
else:
    print(c,"is greater")
```

Looping

```
for i in range(1,5):
    print(i)
```

```
a=13
b=3
for i in range(1,a//b):
    print(i)
```

```
for i in range(6,12):
    print("Square of {0} is {1} and cube of {0} is
     {2}".format(i,i**2,i**3))
```

```
Square of 6 is 36 and cube of 6 is 216
Square of 7 is 49 and cube of 7 is 343
Square of 8 is 64 and cube of 8 is 512
Square of 9 is 81 and cube of 9 is 729
Square of 10 is 100 and cube of 10 is 1000
Square of 11 is 121 and cube of 11 is 1331
```

COLLECTION DATA TYPES

- There are four collection data types in the Python programming language:
- **List** is a collection which is ordered and changeable. Allows duplicate members.
- **Tuple** is a collection which is ordered and unchangeable. Allows duplicate members.

- **Set** is a collection which is unordered, unchangeable and unindexed. No duplicate members.
- **Dictionary** is a collection which is unordered, changeable and indexed. No duplicate members.

Arrays

```
from array import array
a=array('i',[2,4,5,6,5,8,10,5])
a.append(12)
print(a)

a.reverse()
print(a)
for i in a:
    print(i)
print(a.itemsize)   #Give length in bytes of 1 element
print(a.count(5)) #Count the number of occurrences in array
a.insert(7,20)
print(a)
```

Lists

```
a=[35,20,100]
b=[12,10,45,55]
a.extend(b)
print(a)
a.append(50)
print(a)
a.clear()
print(a)
```

Tuples

```
tuple1 = ("apple", "banana", "cherry")
tuple2 = (1, 5, 7, 9, 3)
tuple3 = (True, False, False)
tuple4 = ("abc", 34, True, 40, "male")
print(tuple1)
print(tuple2)
print(tuple3)
print(tuple4)
```

Adding tuple to the list

```
a=[35,20,100]
c=(1,2,3,4,5)
a.extend(c)
print(a)
```

Dictionary

```
dictionary={'a':10,'b':20,'c':30}
print(dictionary['b'])
```