

Lecture 1

Introduction to Machine Learning

- **Course Objectives:**

Machine learning is a highly desirable skill in IT industry and Computer Science research. The objective of this course is to introduce the basic concepts of Machine Learning. To make students understand the use of machine learning approaches to solve some laboratory problems initially and real world problems later on. To equip students with structures and strategies for complex problem solving

- **Tools, IDEs(integrated development environment) and language:**

We will use Python programming language. For coding we will be using PYCHARM or Anaconda and notebook . For online tools you can use the “Google Colab”

- **Motivation:**

Nowadays Machine Learning is one of the most exciting area since it is being used everywhere. While searching on google it starts predicting when you typed, it predicts on the bases of region and area and also on popular search



Another example is Product recommendation after buying similar product

Your Recently Viewed Items and Featured Recommendations

You viewed

View your history

Continue Shopping: Customers Who Bought Items in Your Recent History Also Bought

Machine Learning: A Probabilistic Perspective	Learning From Data	Pattern Recognition and Machine Learning	The Elements of Statistical Learning	Foundations of Machine Learning	Probabilistic Models of Deep Learning
Kevin P. Murphy (28)	Hsuan-Tien Lin (53)	Christopher M. Bishop (88)	Trevor Hastie (31)	Mehryar Mohri (4)	Daphne I. Kingma
Hardcover	Hardcover	Hardcover	Hardcover	Hardcover	Hardcover
\$78.26 Prime		\$64.01 Prime	\$75.98 Prime	\$51.10 Prime	\$90.00

When you searching a product it also shows that
“people also view”

Categories

Countdown Deals DarazMail dBills Global Collection Fashion & Lifestyle

Yes sir 100% new, genuine, branded and authentic product.
 YMART - answered within 1 day

People Who Viewed This Item Also Viewed

Rs. 243,999	Rs. 149,000	Rs. 89,999	Rs. 170	Rs. 16,499

● Machine Learning:

Machine learning was developed as a new capability for computers. Aiming to build intelligent machines For example: Program a machine to find the shortest path from A to B. Machine learns to do task it by itself. Today it touches many segments of industry and science

● What is Machine Learning

“give a computer/machine the ability to learn and to take decisions”

Machine learning focuses on the development of computer programs that can access data and use it learn for themselves

● Steps to build a model

To build any machine learning model (system)

1. We have to train that system.

2. For training purposes we need data.
3. Provide data to model and it learns on that data.
4. After that it make prediction on the base of their learning

- **Why machine leaning is become popular?**

There are many reasons why is it becoming popular few of them are discussed here:

- A. Increase in digital data
- B. Computing powers
- C. One of the reasons that ML becomes so wide spread
- D. Web click data
- E. Tons of companies collecting click-stream data
- F. To understand the users better with machine learning algorithms
- G. Huge segment of Software Industry working on it currently

- **Types of machine learning**

There are three main types of machine learning, in this course we will be studying only two types of machine learning :

- ☐ Supervised learning
- ☐ Unsupervised learning
- ☐ Reinforcement learning

Supervised Learning:

It is probably the most common type of machine learning problem. Supervised learning is where you have input variables (x) and an output variable (Y) and you use an algorithm to learn the mapping function from the input to the output.

$$Y = f(X)$$

The goal is to approximate the mapping function so well that when you have new input data (x) that you can predict the output variables (Y) for that data. supervised learning is a learning in which we teach or train the machine using data which is well labeled that means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples(data) so that supervised learning algorithm analyses the training data(set of training examples) and produces a correct outcome from labeled data.

For instance, suppose you are given a basket filled with different kinds of fruits. Now the first step is to train the machine with all different fruits one by one.



If shape of object is rounded and depression at top having color Red then it will be labeled as –Apple. If shape of object is long curving cylinder having color Green-Yellow then it will be labeled as –Banana. Now suppose after training the data, you have given a new separate fruit say Banana from basket and asked to identify it.

Supervised learning classification:

Supervised learning classified into two categories

Classification: A classification problem is when the output variable is a category, such as “Red” or “blue” or “disease” and “no disease”

Regression: A regression problem is when the output variable is a real value, such as “dollars” or “weight”

Advantages:

- Supervised learning allows collecting data and produce data output from the previous experiences.
- Helps to optimize performance criteria with the help of experience.
- Supervised machine learning helps to solve various types of real-world computation problems.

Disadvantages:

- Classifying big data can be challenging.
- Training for supervised learning needs a lot of computation time. So, it requires a lot of time

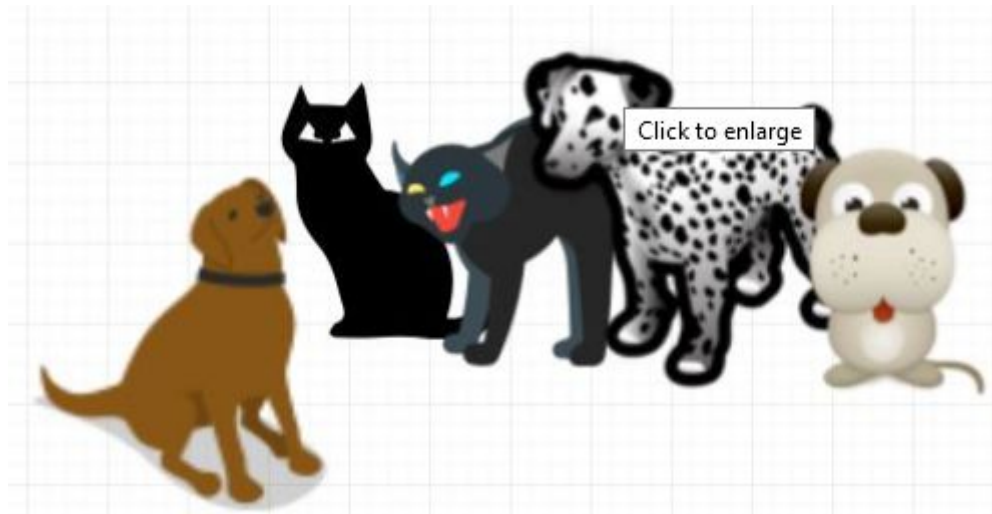
Unsupervised Learning:

Unsupervised learning is the training of machine using information that is neither classified nor labeled and allowing the algorithm to act on that information without guidance.

Here the task of the machine is to group unsorted information according to similarities, patterns and differences without any prior training of data. Unlike supervised learning, no

teacher is provided that means no training will be given to the machine. Therefore machine is restricted to find the hidden structure in unlabeled data by our-self.

For instance, suppose it is given an image having both dogs and cats which have not seen ever.



Thus the machine has no idea about the features of dogs and cat so we can't categorize it in dogs and cats. But it can categorize them according to their similarities, patterns, and differences i.e., we can easily categorize the above picture into two parts.

First may contain all pics having dogs in it and second part may contain all pics having cats in it. It allows the model to work on its own to discover patterns and information that was previously undetected. It mainly deals with unlabeled data

Unsupervised learning classification:

Unsupervised learning classified into two categories

Clustering: A clustering problem is where you want to discover the inherent groupings in the data, such as grouping customers by purchasing behavior.

Association: An association rule learning problem is where you want to discover rules that describe large portions of your data, such as people that buy X also tend to buy Y

Advantages:

- No previous knowledge of the image area is required.
- The opportunity for human error is minimized.
- It produces unique spectral classes.
- Relatively easy and fast to carry out.

Disadvantages:

- The spectral classes do not necessarily represent the features on the ground.
- It does not consider spatial relationships in the data.
- It can take time to interpret the spectral classes.

