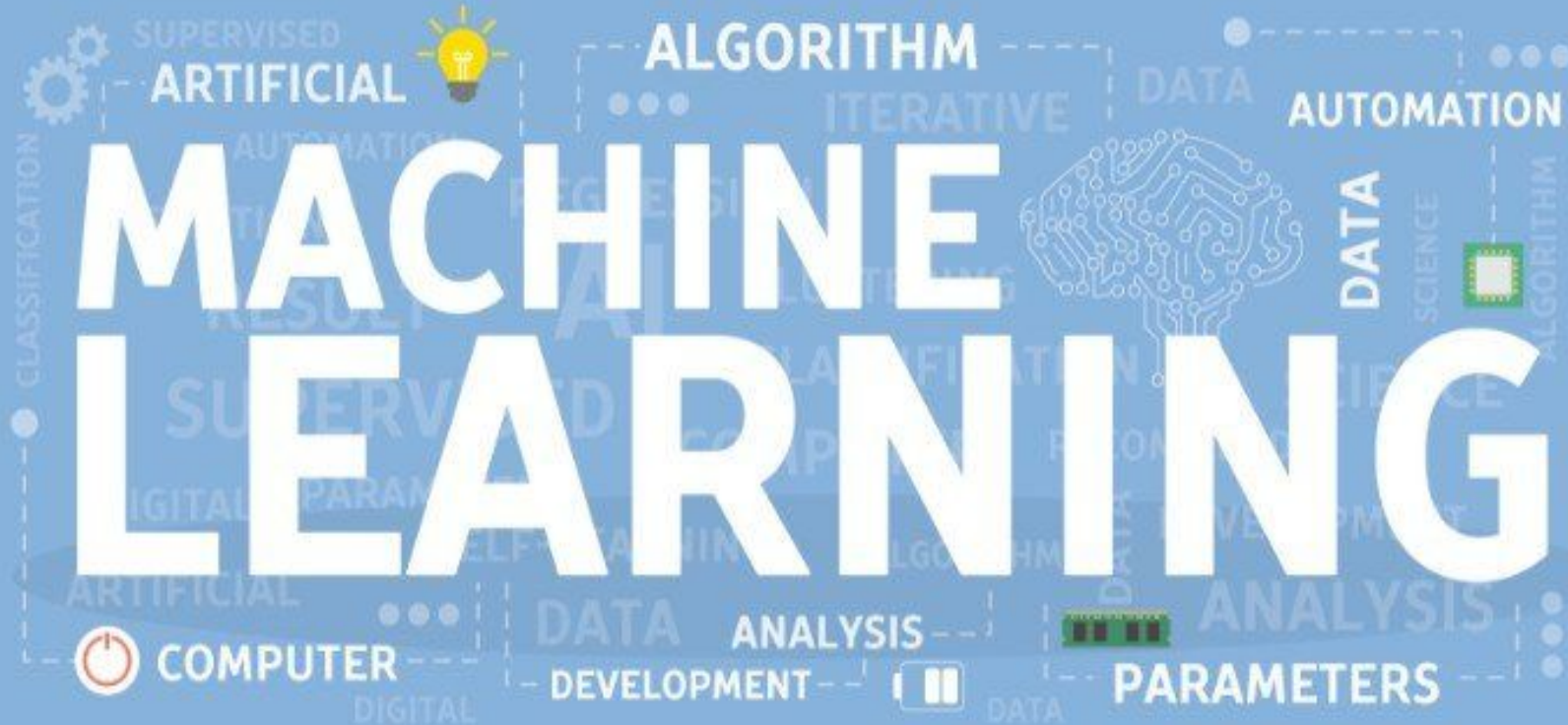




Developer Student Clubs

Indian Institute of Technology Patna



Contact(Introduction)

Joshika,

Department Lead, ML, DSC

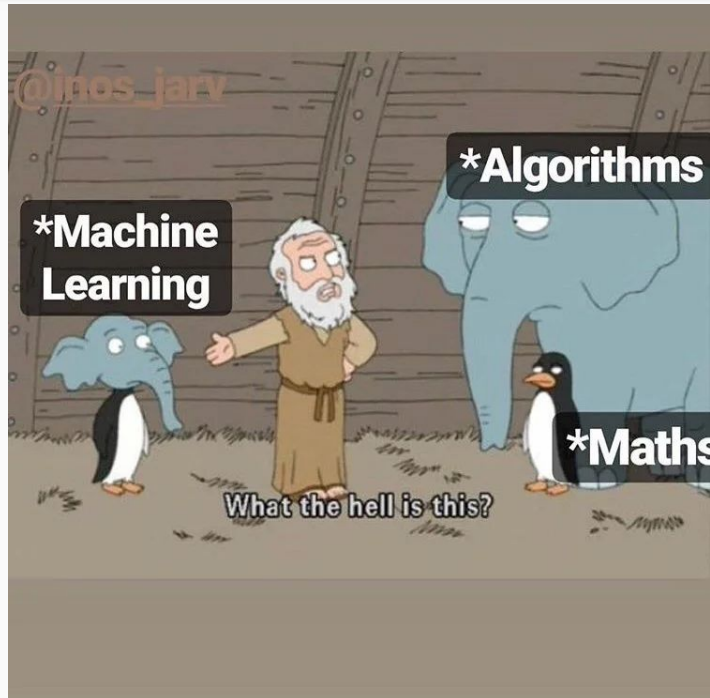
+91 6204758568

Nischal A,

Software Lead, Aviation Society, DSC

+91 9739233379

What is ML? Algorithms + Maths?



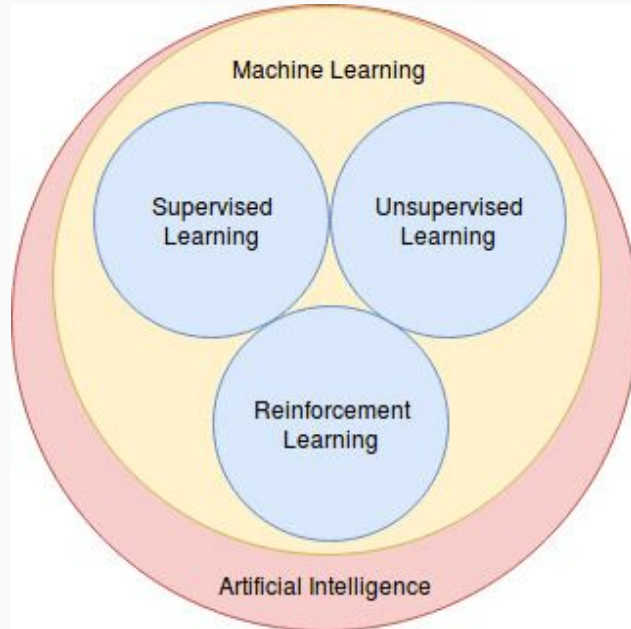
Some formality

Two definitions of Machine Learning are offered.

Arthur Samuel described it as: *"the field of study that gives computers the ability to learn without being explicitly programmed."* This is an older, informal definition.

Tom Mitchell provides a more modern definition: *"A computer program is said to learn from experience E with respect to some class of tasks T and performance measure P , if its performance at tasks in T , as measured by P , improves with experience E ."*

The Artificial Intelligence Circle



supervised learning

Input data



Annotations

These are
apples



Model

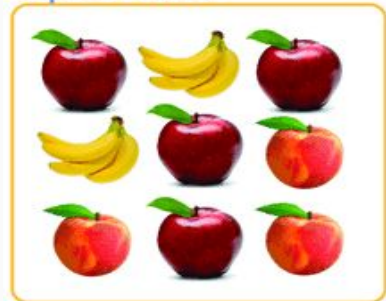


Prediction

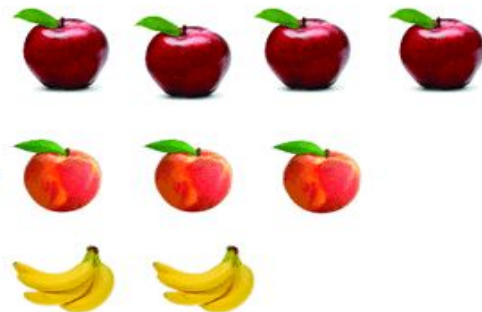
Its an
apple!

unsupervised learning

Input data



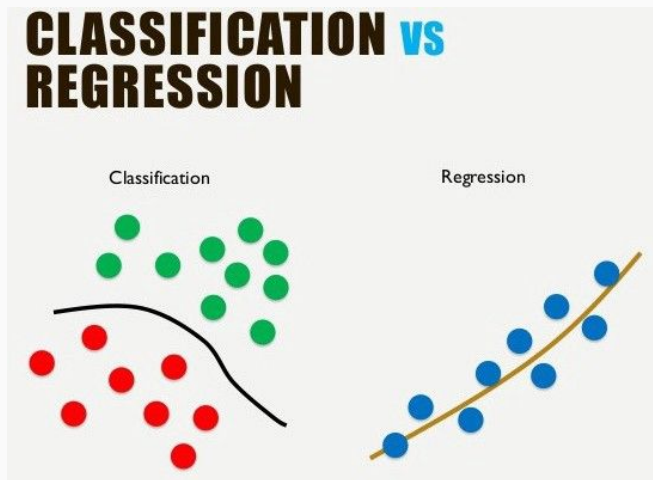
Model



Supervised Learning

Learning a task under supervision! (Someone is present judging whether you're getting the right answer)

Similarly, in supervised learning, that means having a full set of labeled data while training an algorithm.



Unsupervised Learning

Do you think it is possible every time to get a perfectly labeled data?

Or, what if you yourself don't know what should be the output?

In unsupervised learning, a model is handed a dataset without explicit instructions on what to do with it.

The training dataset is a collection of examples without a specific desired outcome or correct answer. The neural network then attempts to automatically find structure in the data by extracting useful features and analyzing its structure.



Reinforcement Learning

Reinforcement Learning is the branch of machine learning where the agent learns to behave in an environment, by performing certain actions and observing the rewards.

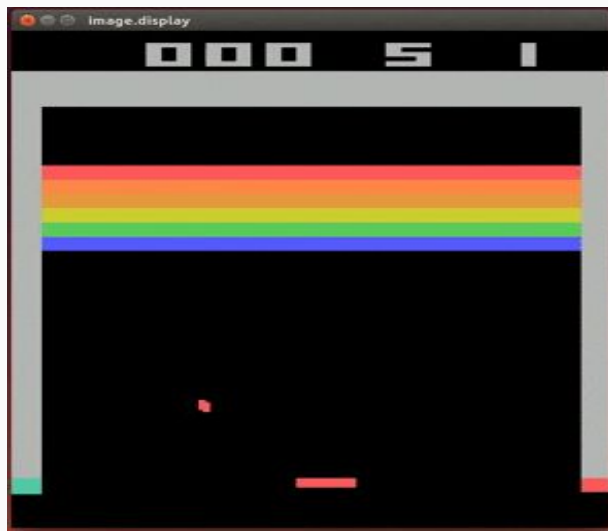
Let's take an example of a baby who is learning to walk and wants to reach the couch. There arises two cases here :-

1. Baby starts walking and successfully reaches the couch.
2. Baby starts walking and falls due to some obstacle and gets bruised.

We associate a **reward** for each **action** and the ultimate goal of this process is to maximize the **reward**.

Reinforcement Learning(Continued)

With the advancements in Robotics Arm Manipulation, Google Deep Mind beating a professional Alpha Go Player, and recently the OpenAI team beating a professional DOTA player, the field of reinforcement learning has really exploded in recent years.



What is a model?

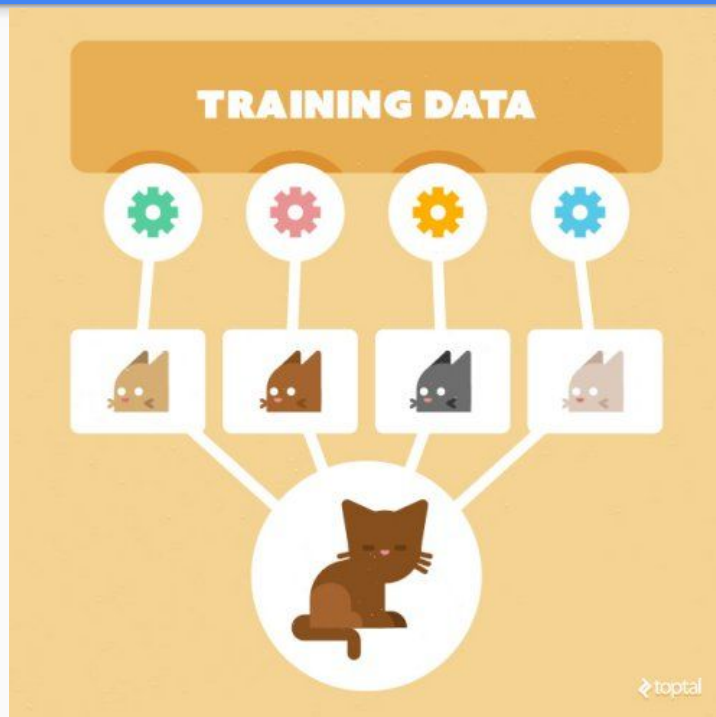
A machine learning model can be a mathematical representation of a real-world process. To generate a machine learning model you will need to provide training data to a machine learning algorithm to learn from.

What is your data?

Possible Forms?

Text, Image, Audio, Anything else?

- Labeled
- Un-labeled

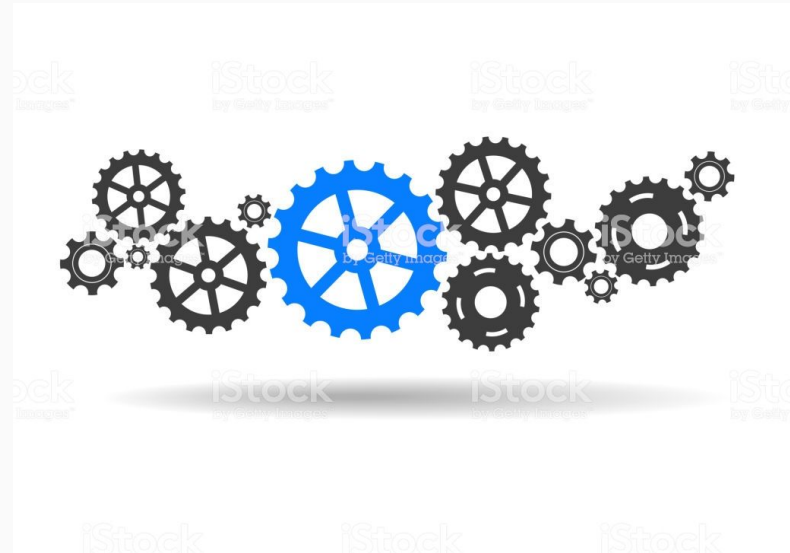


What do you want to predict?

Do you know what you want to do?

Plan your action

How to generate hypothesis?



How will you judge your prediction?

Here is where Cost functions arrive!

Cost Function quantifies the error between predicted values and expected values and **presents it in the form of a single real number.**

Our aim is to OPTIMIZE the cost!

Sounds simple, right? [blog](#)

**When you get 0.5% increase in accuracy
after tuning the hyperparameters for a week**



I see this as an absolute win!

Regression

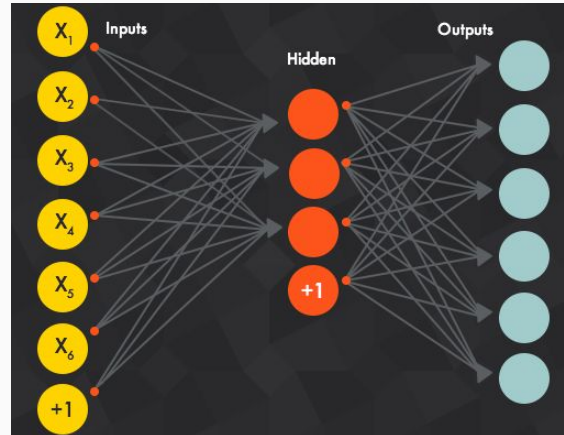
Consider these cases:

- A credit card company wants to predict monthly gift card sales and improve yearly revenue projections.
- You were told to estimate the selling price of a house, provided you are given data of various houses enlisting no. of rooms, area, location, etc.

Blog

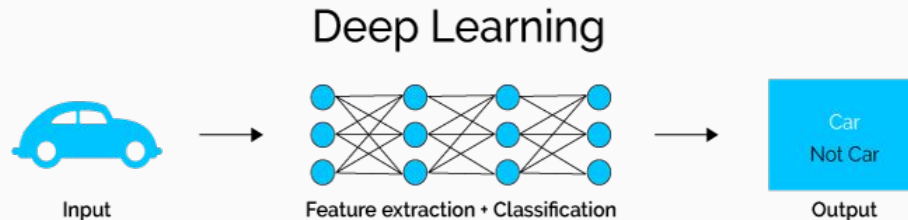
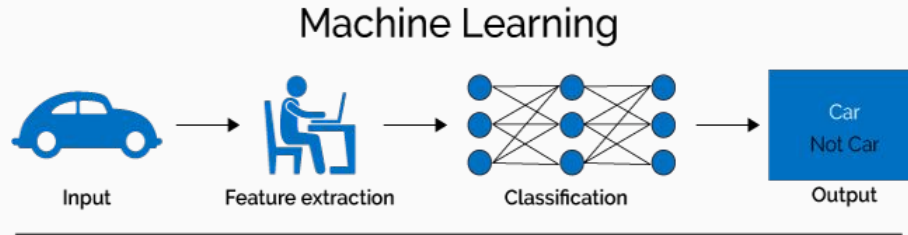
Neural Networks(Deep Learning)

Deep learning is a sub-field of machine learning dealing with algorithms inspired by structure and function of the brain.



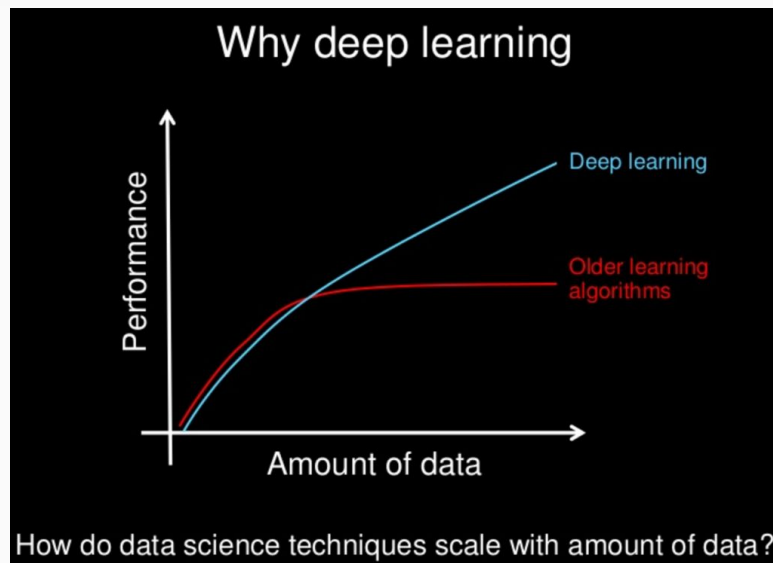
Neural Networks(Deep Learning)

Deep learning models work in layers and a typical model at least has three layers. Each layer accepts the information from previous and passes it on to the next one.



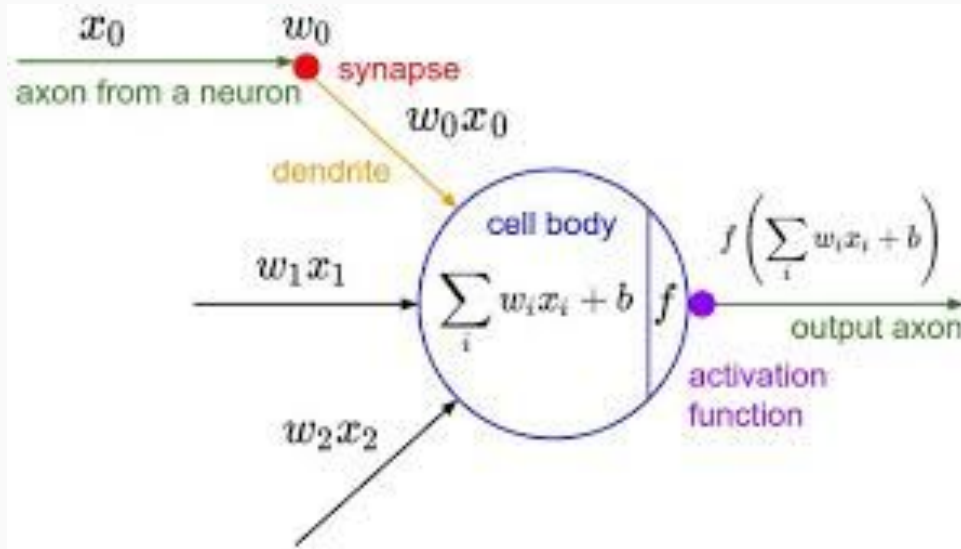
One of differences between machine learning and deep learning model is on the feature extraction area. Feature extraction is done by human in machine learning whereas deep learning model figure out by itself.

Why deep learning?



Deep learning models tend to perform well with increase in the amount of data whereas traditional machine learning models stops improving after a saturation point.

Mathematical Representation



A single neuron(Basic functional unit of a neural network)

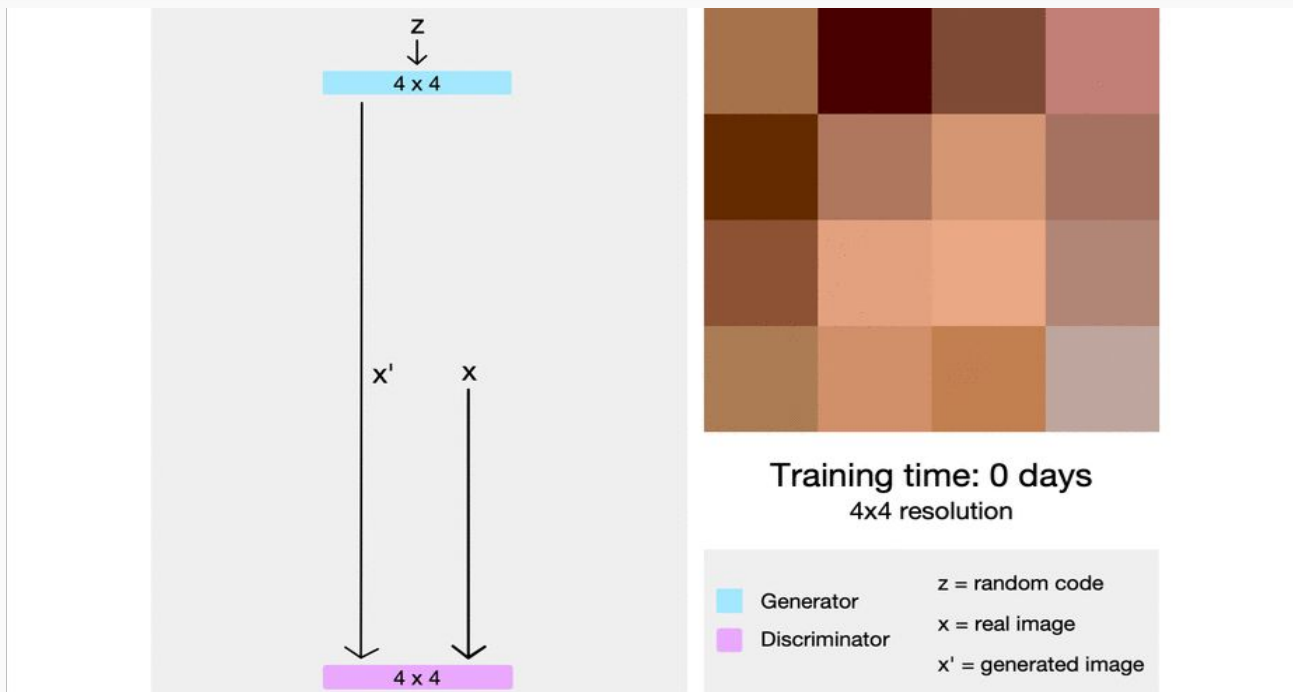
Computer Vision

- Ever tried the face app challenge to see how you may look when you are old?
- Wondered how self driving cars work?
- Heard about Amazon Go shopping store?
- What exactly do those snapchat filters do? Ever tried websites like Lenskart?
- Who are these people shown in this link? Do they really exist?

<https://thispersondoesnotexist.com/>

How do you think these things are done?

This person doesn't Exist(An intuition)



Computer Vision, often abbreviated as CV, is defined as a field of study that seeks to develop techniques to help computers “see” and understand the content of digital images such as photographs and videos.

We mainly use deep learning techniques to achieve this.

Computer vision has a wide variety of applications, both old (e.g., mobile robot navigation, industrial inspection, and military intelligence) and new (e.g., human computer interaction, image retrieval in digital libraries, medical image analysis, and the realistic rendering of synthetic scenes in computer graphics).

Natural Language Processing

Where do we find NLP?

- Machine Language translation
- Word Processors such as grammarly that employ NLP to check grammatical accuracy of text
- Interactive Voice Response (IVR) applications used in call centers to respond to certain users' requests.
- Personal assistant applications such as OK Google, Siri, Cortana, and Alexa.

Natural Language Processing

NLP is the branch of artificial intelligence that deals with interaction between computers and humans using the natural language.

The ultimate objective of NLP is to read, decipher, understand, and make sense of the human languages in a manner that is valuable.

Most NLP techniques rely on machine learning to derive meaning from human languages.

Natural Language Processing

Rule based Vs the **Statistical** Vs the **Deep Learning** Approach

Machine Translation Task as an example.



TRUE THAT!



Innovations

You won't believe what Obama says in this video

- <https://www.youtube.com/watch?v=cQ54GDm1eL0&app=desktop>

Are you a bad artist? Don't worry xD

- <https://www.youtube.com/watch?v=p5U4NgVGAwg&feature=youtu.be>

Everybody can Dance!

- https://drive.google.com/file/d/1jmm0rcwVJlfejEiECAO9DnE_-xqiQ0e/view?usp=sharing



IDEAS
— For Us —

Notebooks

- Python
 - Go to colab.research.google.com
 - Switch to GITHUB tab
 - Enter the github handle as dsciiatpatna
 - Choose the Python repository
- <https://github.com/dsciiatpatna/ML-AI-Meetups>

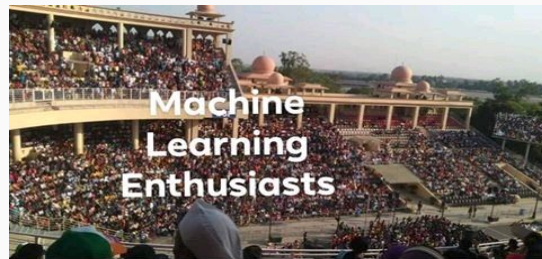
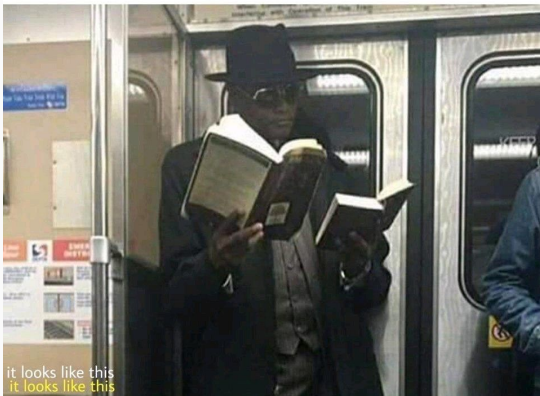
Future Scope in Artificial Intelligence

- It is one of the most in-demand fields in the industry.
- Automation is everywhere. AI and ML are playing important roles in the technological revolution of the new era.
- Machine Learning Engineers are highly paid with a lot of other perks.
- There is a great scope to pursue research in Machine Learning.

Research in Machine Learning

- Machine Learning is predominantly experimental in nature.
- Research is a very unique aspect which differentiates ML from other branches of CS like development, Competitive Programming etc.
- Bill Gates quotes “A breakthrough in ML is worth 10 Microsofts”
- The Governments of many countries are funding millions for research in AI.

When the paper you're reading keeps citing another paper



Resources

<https://aquarius31.github.io/ml/>

You can find plenty of resources on this link.

Whoever wants to get started on their own may start from some tutorial mentioned in it or refer some book.

1. Andrew NG course of Stanford University on Coursera (skip the Matlab part of it)
2. <http://www.labri.fr/perso/nrougier/teaching/numpy.100/>
3. <https://www.machinelearningplus.com/python/101-pandas-exercises-python>

Resources(Continued)

A very exhaustive link which covers almost everything.

- <https://github.com/adeshpande3/Machine-Learning-Links-And-Lessons-Learned#learning-machine-learning>

General ML and AI projects ideas for implementation:-

- <https://github.com/NirantK/awesome-project-ideas>

Simple tutorial for starting Kaggle

- <https://www.kaggle.com/rochellesilva/simple-tutorial-for-beginners>

Practice

- <https://www.kaggle.com/learn/overview>