CAREERERA®

A Warm Welcome To Careerera Family

DATA SCIENCE

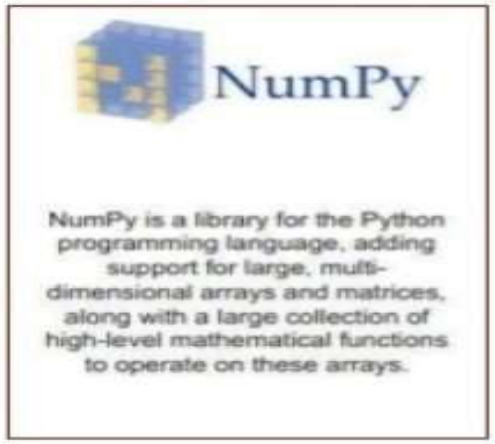

DATA
SCIENCE

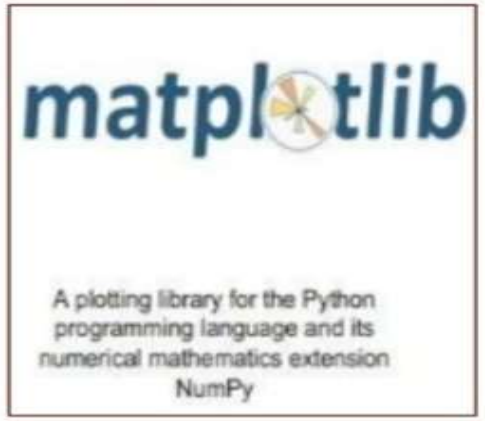
What is Data Science

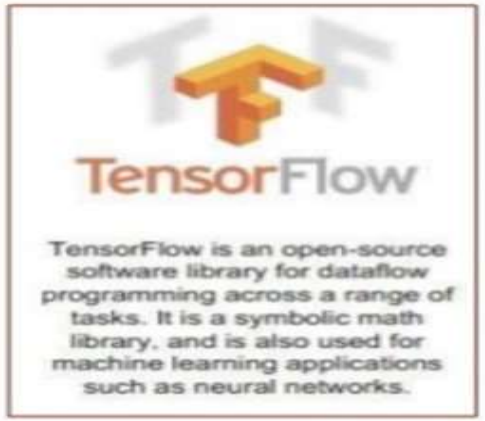
Data science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from data in various forms, both structured and unstructured data.

WHAT IS DATA SCIENCE?

Learning Data Science with Python - Libraries



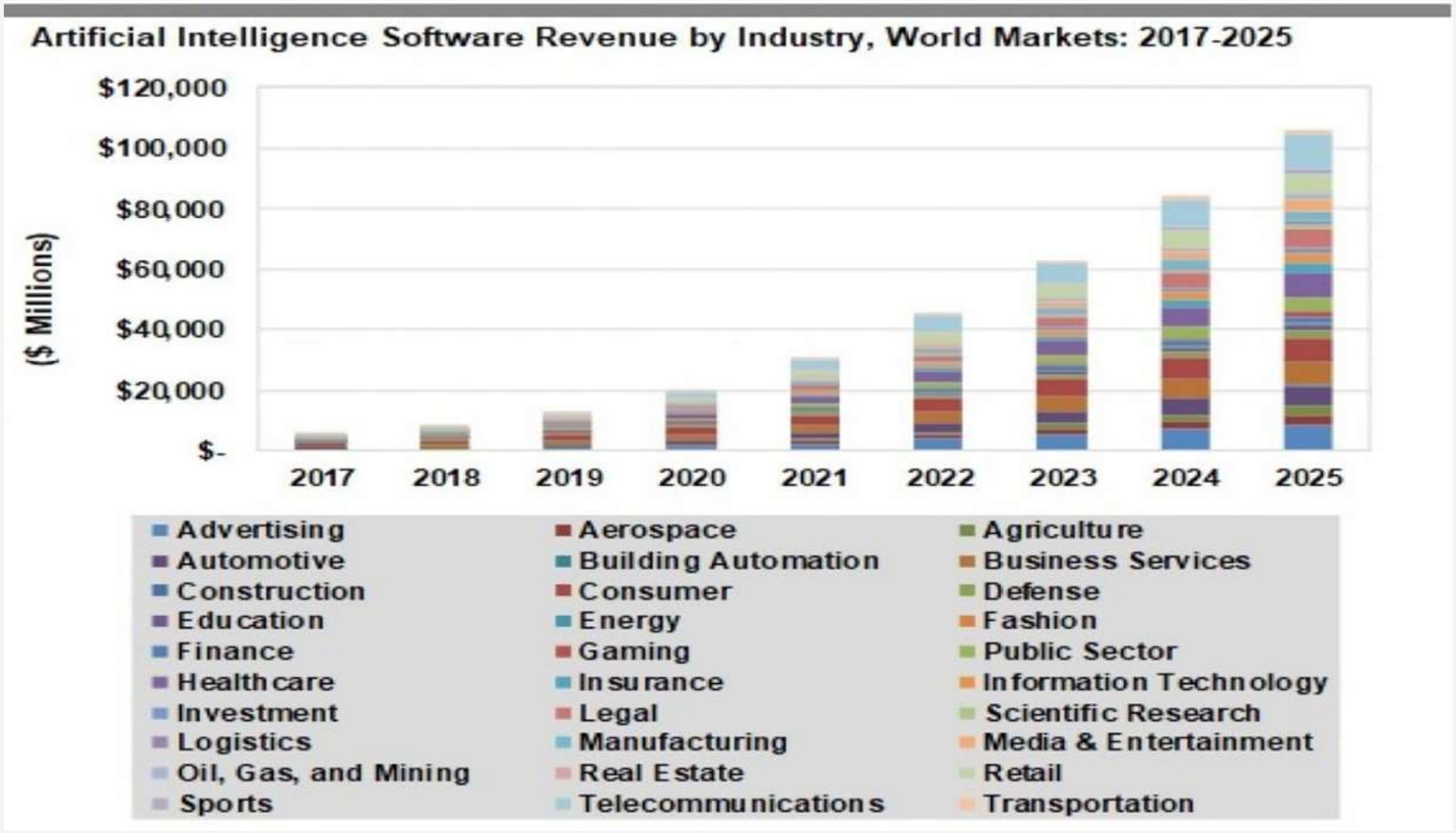




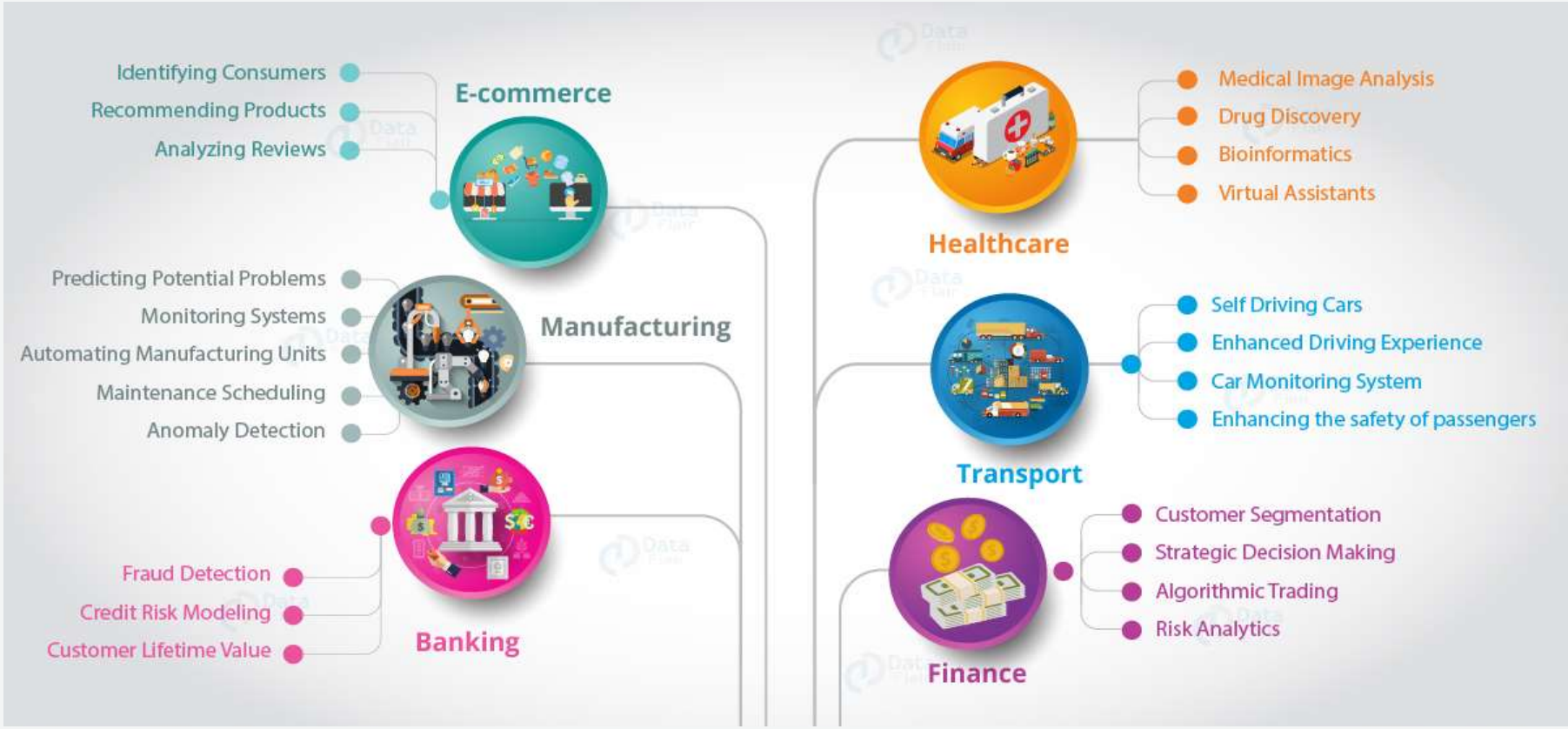
WHAT IS DATA SCIENCE?

Big Data Science Tasks

- Facebooks
- Amazon
- Google
- LinkedIn
- Netflix
- Rozetka
- Microsoft


Artificial Intelligence Software Revenue by Industry, World Markets: 2017-2025
($ Millions)
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
2017
2018
2019
2020
2021
2022
2023
2024
2025
Advertising
Aerospace
Agriculture
Automotive
Building Automation
Business Services
Construction
Consumer
Defense
Education
Energy
Fashion
Finance
Gaming
Public Sector
Healthcare
Insurance
Information Technology
Investment
Legal
Scientific Research
Logistics
Manufacturing
Media & Entertainment
Oil, Gas, and Mining
Real Estate
Retail
Sports
Telecommunications
Transportation

Data Science Applications



Data Science Applications in Banking

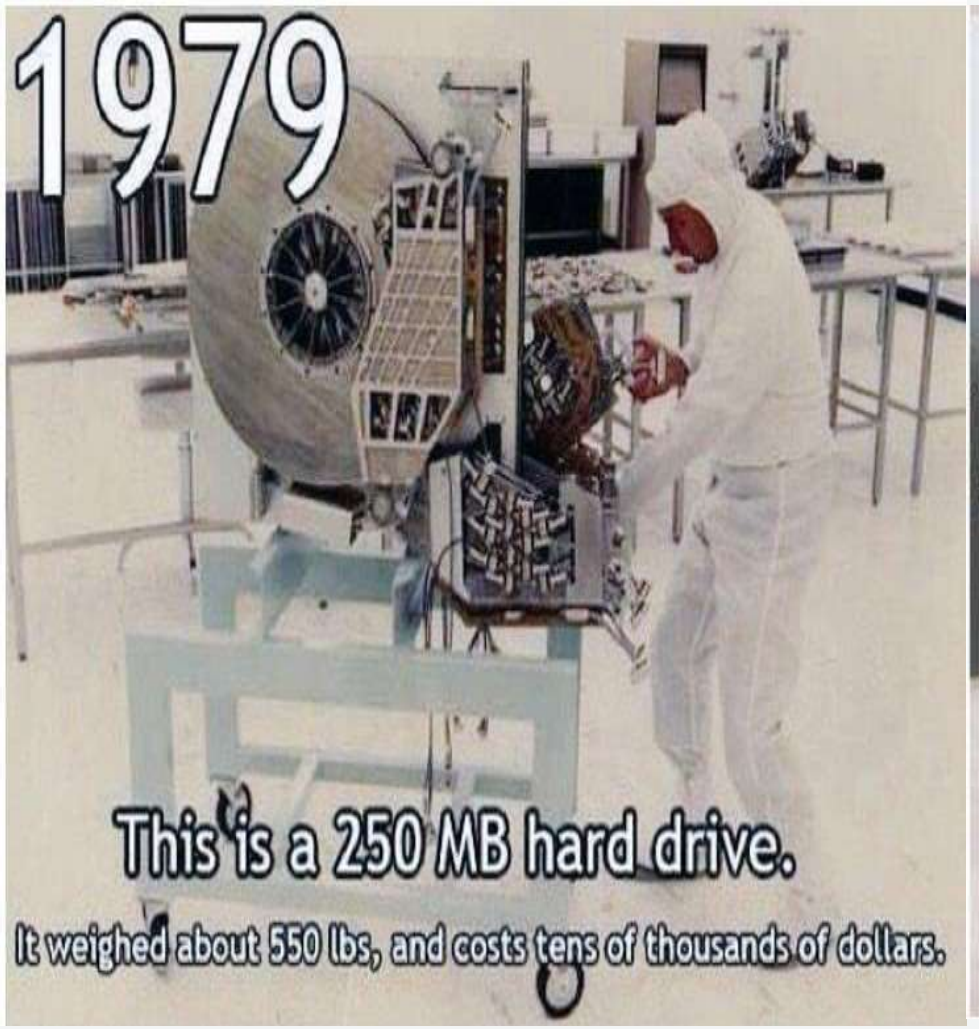
AGENDA FOR TODAYS SESSION

- What is data-science. How the machine learning, NLP, AI are generated from the data?
- why data science technology? Why not other technology?
- why data science more hype now. What is the reason
- which programing language we will use for data-science
- which topics come under data-science
- Data-science real-time application, job opening & salary range ML vs AI vs NLP vs DL vs NN
- Why visualization is required in real-time world, Tableau
- Lets understand some Realtime projects –
  - ✓ **CHATBOT DEVELOPMENT**
  - ✓ **DATA AUGUMENTATION**
  - ✓ **NETFLIX VISUALIZATION**

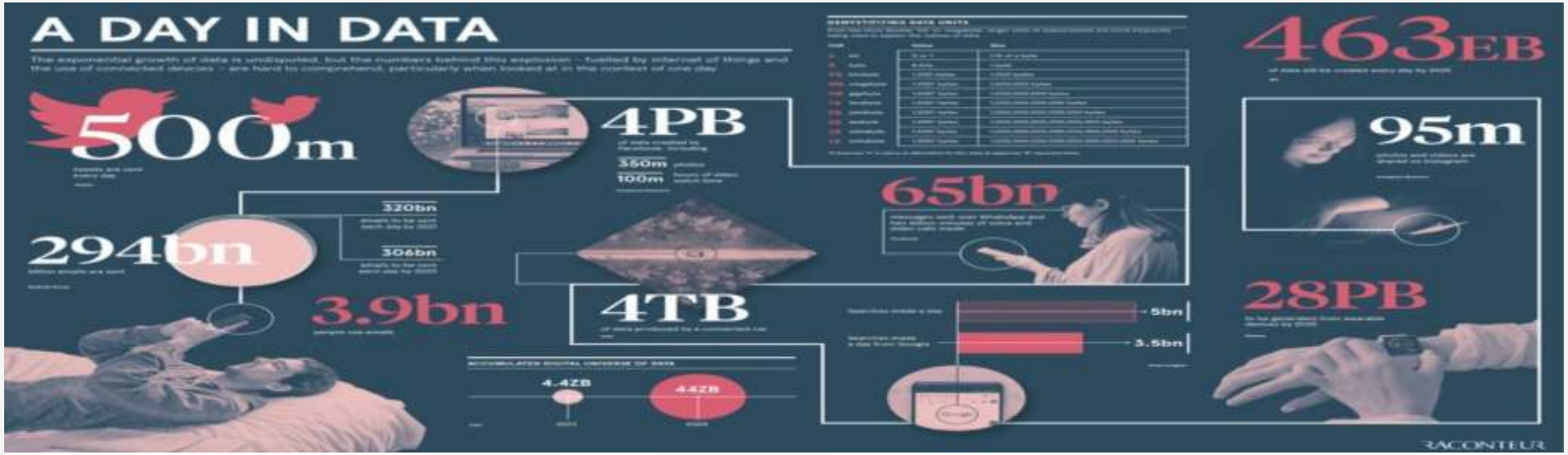
JOB SUPPORT

- We will discussion more Live project on different domain
- Mock interview on every session
- Provided real time project to practice on daily basis
- 1-on-1 session with all the learners
- Resume prepare based on learners and their experience
- Provide guidance for data science career transitions
- After complete this course you might get job offer below designation like Data analytics//ML Engineer/ AI Engineer/Data scientist/ NLP Engineer.
- Q & A

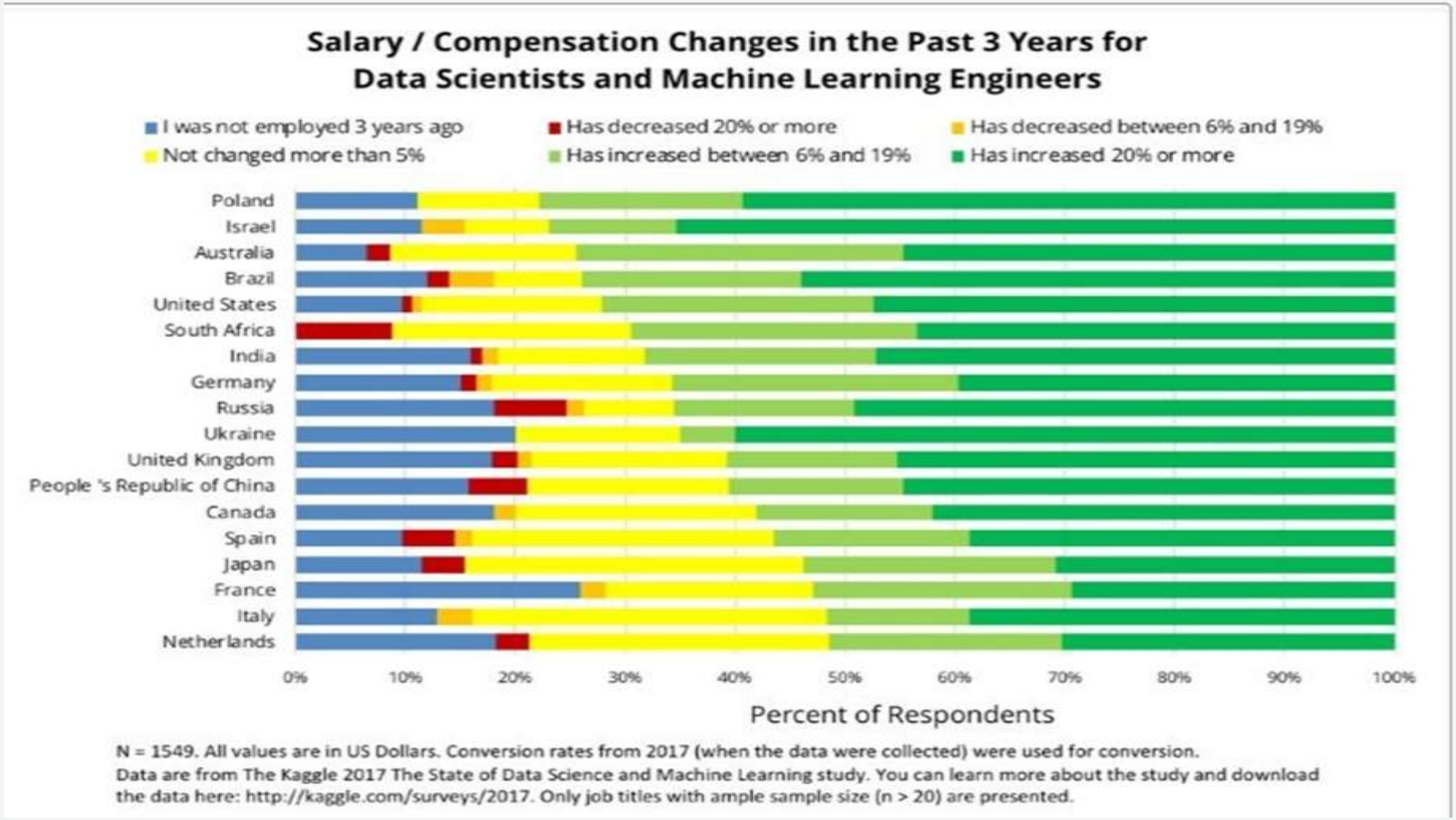
Need of Data Science


1979
This is a 250 MB hard drive.
It weighed about 550 lbs, and costs tens of thousands of dollars.


2014
This is a 128 GB microSD card.
It holds about 525x the data as the DH above.
It weighs about 4/10 of 1 gram and costs about $25.



Abbreviation	Unit	Value	Size (in bytes)
b	bit	0 or 1	1/8 of a byte
B	bytes	8 bits	1 byte
KB	kilobytes	1,000 bytes	1,000 bytes
MB	megabyte	$1{,}000^2$ bytes	1,000,000 bytes
GB	gigabyte	$1{,}000^3$ bytes	1,000,000,000 bytes
TB	terabyte	$1{,}000^4$ bytes	1,000,000,000,000 bytes
PB	petabyte	$1{,}000^5$ bytes	1,000,000,000,000,000 bytes
EB	exabyte	$1{,}000^6$ bytes	1,000,000,000,000,000,000 bytes
ZB	zettabyte	$1{,}000^7$ bytes	1,000,000,000,000,000,000,000 bytes
YB	yottabyte	$1{,}000^8$ bytes	1,000,000,000,000,000,000,000,000 bytes


Salary / Compensation Changes in the Past 3 Years for Data Scientists and Machine Learning Engineers
I was not employed 3 years ago
Has decreased 20% or more
Has decreased between 6% and 19%
Not changed more than 5%
Has increased between 6% and 19%
Has increased 20% or more
Poland
Israel
Australia
Brazil
United States
South Africa
India
Germany
Russia
Ukraine
United Kingdom
People 's Republic of China
Canada
Spain
Japan
France
Italy
Netherlands
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Respondents
N = 1549. All values are in US Dollars. Conversion rates from 2017 (when the data were collected) were used for conversion.
Data are from The Kaggle 2017 The State of Data Science and Machine Learning study. You can learn more about the study and download the data here: http://kaggle.com/surveys/2017. Only job titles with ample sample size (n > 20) are presented.

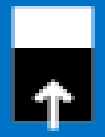
Artificial Intelligence

Any technique that enables computers to mimic human intelligence. It includes *machine learning*

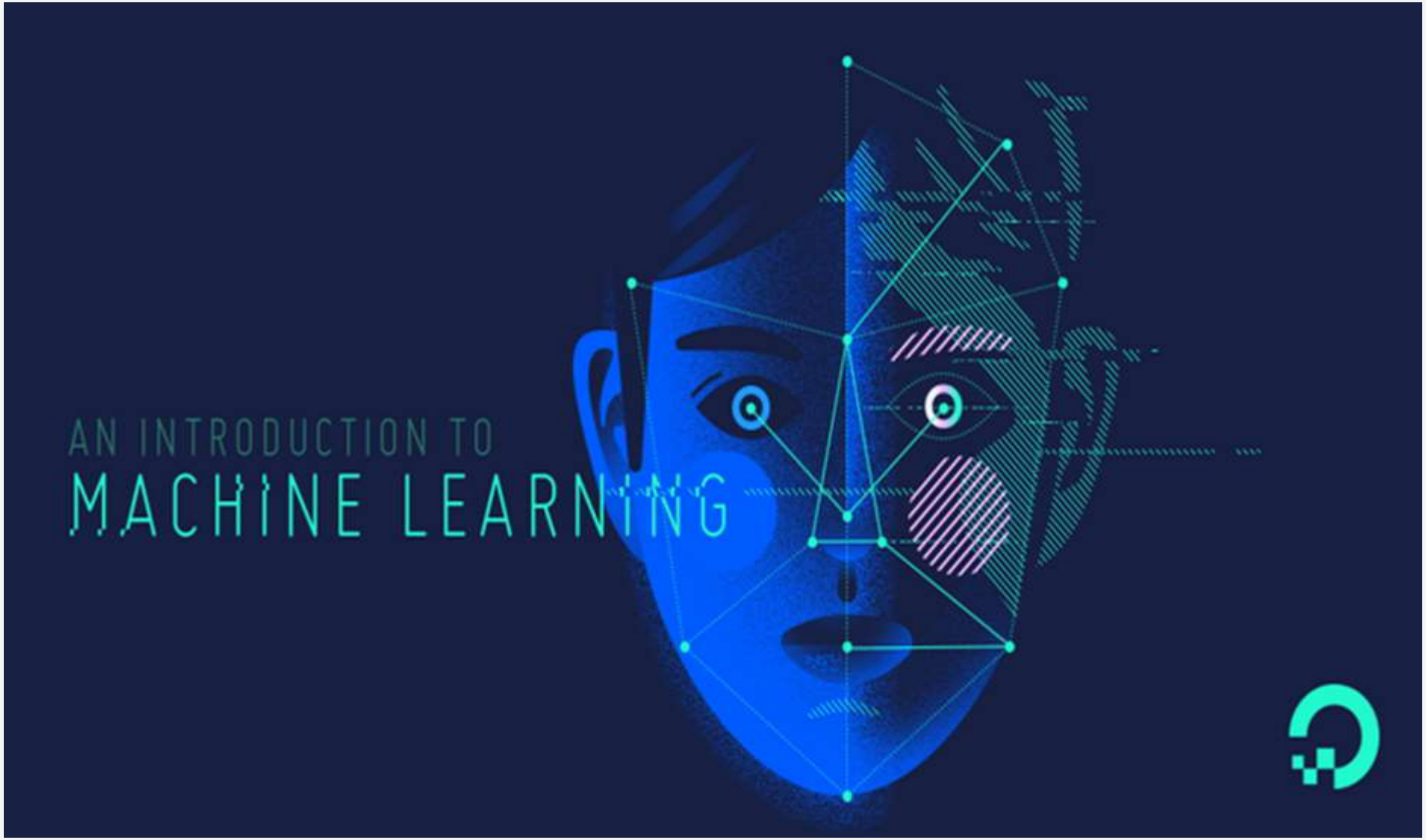
Machine Learning

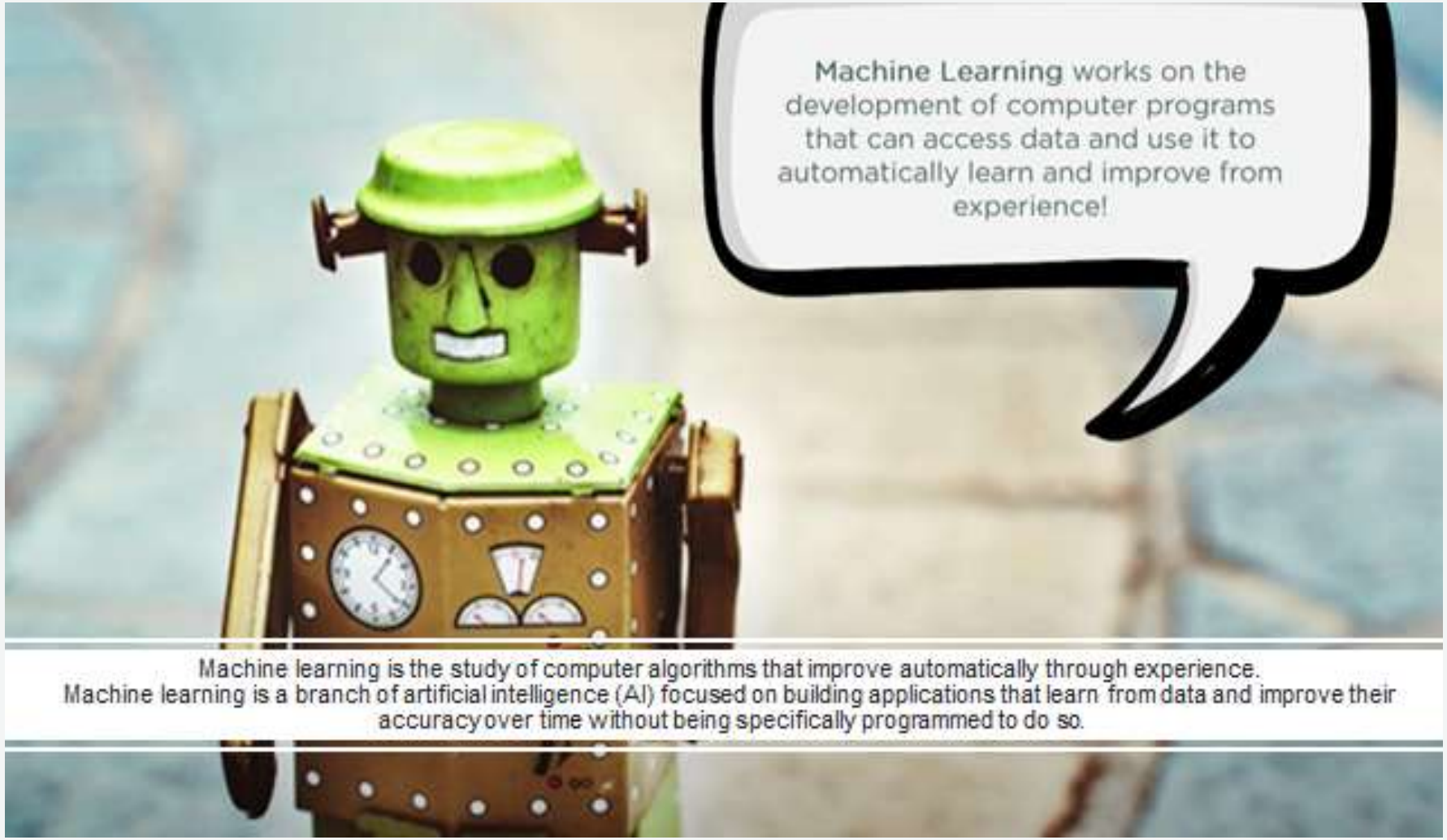
A subset of AI that includes techniques that enable machines to improve at tasks with experience. It includes *deep learning*

Deep Learning



A subset of machine learning based on neural networks that permit a machine to train itself to perform a task.


AN INTRODUCTION TO
MACHINE LEARNING

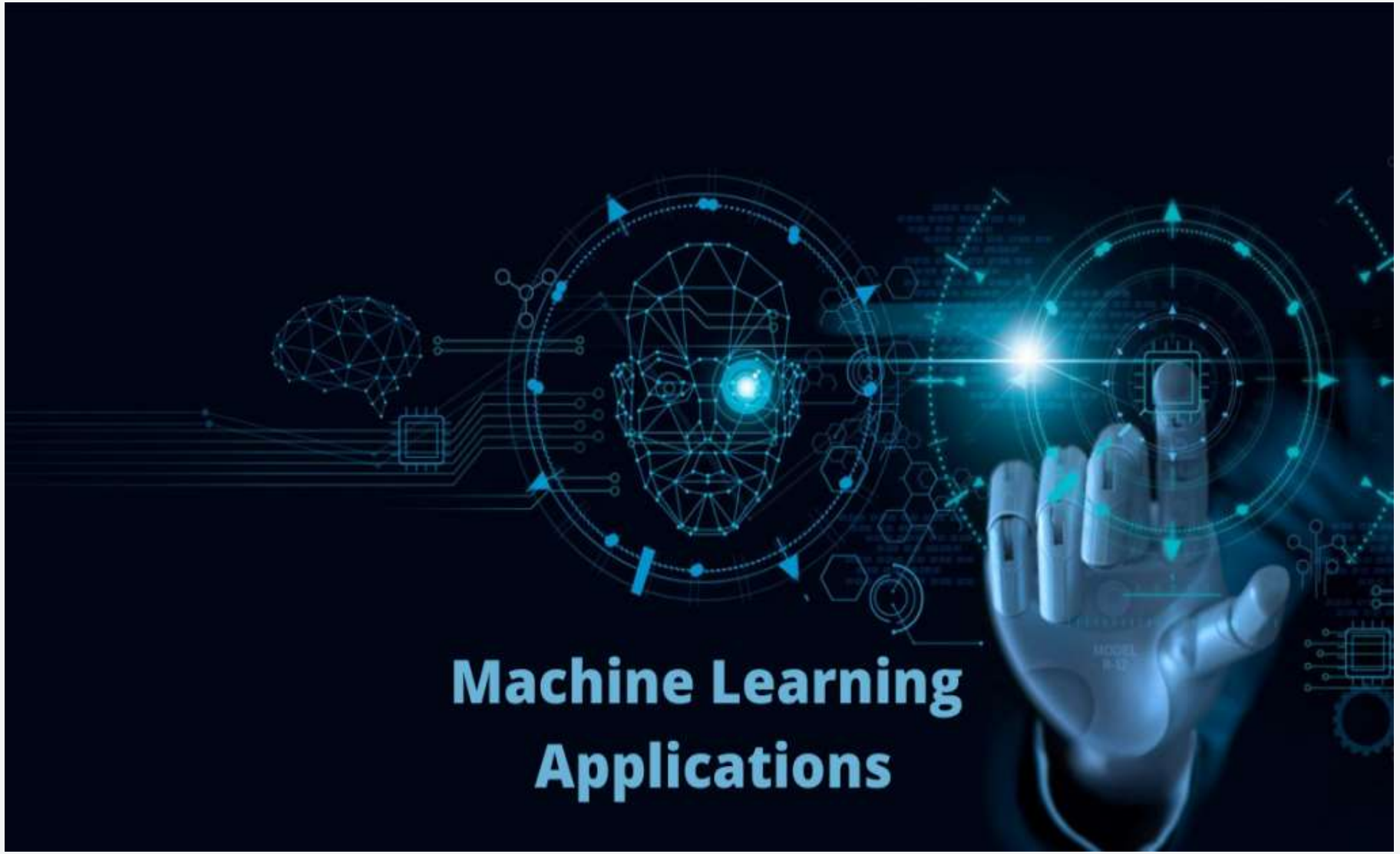


Machine learning is the study of computer algorithms that improve automatically through experience.
Machine learning is a branch of artificial intelligence (AI) focused on building applications that learn from data and improve their accuracy over time without being specifically programmed to do so.

Machine Learning is a sub-field of Artificial Intelligence that has empowered various smart applications.

Its functions are as follows:

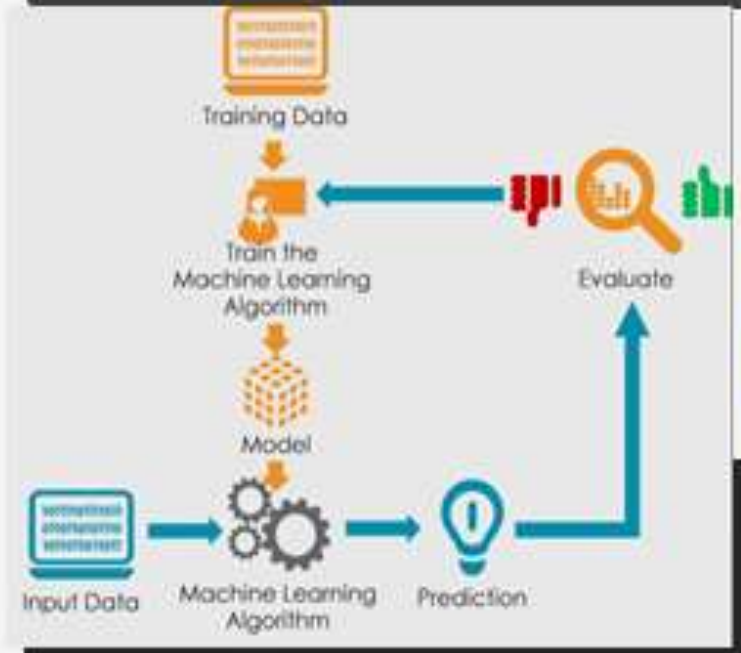
- Deals with the construction and study of systems that can learn from data
- Aims to let a computer predict something
- Predicts unknown things or events


Machine Learning
Applications

Applications of Machine Learning

- Product Recommendations
- Sentiment Analysis
- Image Recognition
- Google Translate
- Autonomous Cars
- Chat-bots
- Virtual Assistant
- Medical Diagnosis
- Email Filtering

MACHINE LEARNING PROCESS




Supervised Learning
Unsupervised Learning
TYPES OF MACHINE LEARNING

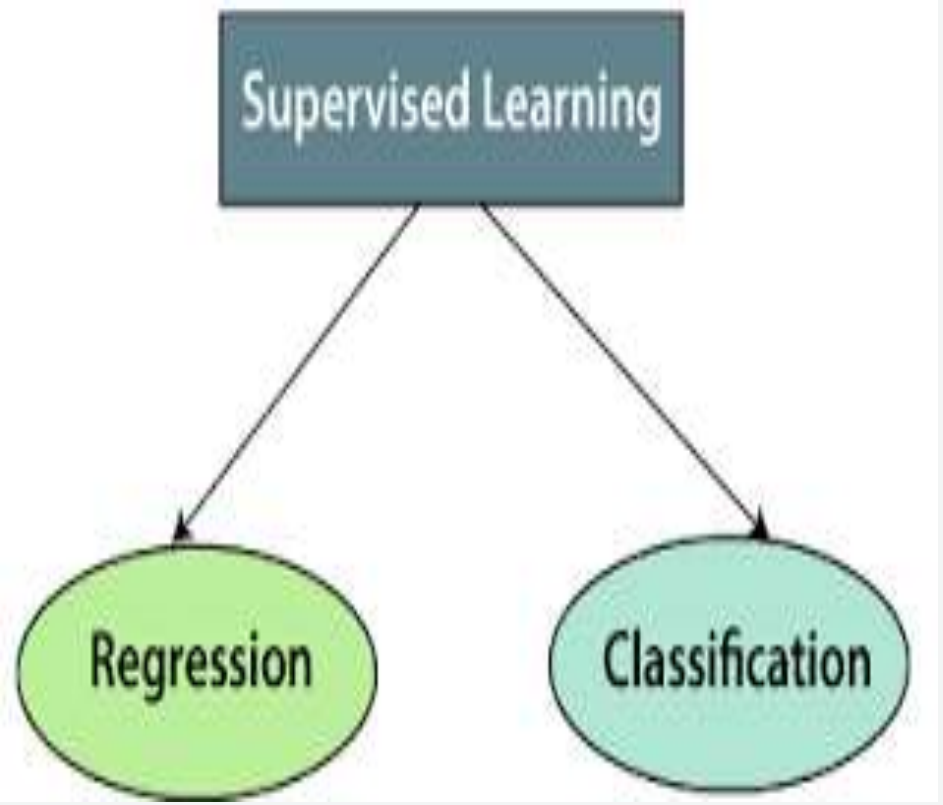
Supervised Learning

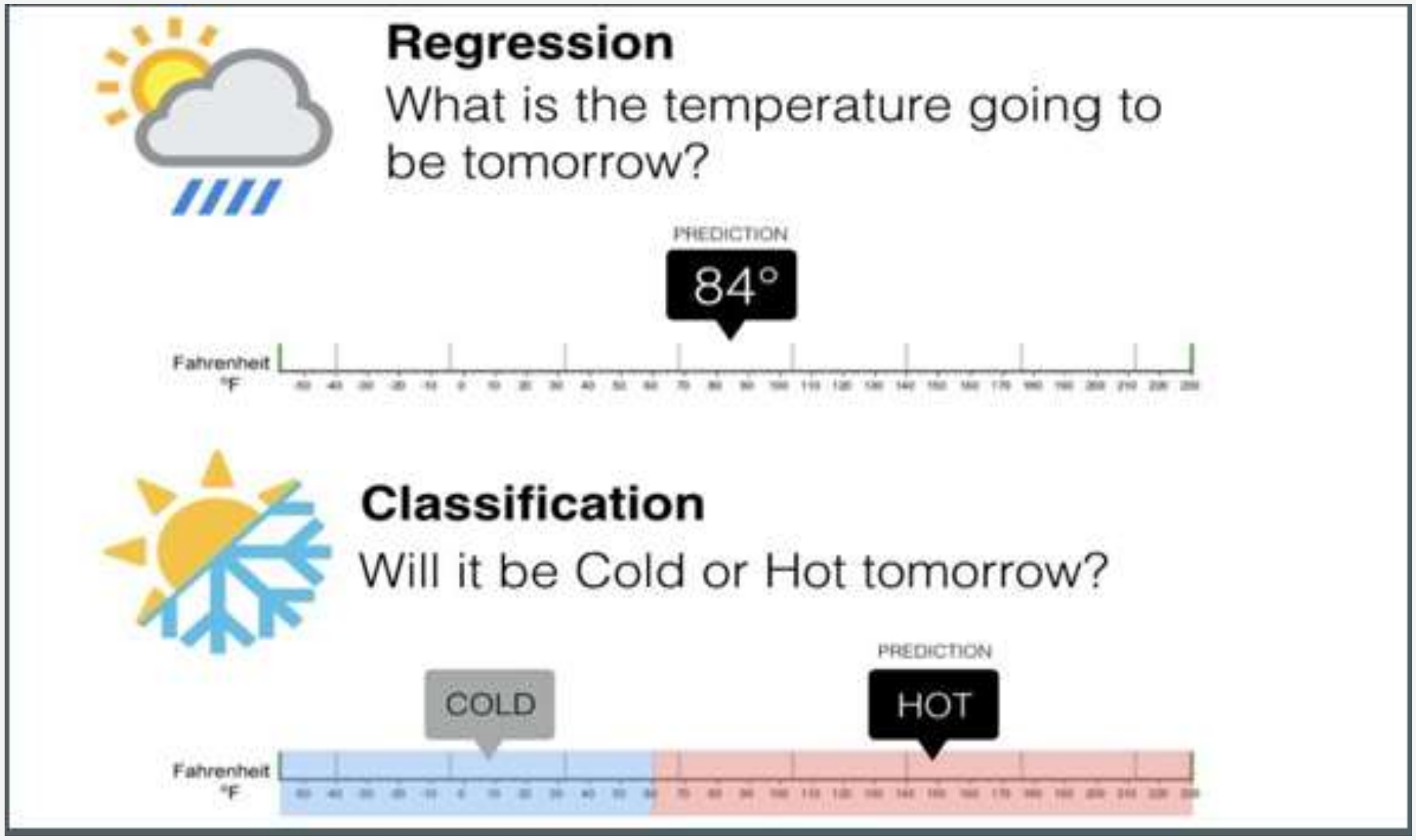
- In supervised learning, you train your model on a labelled dataset that means we have both raw input data as well as its results.

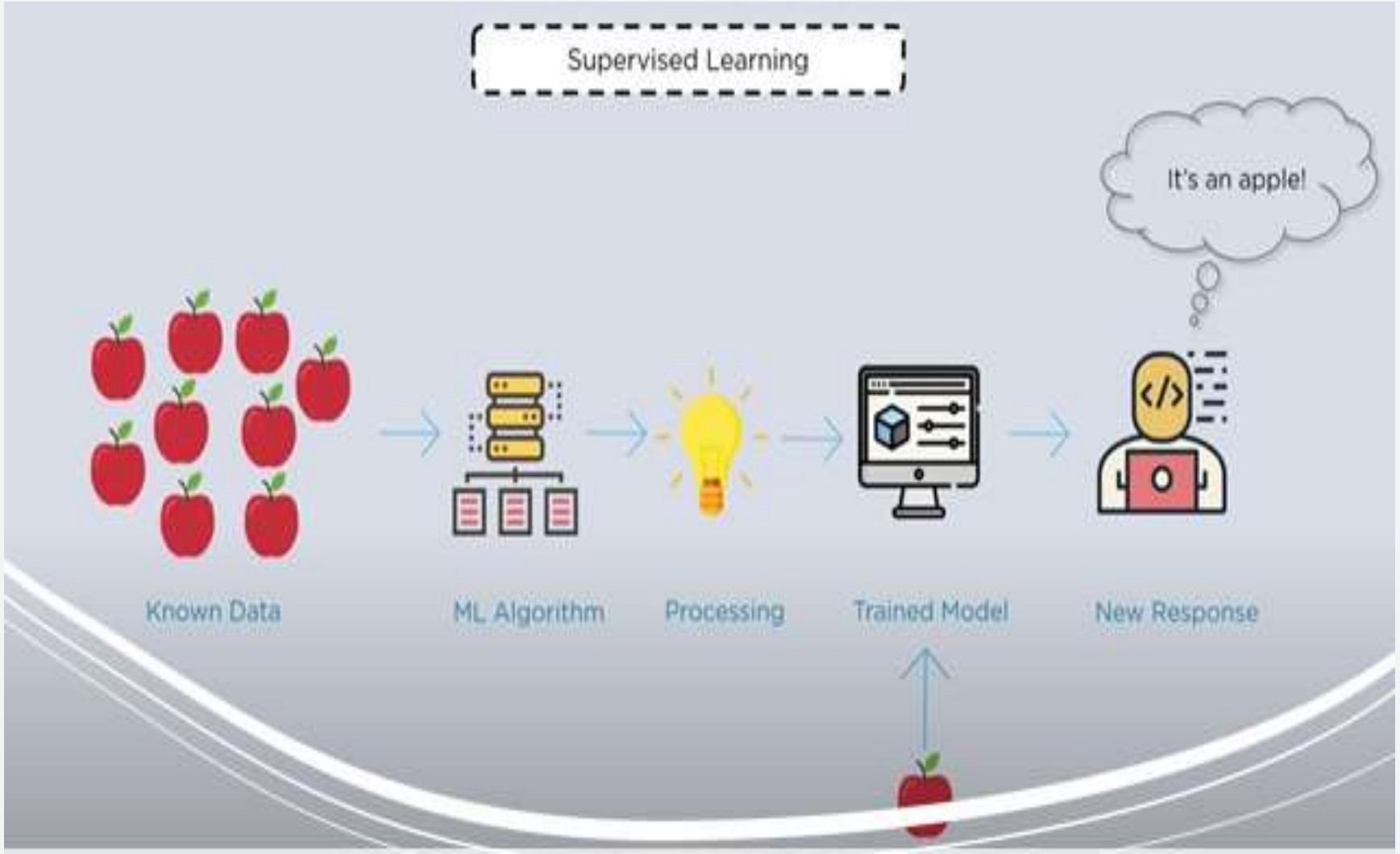
- We split our data into a training dataset and test dataset where the training dataset is used to train our network.

&

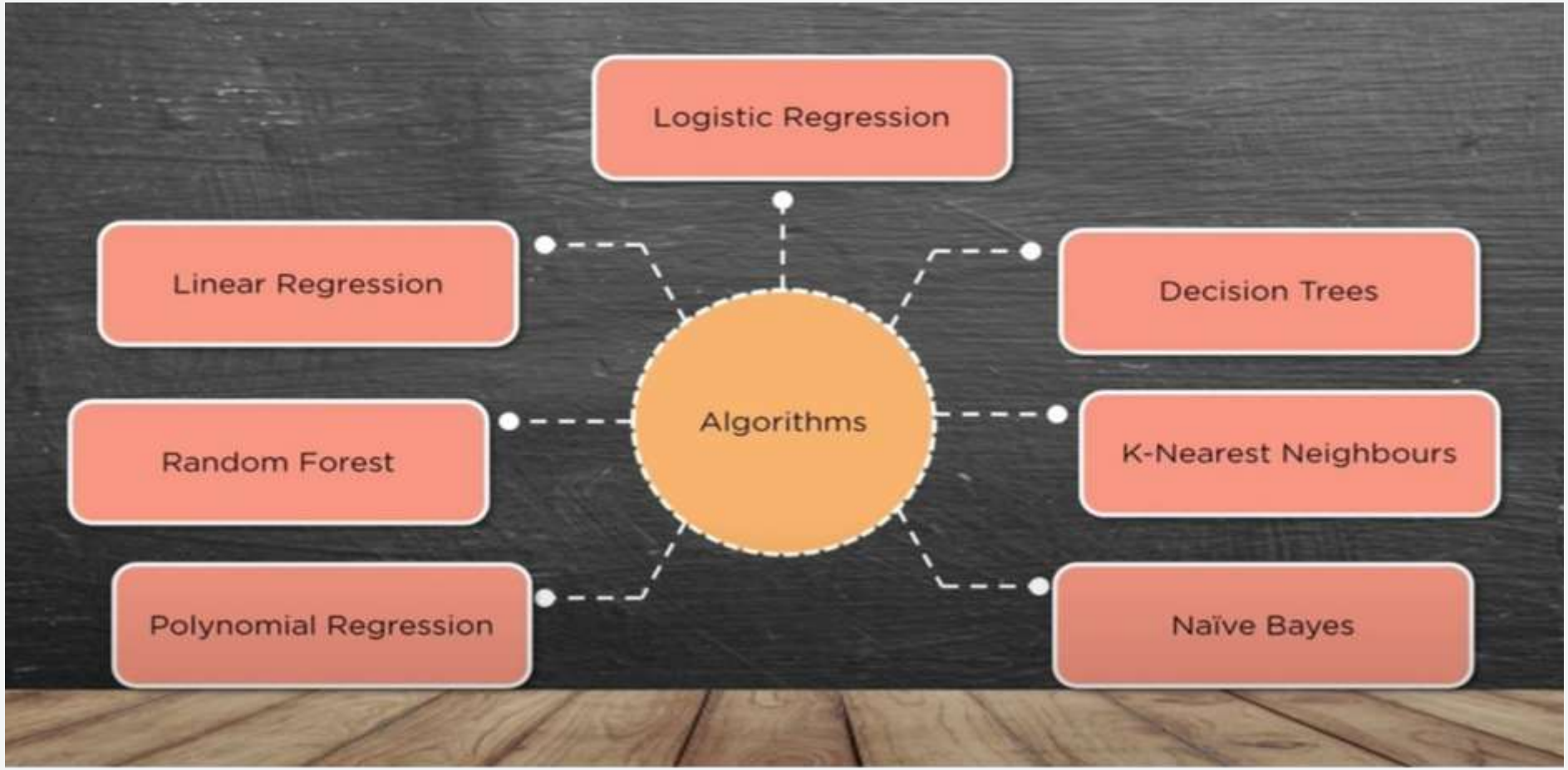
- The test dataset acts as new data for predicting the results or to see the accuracy of the models.



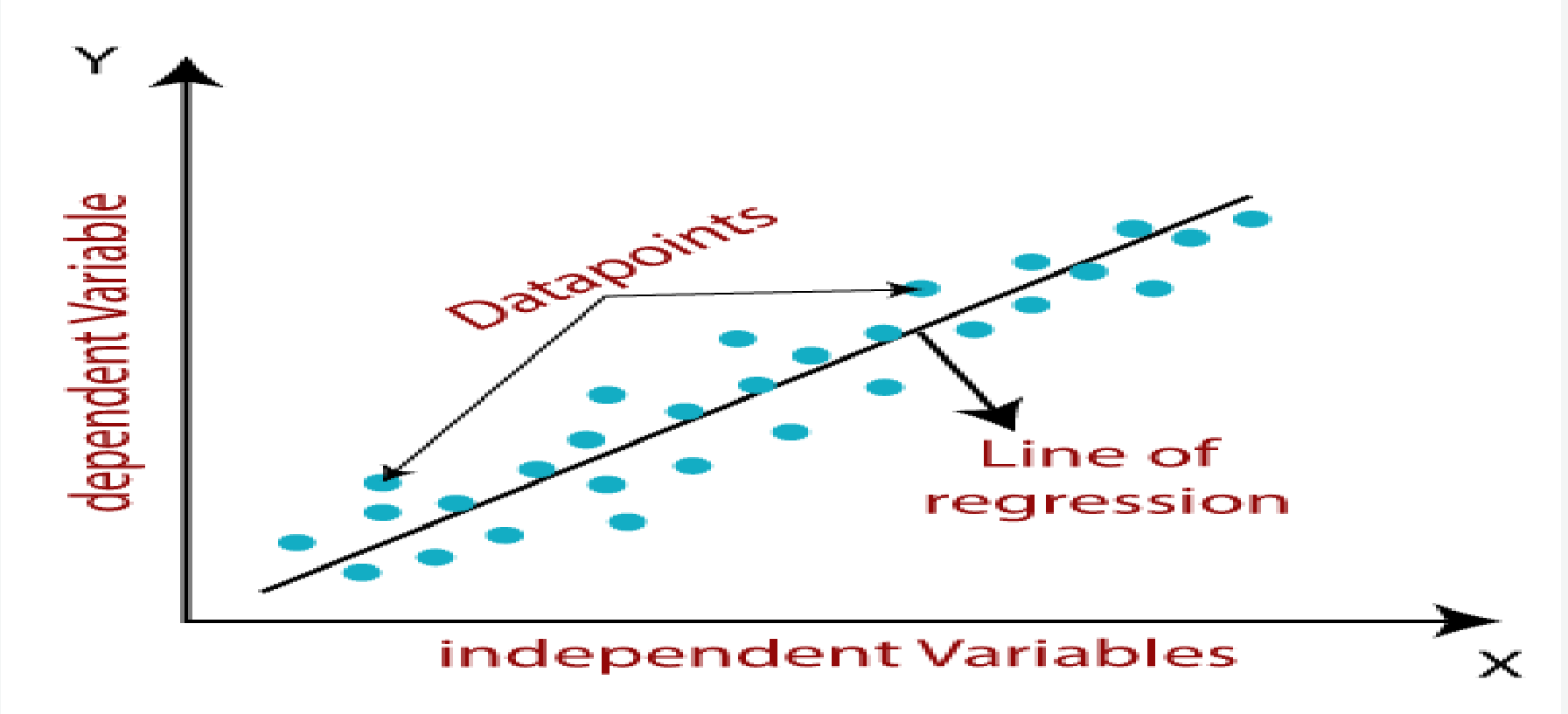

Regression
What is the temperature going to be tomorrow?
PREDICTION
84°
Fahrenheit
°F
Classification
Will it be Cold or Hot tomorrow?
PREDICTION
COLD
HOT
Fahrenheit
°F


Supervised Learning
It's an apple!
Known Data
ML Algorithm
Processing
Trained Model
New Response

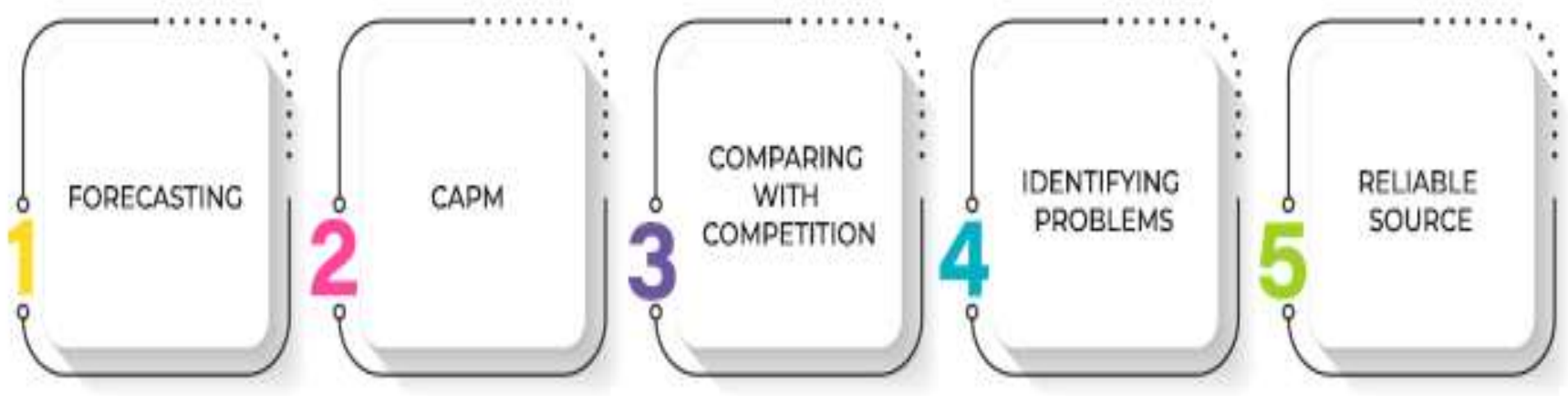
Supervised Learning Algorithm

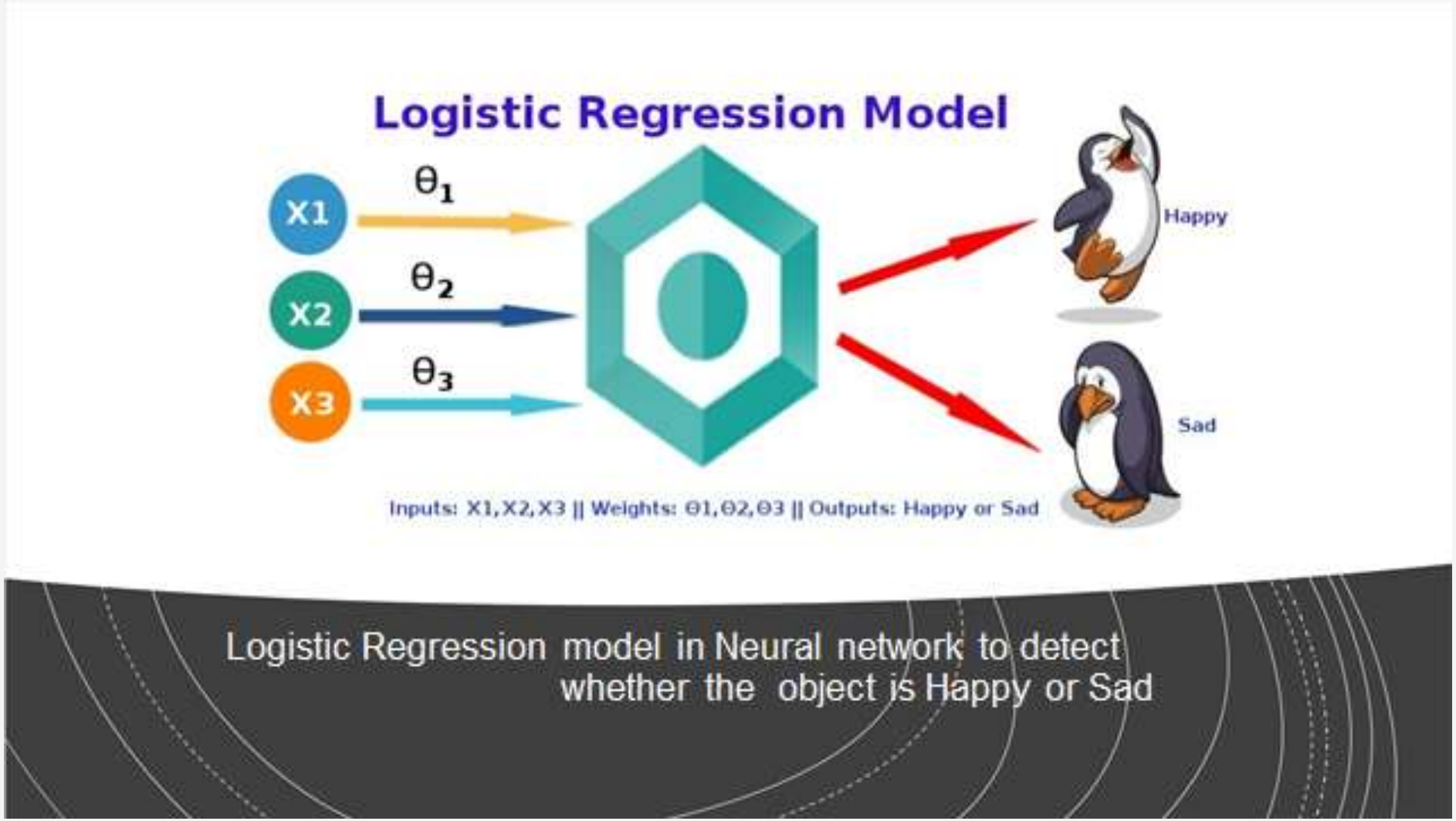


Linear regression is used for finding linear relationship between target and one or more predictors.

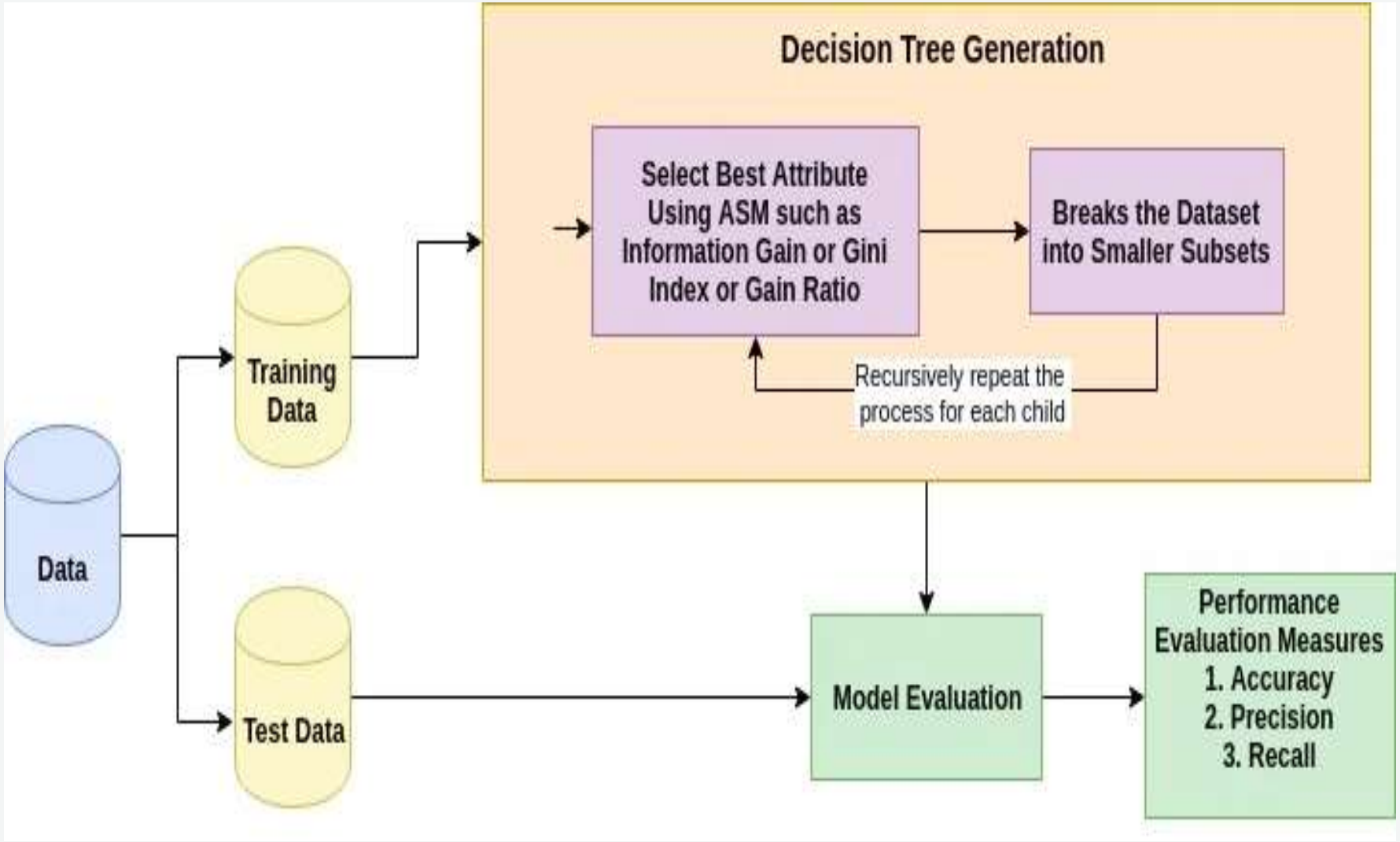


5 APPLICATIONS OF REGRESSION ANALYSIS

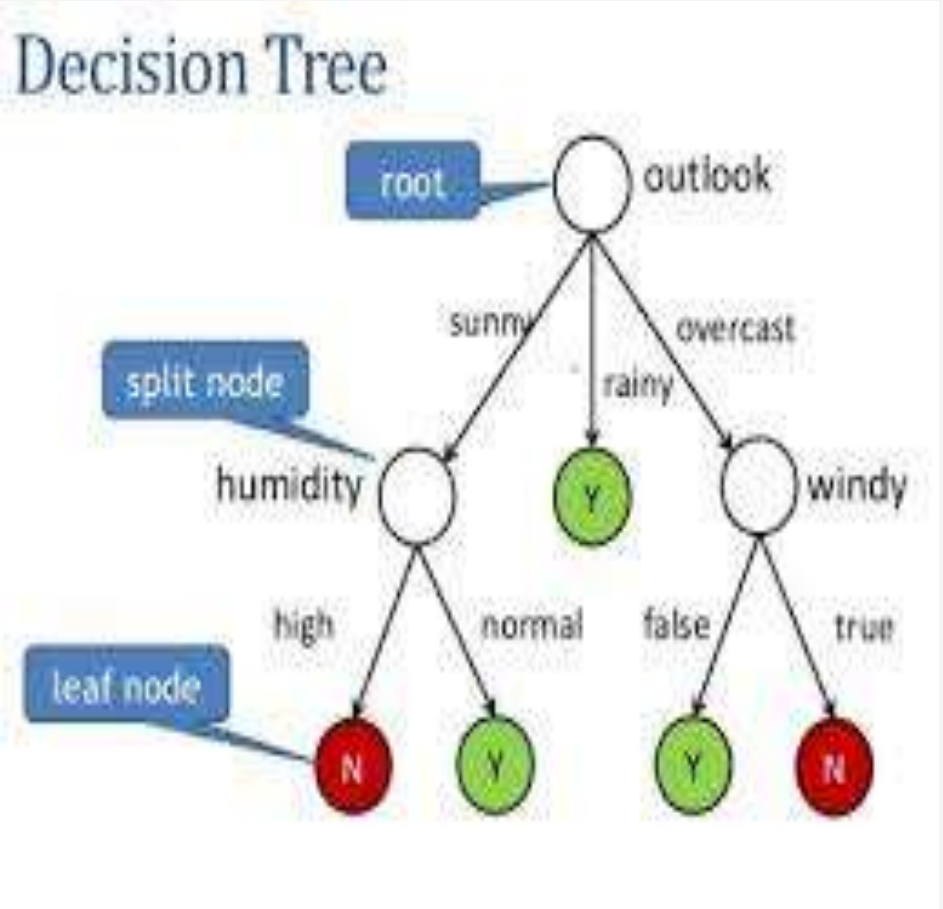



Logistic Regression Model
X1
X2
X3
θ1
θ2
θ3
Happy
Sad
Inputs: X1,X2,X3 || Weights: Θ1,Θ2,Θ3 || Outputs: Happy or Sad
Logistic Regression model in Neural network to detect whether the object is Happy or Sad


DECISION TREE


Decision Tree Generation
Select Best Attribute Using ASM such as Information Gain or Gini Index or Gain Ratio
Breaks the Dataset into Smaller Subsets
Recursively repeat the process for each child
Training Data
Data
Test Data
Model Evaluation
Performance Evaluation Measures
1. Accuracy
2. Precision
3. Recall

- Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems.
- It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome.
- It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.

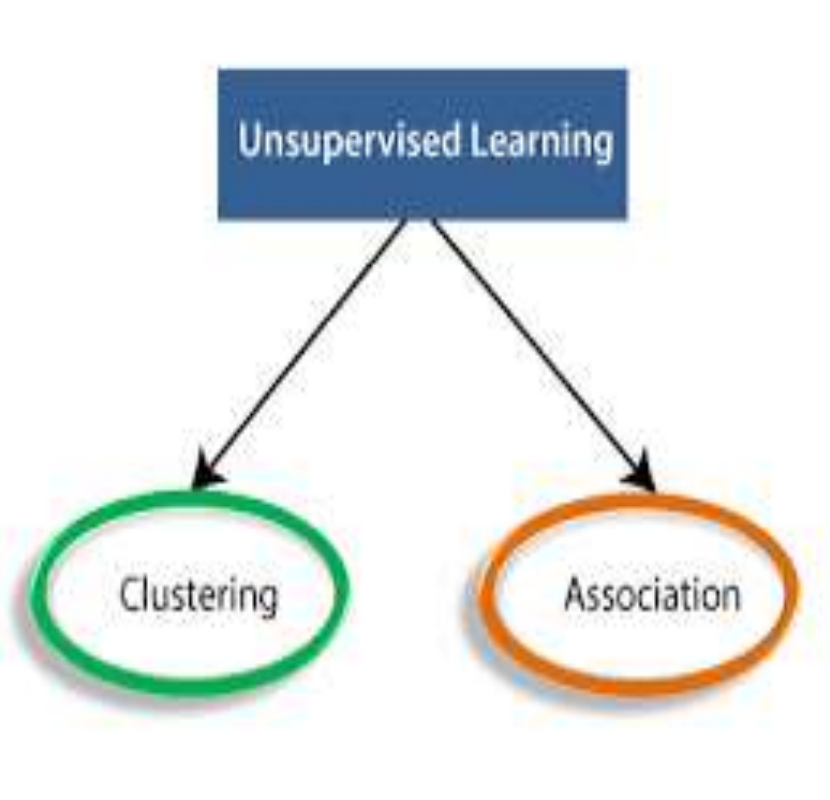


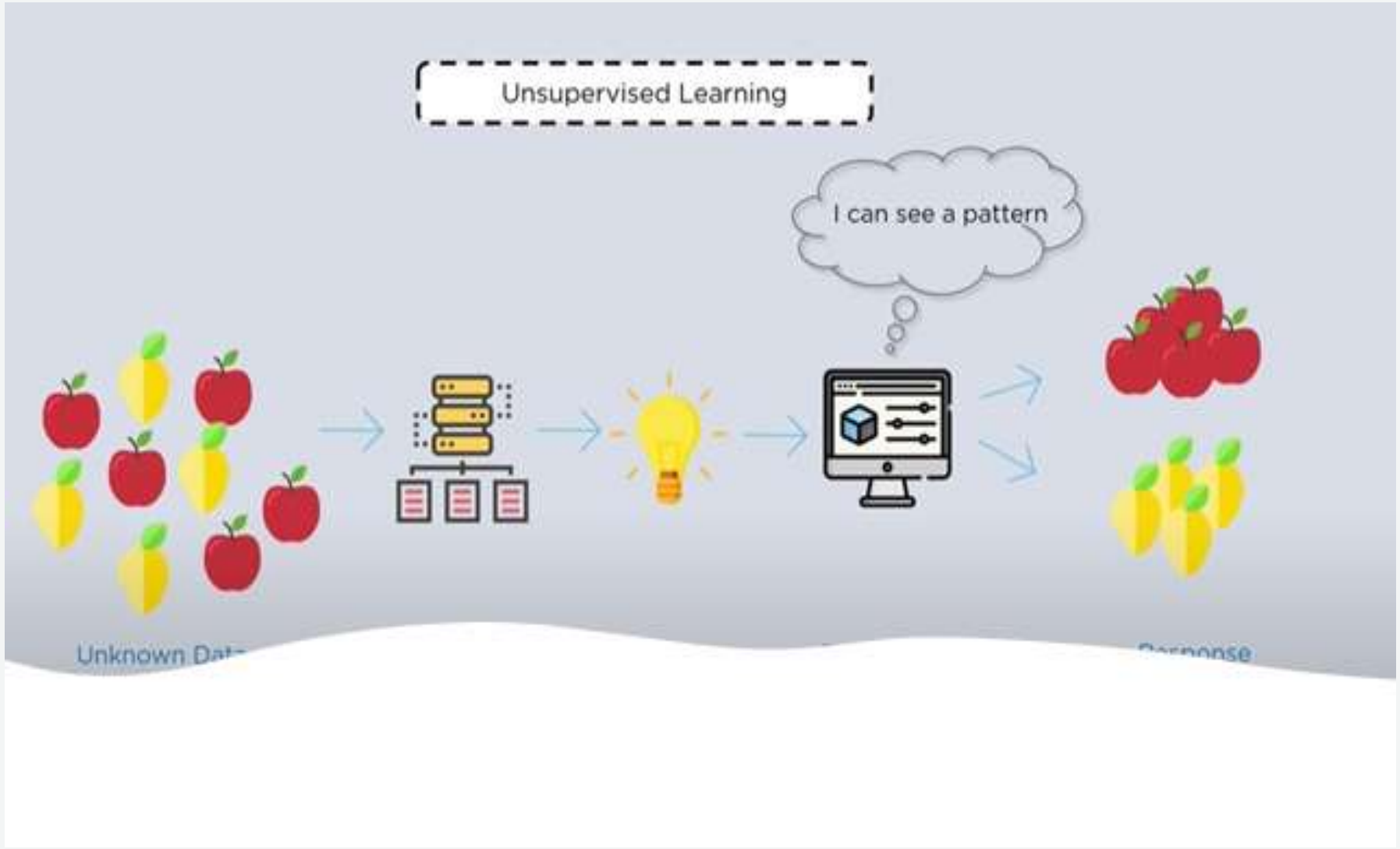
Some major Applications of Decision tree & Random Forest in different sectors

- **Banking Industry**
  - Credit Card Fraud Detection
  - Customer Segmentation
  - Predicting Loan Defaults on LendingClub.com
- **Healthcare and Medicine**
  - Cardiovascular Disease Prediction
  - Diabetes Prediction
  - Breast Cancer Prediction
- **Stock Market**
  - Stock Market Prediction
  - Stock Market Sentiment Analysis
  - Bitcoin Price Detection
- **E-Commerce**
  - Product Recommendation
  - Price Optimization
  - Search Ranking

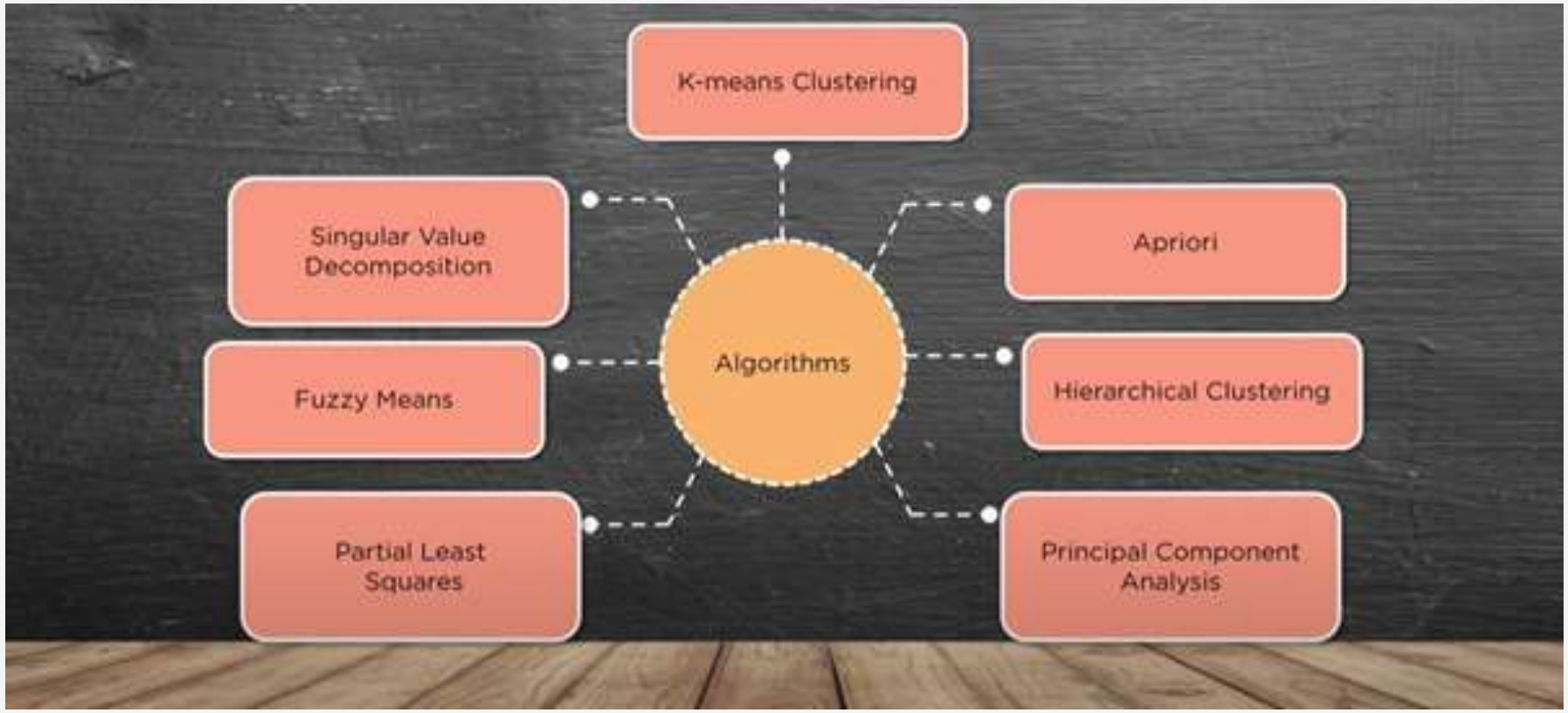
Unsupervised Learning

- In unsupervised learning, the information used to train is neither classified nor labelled in the dataset.
- Unsupervised learning studies on how systems can infer a function to describe a hidden structure from unlabelled data.
- The main task of unsupervised learning is to find patterns in the data.



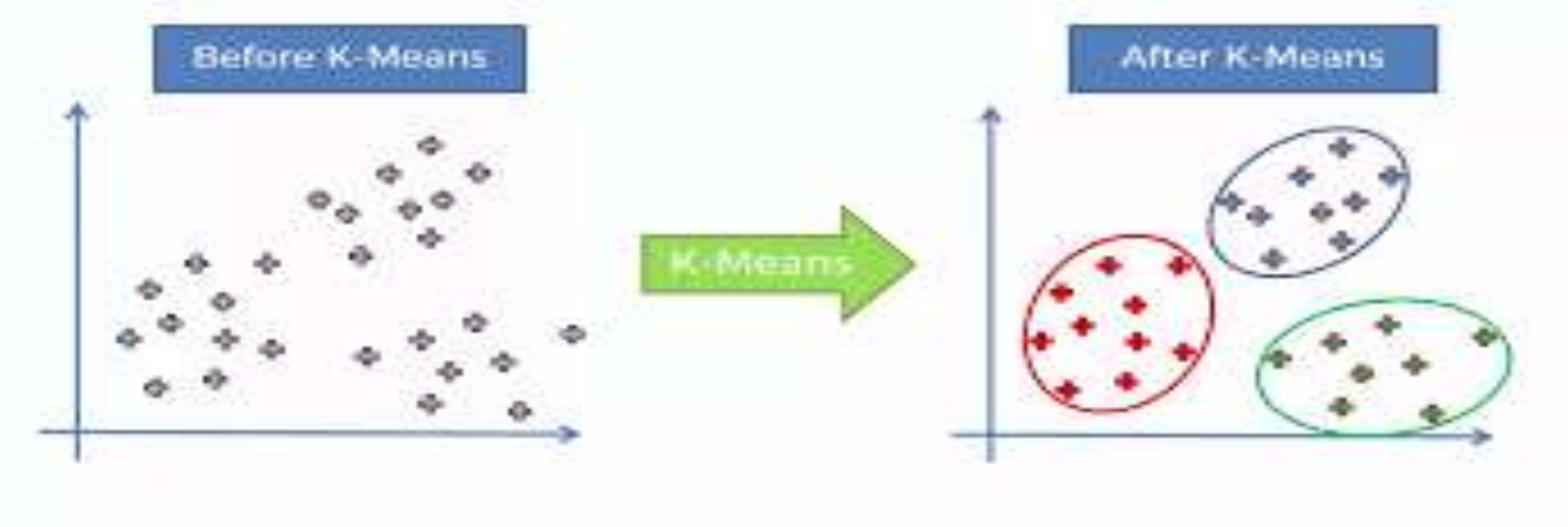

Unsupervised Learning
I can see a pattern

Unsupervised Learning Algorithm



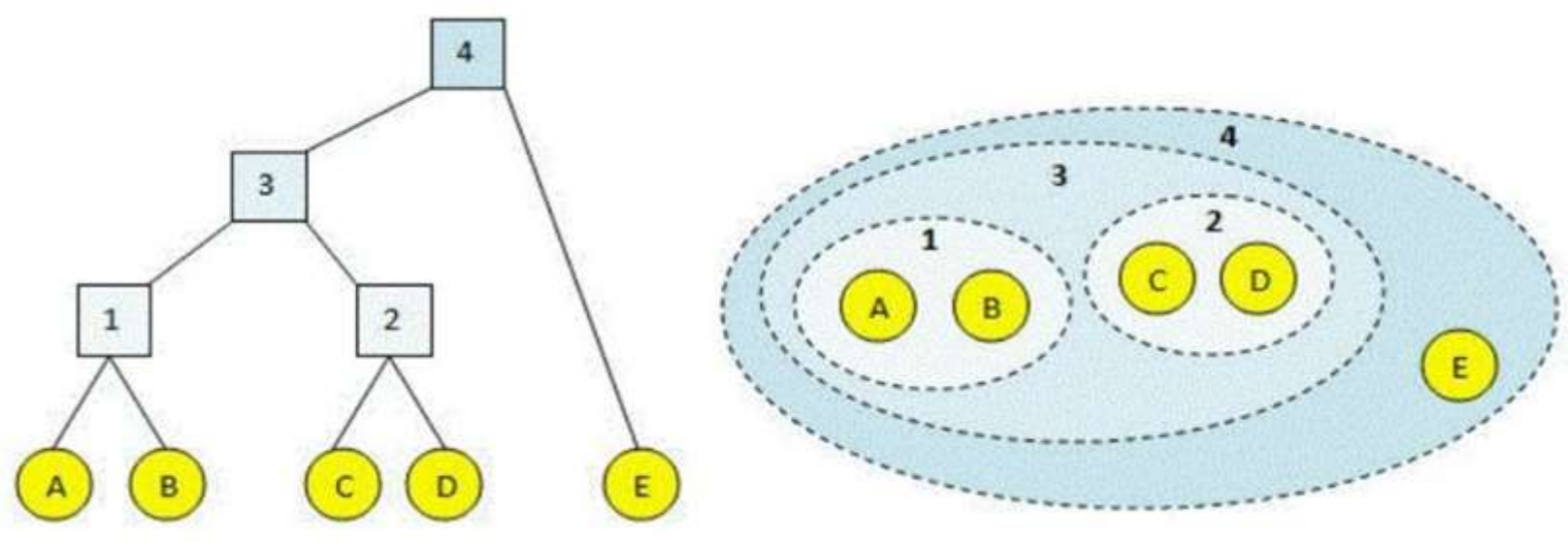
K-Means Clustering

- K-Means Clustering is an Unsupervised Learning algorithm, which groups the unlabeled dataset into different clusters.
- The algorithm works iteratively to assign each data point to one of K groups based on the features that are provided.



Hierarchical clustering

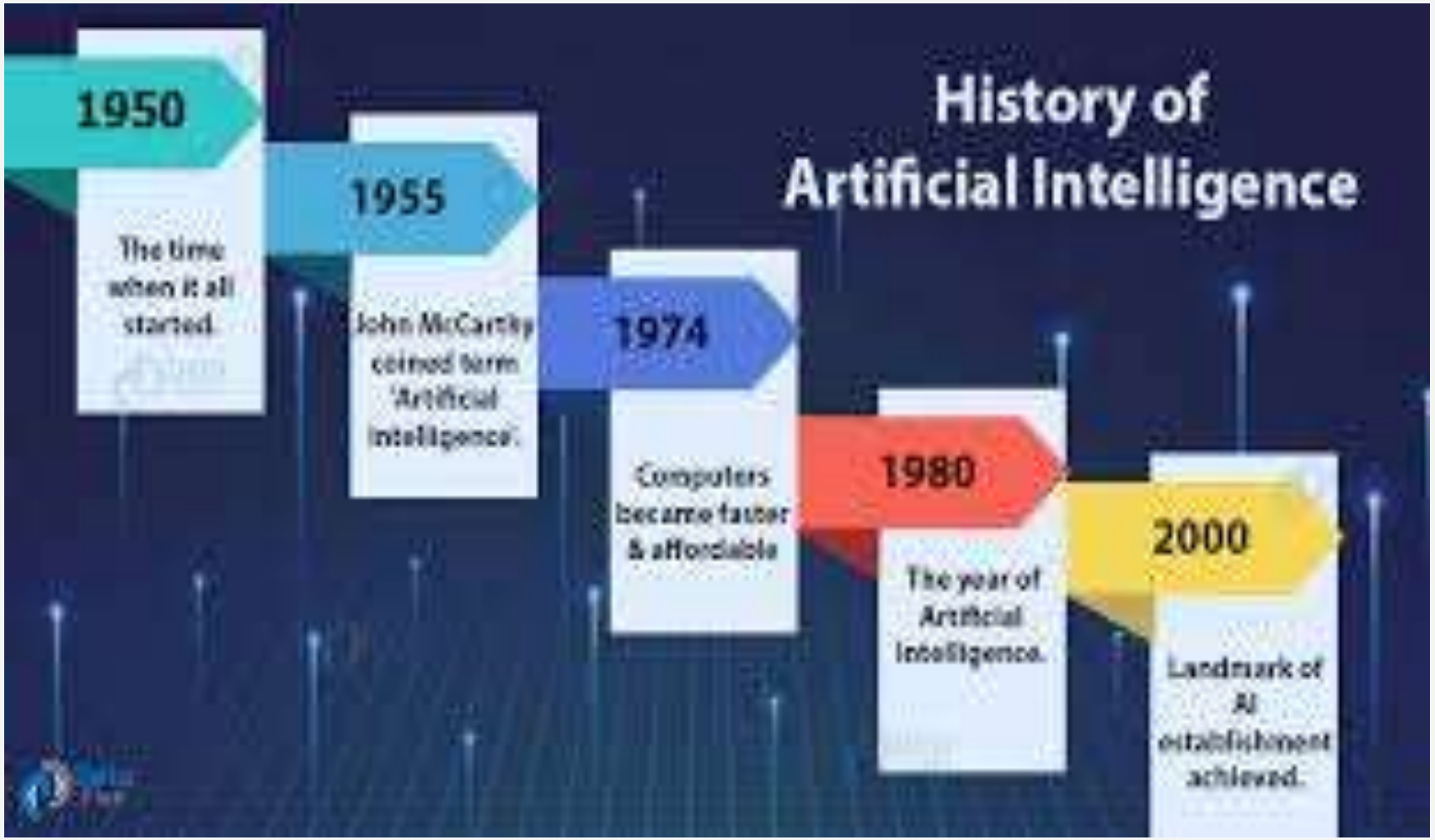
- Hierarchical clustering involves creating clusters that have a predetermined ordering from top to bottom.
- A Hierarchical clustering method works via grouping data into a tree of clusters.



Applications of Clustering

- Recommendation engines
- Market and Customer segmentation
- Social Network Analysis (SNA)
- Search Result Clustering


ARTIFICIAL
INTELLIGENCE


History of
Artificial Intelligence
1950
The time when it all started.
1955
John McCarthy coined term 'Artificial intelligence'.
1974
Computers became faster & affordable
1980
The year of Artificial Intelligence.
2000
Landmark of AI establishment achieved.

Intro to Artificial Intelligence

- The term artificial intelligence was introduced by john McCarty in the year of 1956.
- Artificial intelligence is a branch of computer science that aims to create intelligent machines which can behave like a human, think like humans, and able to make decisions.
- The aim of AI is to improve functions which are related to human knowledge.

For example

Reasoning

Learning

Linguistic Intelligence

Problem Solving

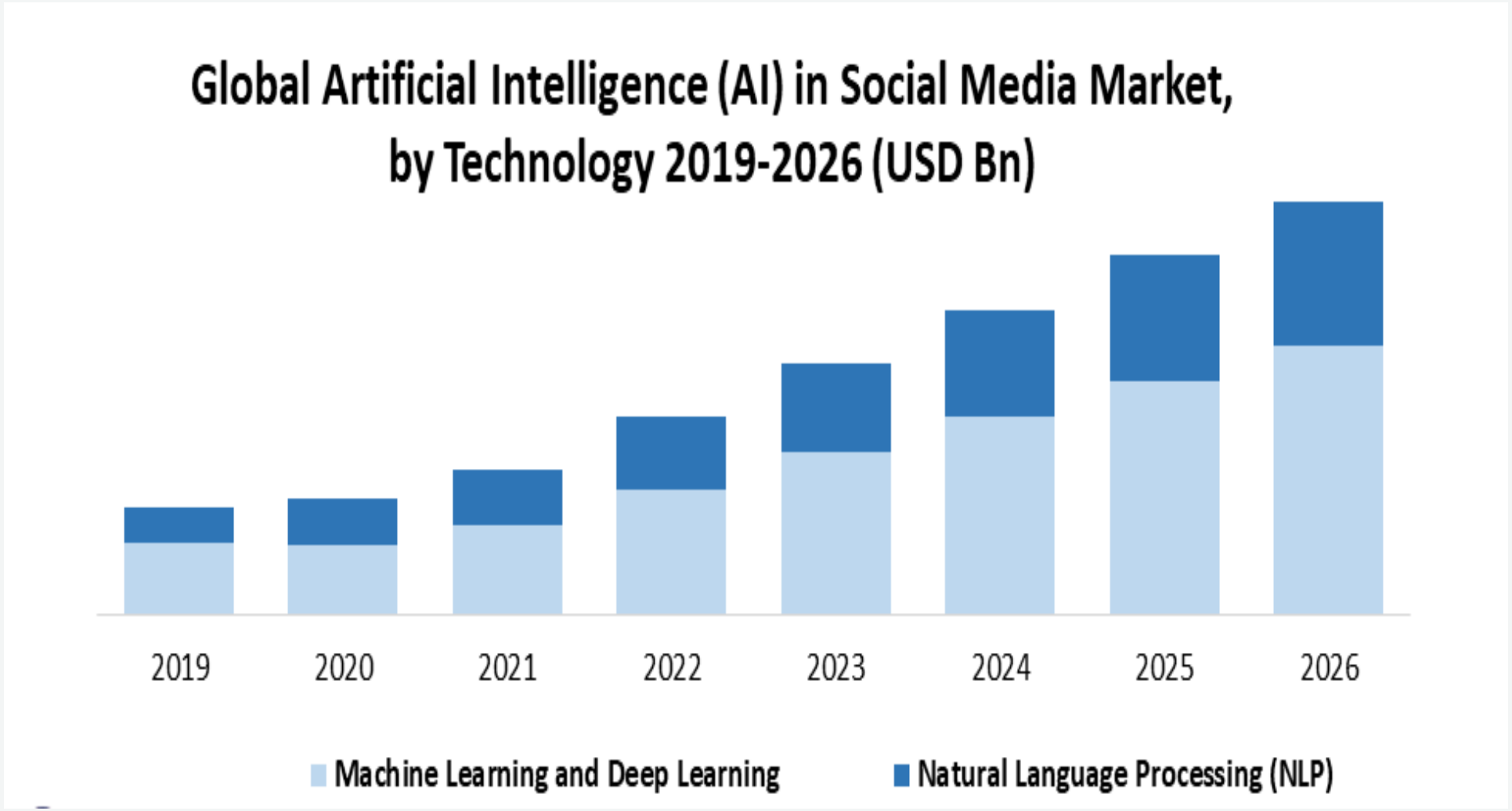
Applications of Artificial Intelligence

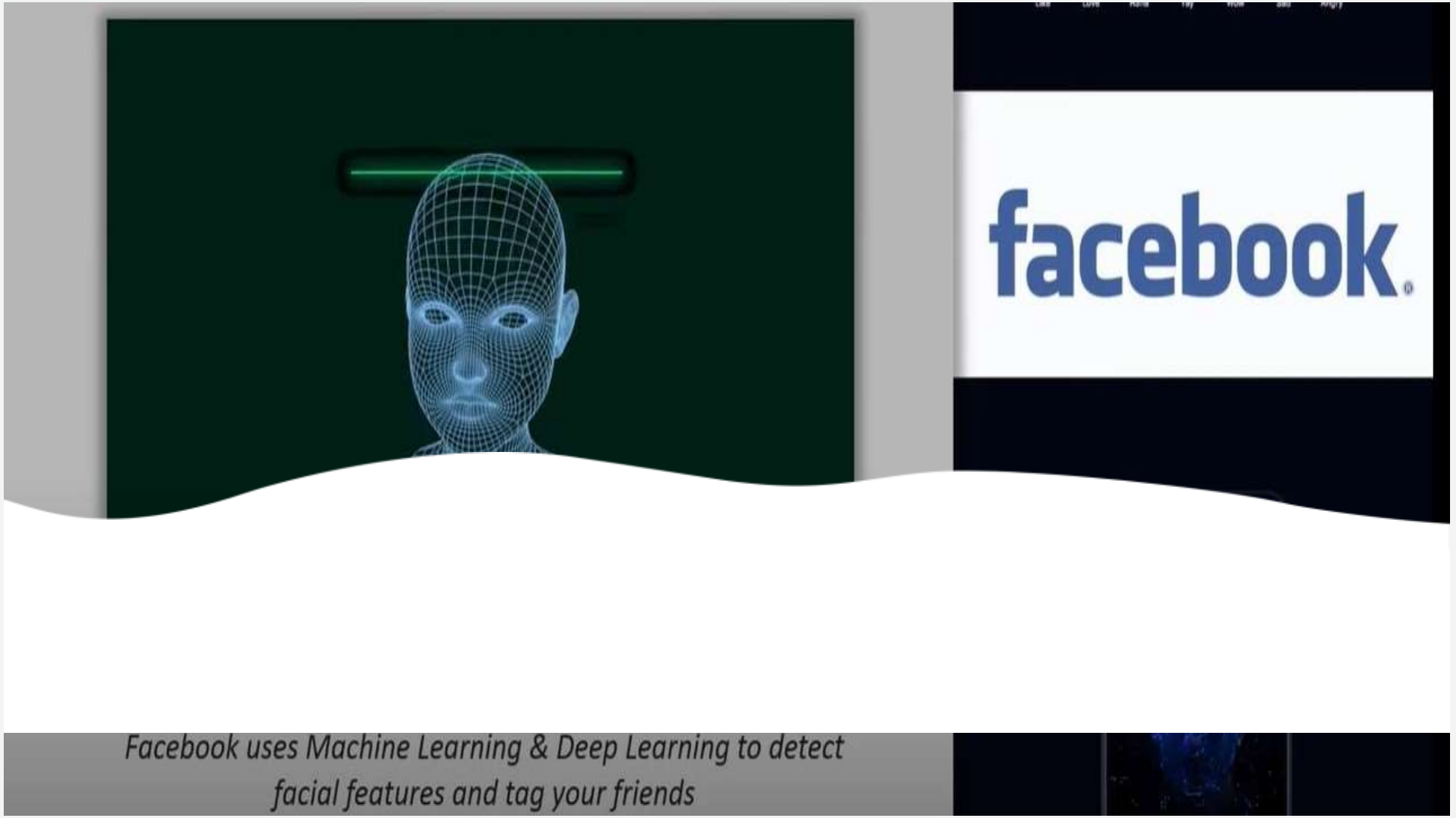
Goals of Artificial Intelligence

- To create such systems which possess intelligent behaviour, learn, demonstrate, explain, think and make decisions like a human brain.
- Decrease time of completion.
- Increase access.
- Automated Learning's & Scheduling
- Natural Language Processing.
- Problem Solving.
- Solve knowledge-intensive tasks.


How AI is impacting our lives?
Smartphones
Social Media Platforms
E-Commerce
Autonomous Vehicles
Security & Surveillance
Navigation
Banking & Finance Sector
Smart Home

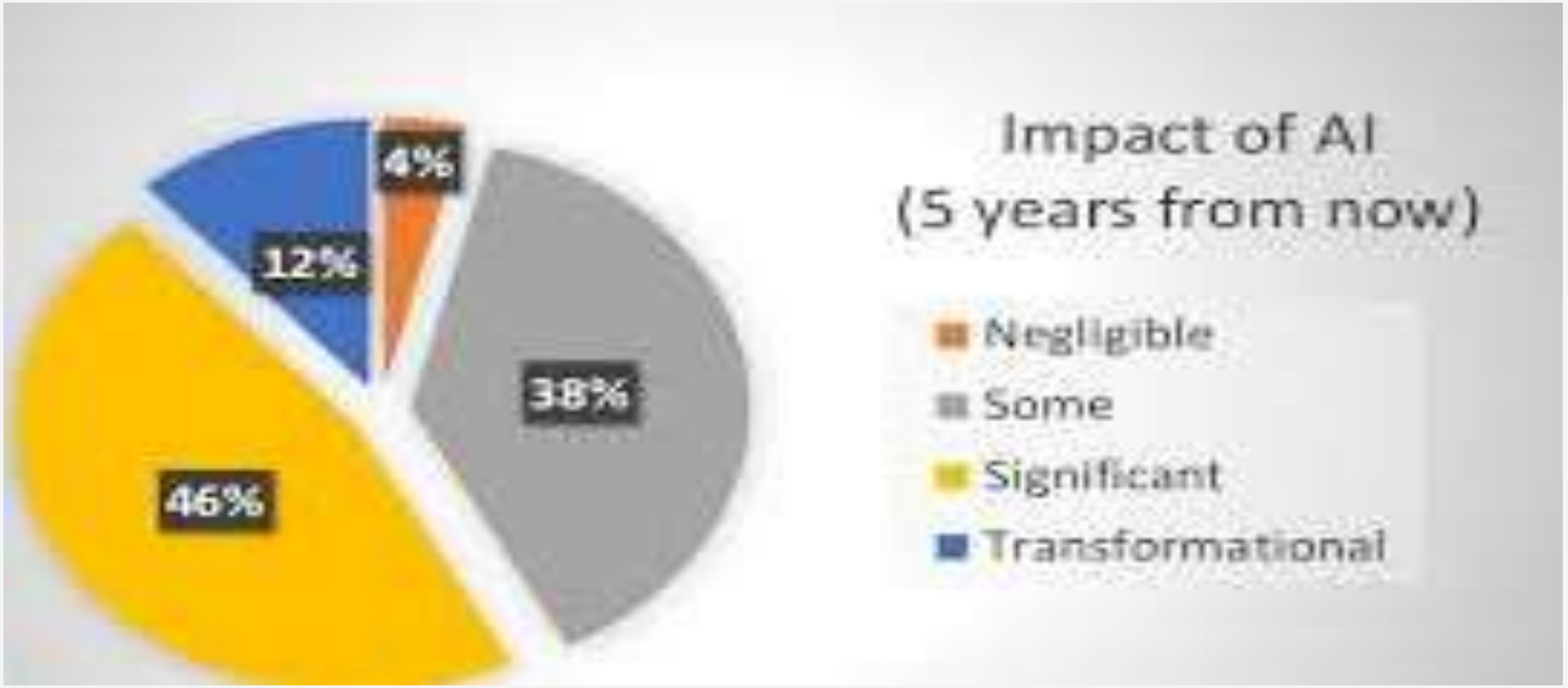
AI IN SOCIAL MEDIA


Global Artificial Intelligence (AI) in Social Media Market, by Technology 2019-2026 (USD Bn)
2019
2020
2021
2022
2023
2024
2025
2026
Machine Learning and Deep Learning
Natural Language Processing (NLP)



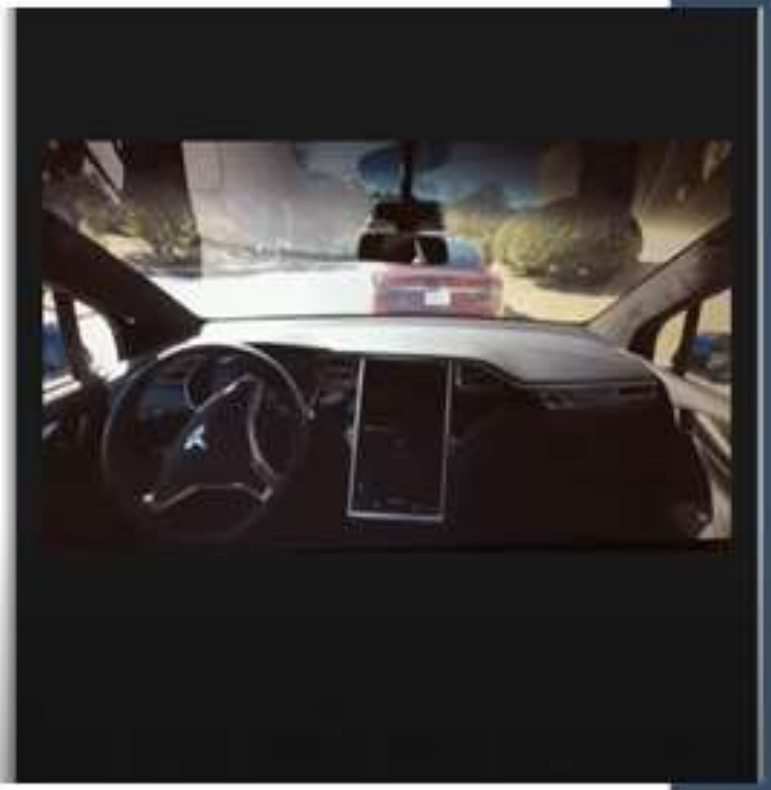
Facebook uses Machine Learning & Deep Learning to detect facial features and tag your friends

AI IN AUTONOMOUS VEHICLES


Impact of AI
(5 years from now)
4%
38%
46%
12%
Negligible
Some
Significant
Transformational

WAYMO

Company like WAYMO conducted several test drive before deploying their first AI based public service.
AI system collect data from vehicle radar, camera, gps and cloud servers to produce the control signal that operates the vehicle.
Advance Deep Learning Algorithm can accurately predict what objects in the vehicle "vision" or path are likely to do, this makes WAYMO cars
much more effective and safer



- Another famous example of utonomous vehicle are Tesla self riving car.

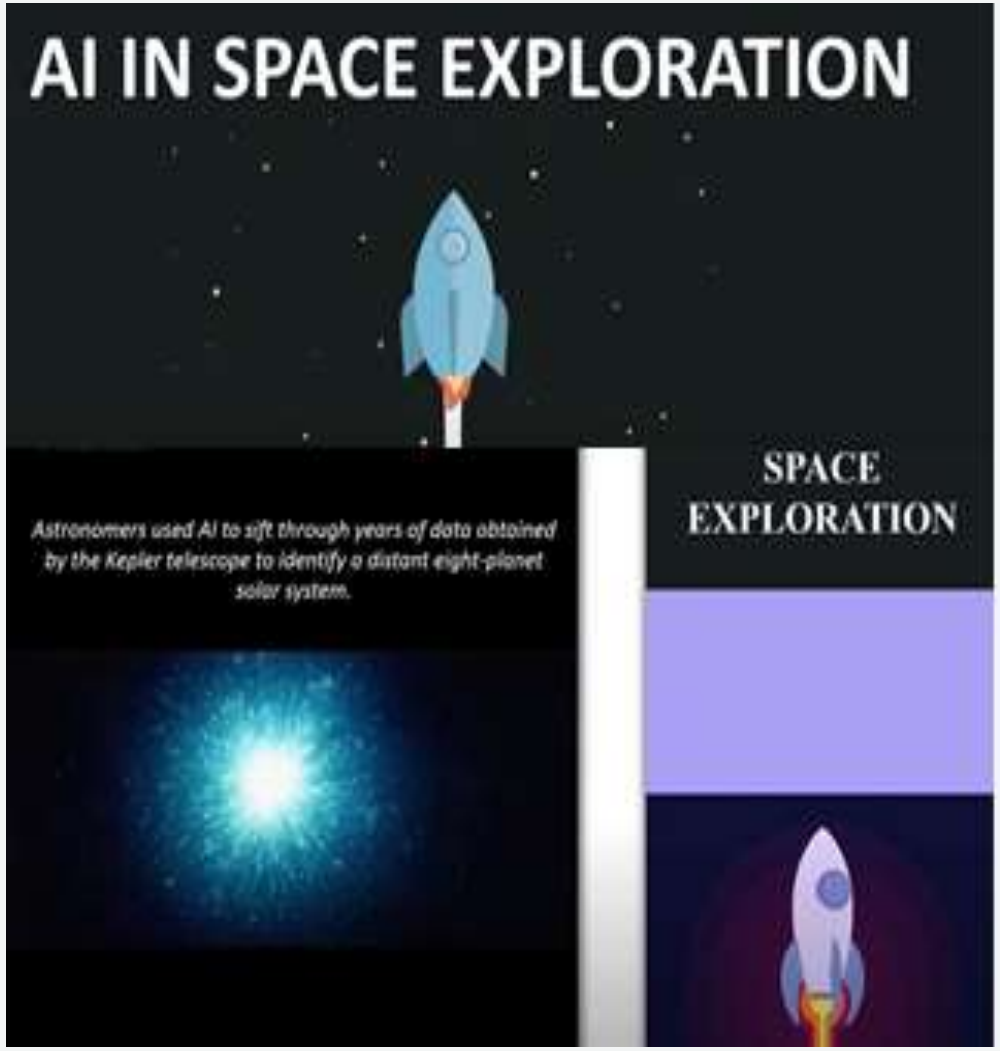
AI implement computer vision, mage detection and deep learning o build cars that automatically etect the objects and drive without human intervention

Elon Musk founder of Tesla talks more about how AI is mplemented self driving car and uto pilot features.

Tesla Auto Pilot software oes beyond just driving the car- ou can also instruct it where to o.

If you are not in the mood for alking then Auto pilot will check our calendar and drive to your scheduled appointment

- This is one of the most interesting field where AI is being implemented.
- Space exploration and discovery needs to analyze vast amount of data.
- AI & ML is the best way to handle and process big data.
- After extensive research astronomers used AI to go through years of data obtained by telescopes to identify the distance between planet as well as other aspects like surface, atmosphere etc.



AI & Machine Learning in Space Operations

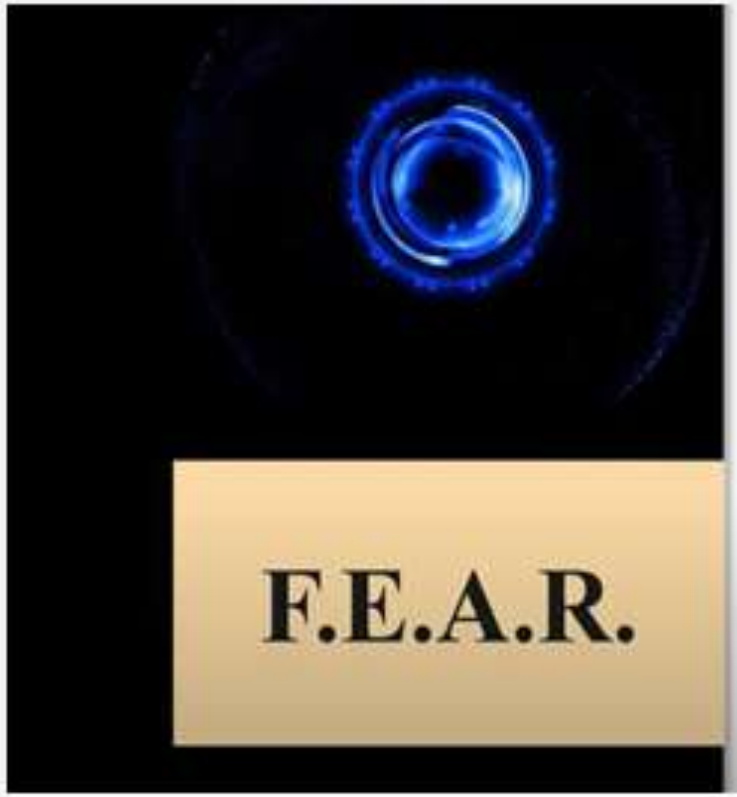
Current space exploration missions use AI and machine learning capabilities in many areas of space operations including mission planning and operations, data collection, autonomous navigation and maneuvering, and spacecraft maintenance.
Future missions will need to rely on the same.


AI IN BANKING & FINANCE
helps banks predict future outcomes and trends. This helps banks to identify fraud, detect anti-money laundering pattern and make customer recommendations.

AI is growing very faster in Banking industry. HDFC bank has deployed an AI based chat bot called as EVA (Electronic virtual assistance) since it launched EVA has addressed over 3 millions customer queries, interacted with over half a million unique users, and held over a million conversations. EVA can collect knowledge from thousand sources and provide simple answer in less then 0.4 seconds which is quite impressive.

AI technologies such as machine learning can help improve loan underwriting and alsoreduce financial risk


AI IN GAMING

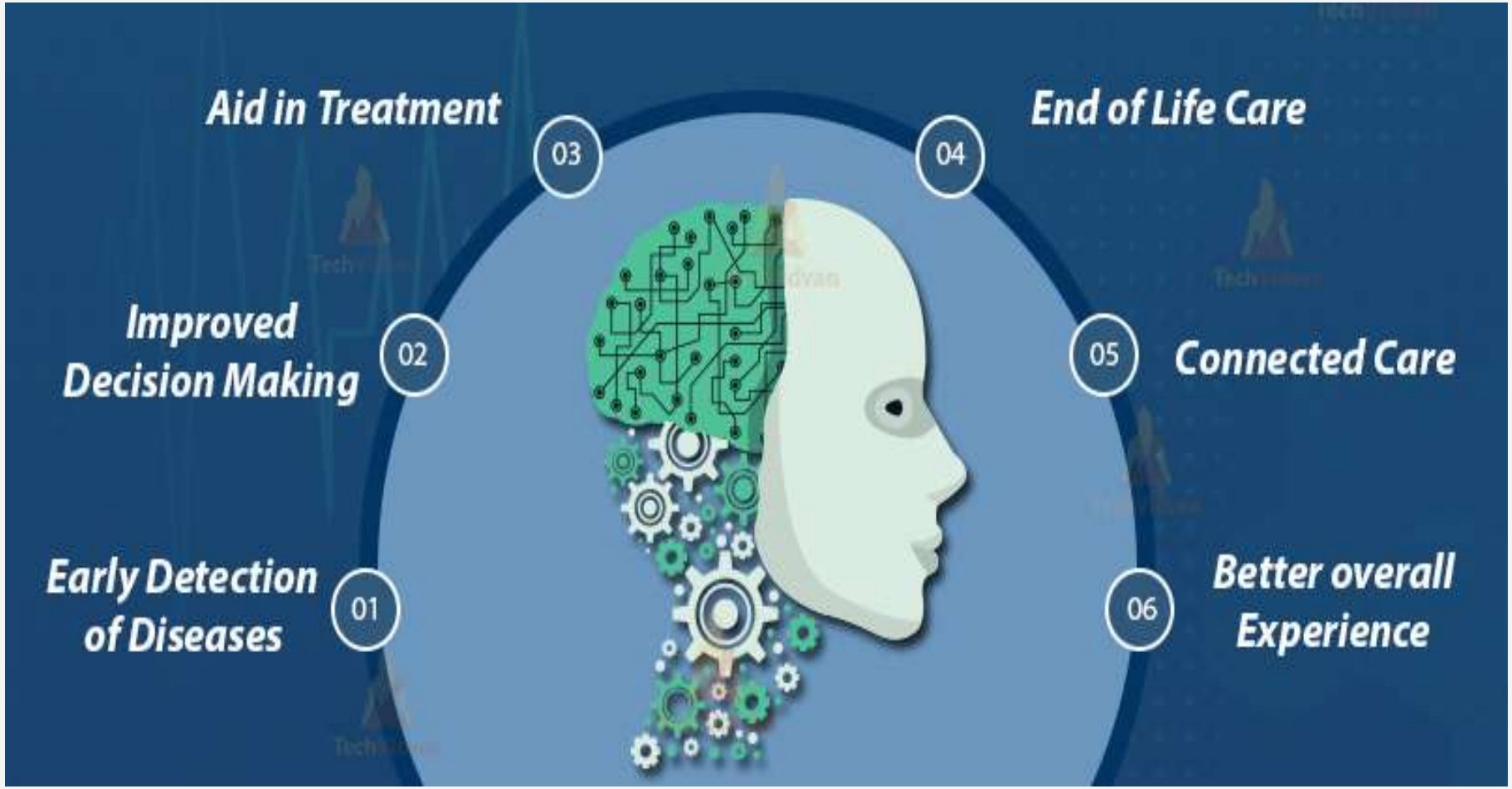


The popular video game called FEAR Is basically the 1st person shooter video game .
This video game is so special - The action taken by opponent which, uses AI are unpredictable because the game is designed in such a way the opponents are trained through out the game and never repeat the same mistakes.Basically, they get better as the game gets harder, this makes the game very challenging and prompts the human players to constantly switch strategies.

AI IN HEALTHCARE

AI in Healthcare helps patients all over the world

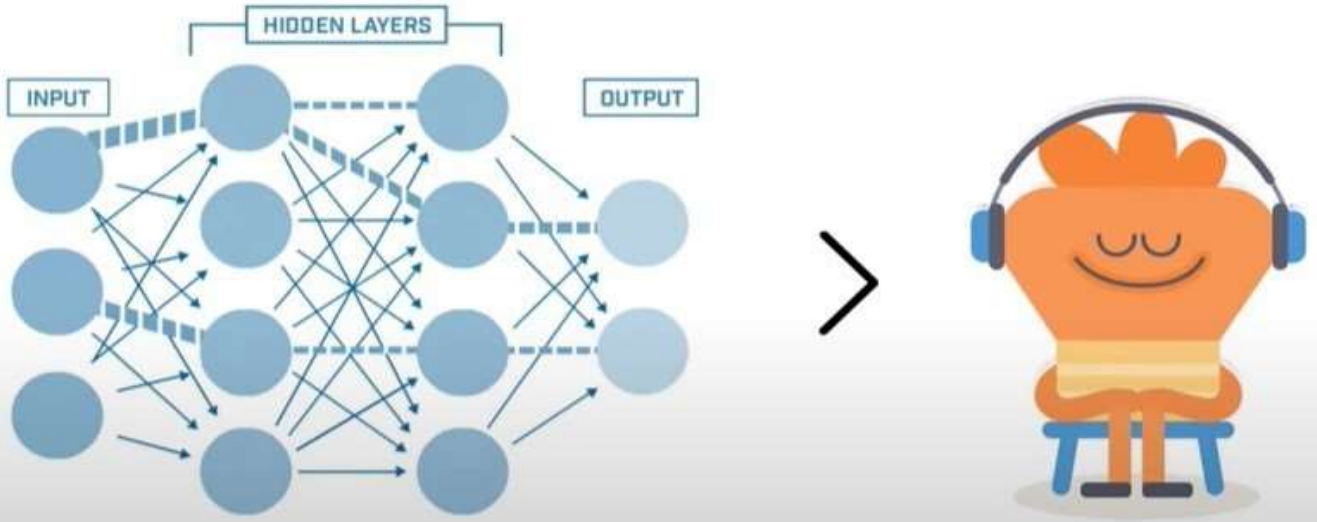
AI in Health Care




AI FASHION TECHNOLOGY
empowering fashion companies with image recognition solutions
WIDE-EYES.IT
SHOP THE LOOK
SIMILAR RECOMMENDATION
SHOP BY IMAGE
STYLE ADVISOR
AUTO-TAGGING
IMAGE CLASSIFICATION

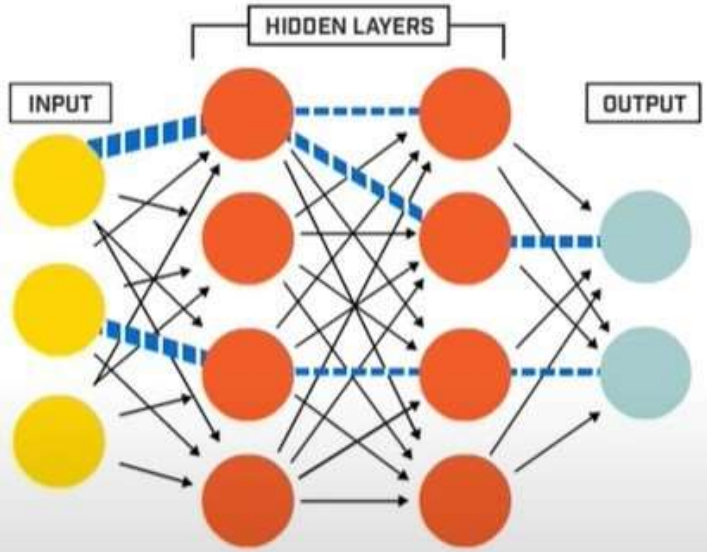
- Deep learning is an AI function that mimics the workings of the human brain in processing data for use in detecting objects, recognizing speech, translating languages, and making decisions.
- Deep learning AI can learn without human supervision, drawing from data that is both unstructured and unlabeled

Deep learning makes use of Artificial Neural Networks that behave similar to the Neural Networks in our brain.



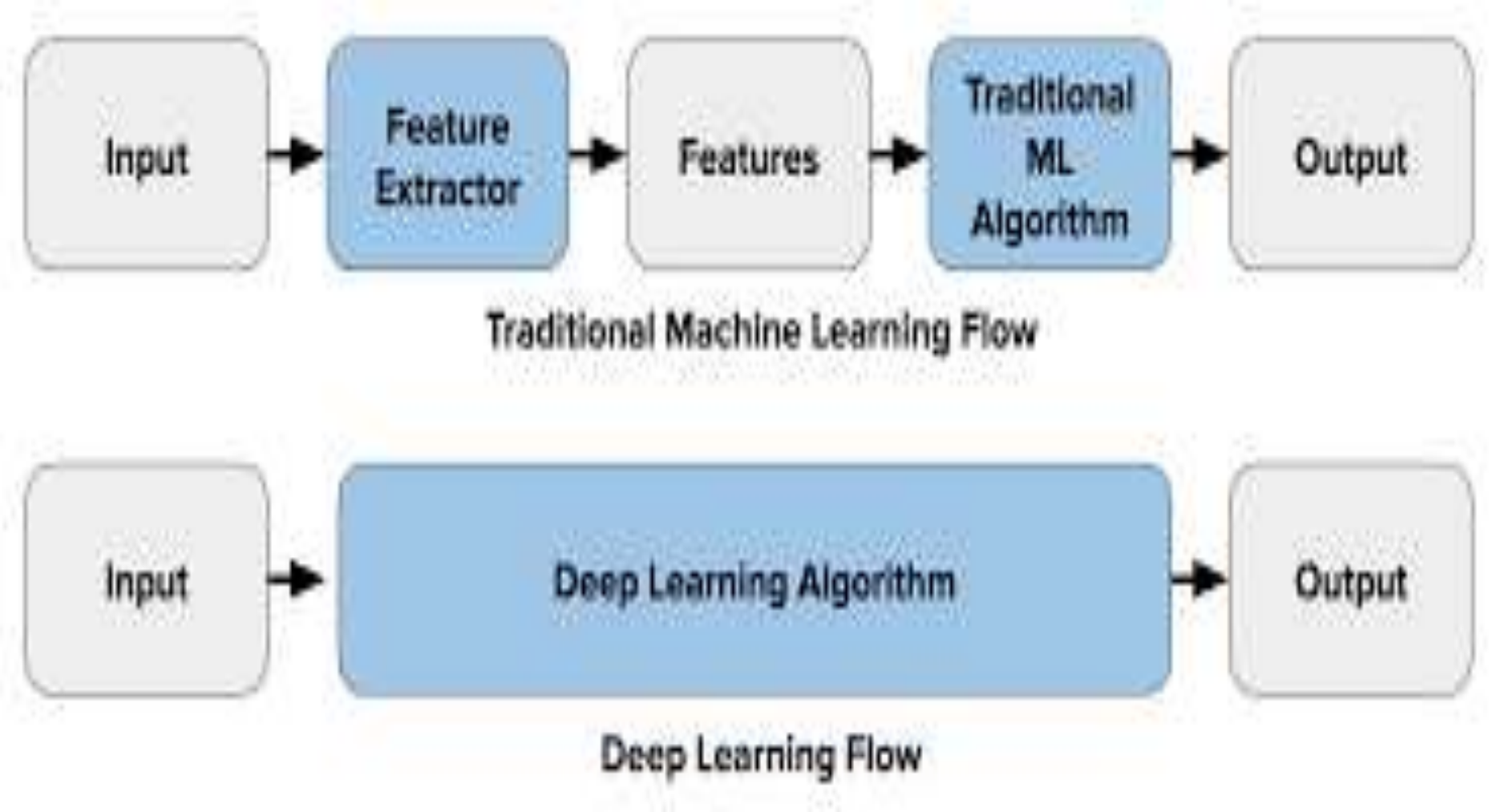
Neural Network

A Neural Network functions when some input data is fed to it. This data is then processed via layers of Perceptrons to produce a desired output.

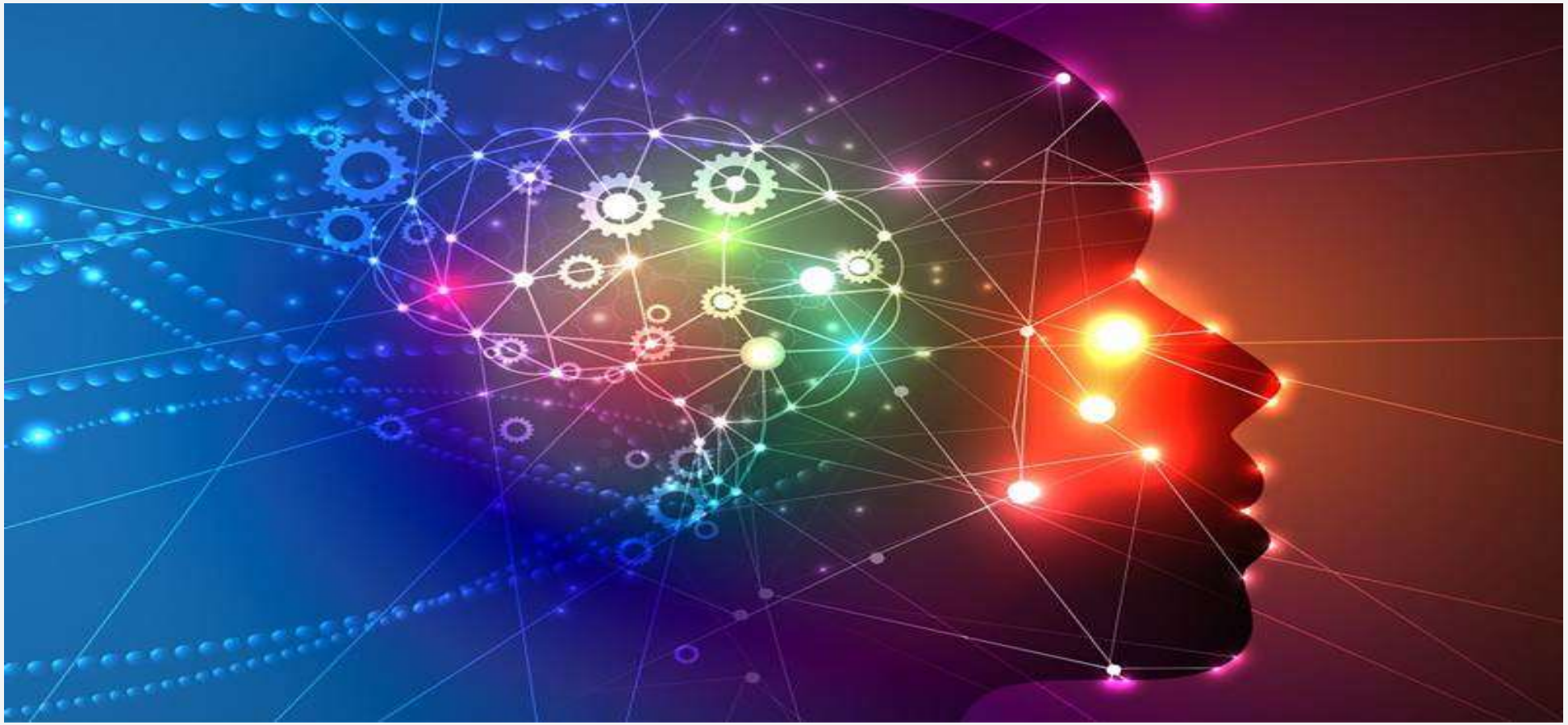


DEEP LEARNING

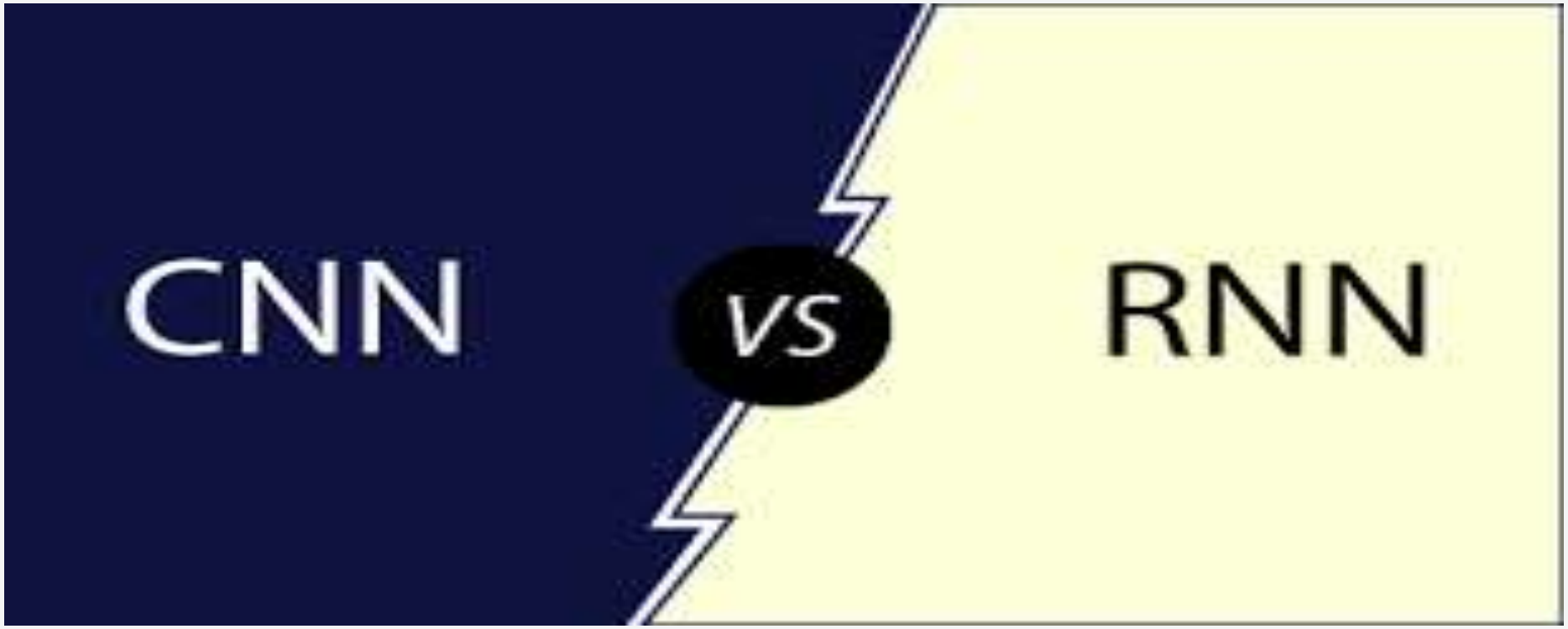
- Deep learning is a subset of machine learning in artificial intelligence that has networks capable of learning unsupervised from data that is unstructured or unlabeled.
- Also known as deep neural learning or deep neural network.
- Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher-level features from the raw input.
- For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces


Input
Feature Extractor
Features
Traditional ML Algorithm
Output
Traditional Machine Learning Flow
Input
Deep Learning Algorithm
Output
Deep Learning Flow

DEEP LEARNING ALGORITHM

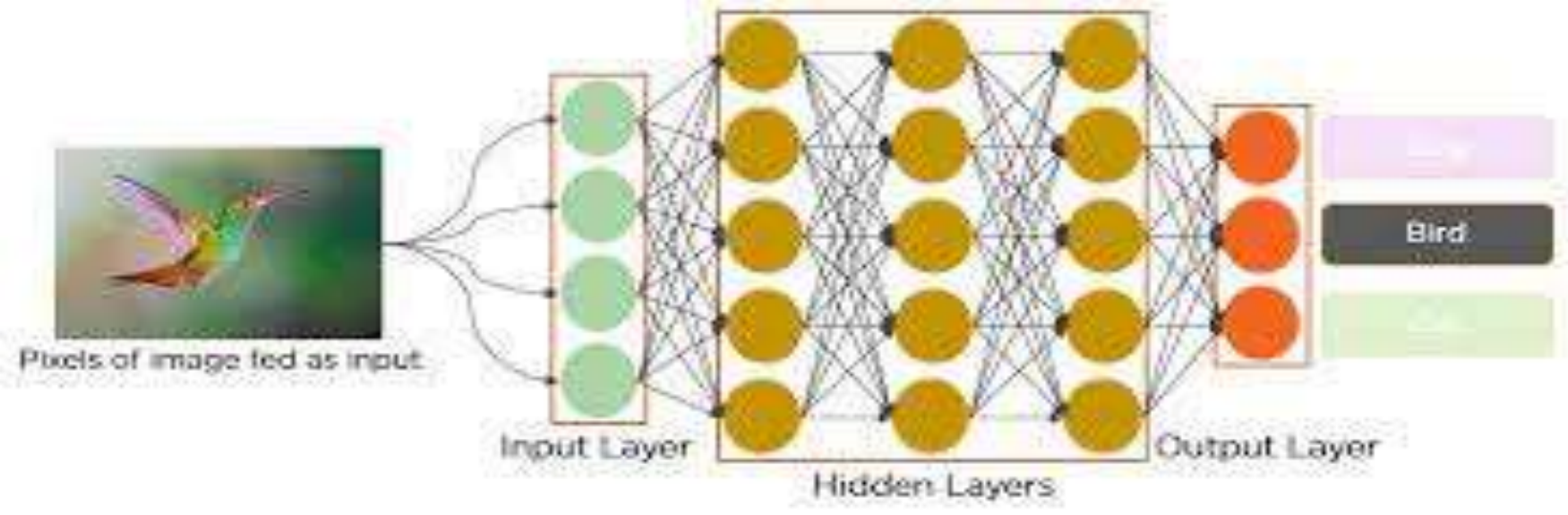


- Convolutional Neural Network (CNN)
- Recurrent Neural Networks (RNNs)

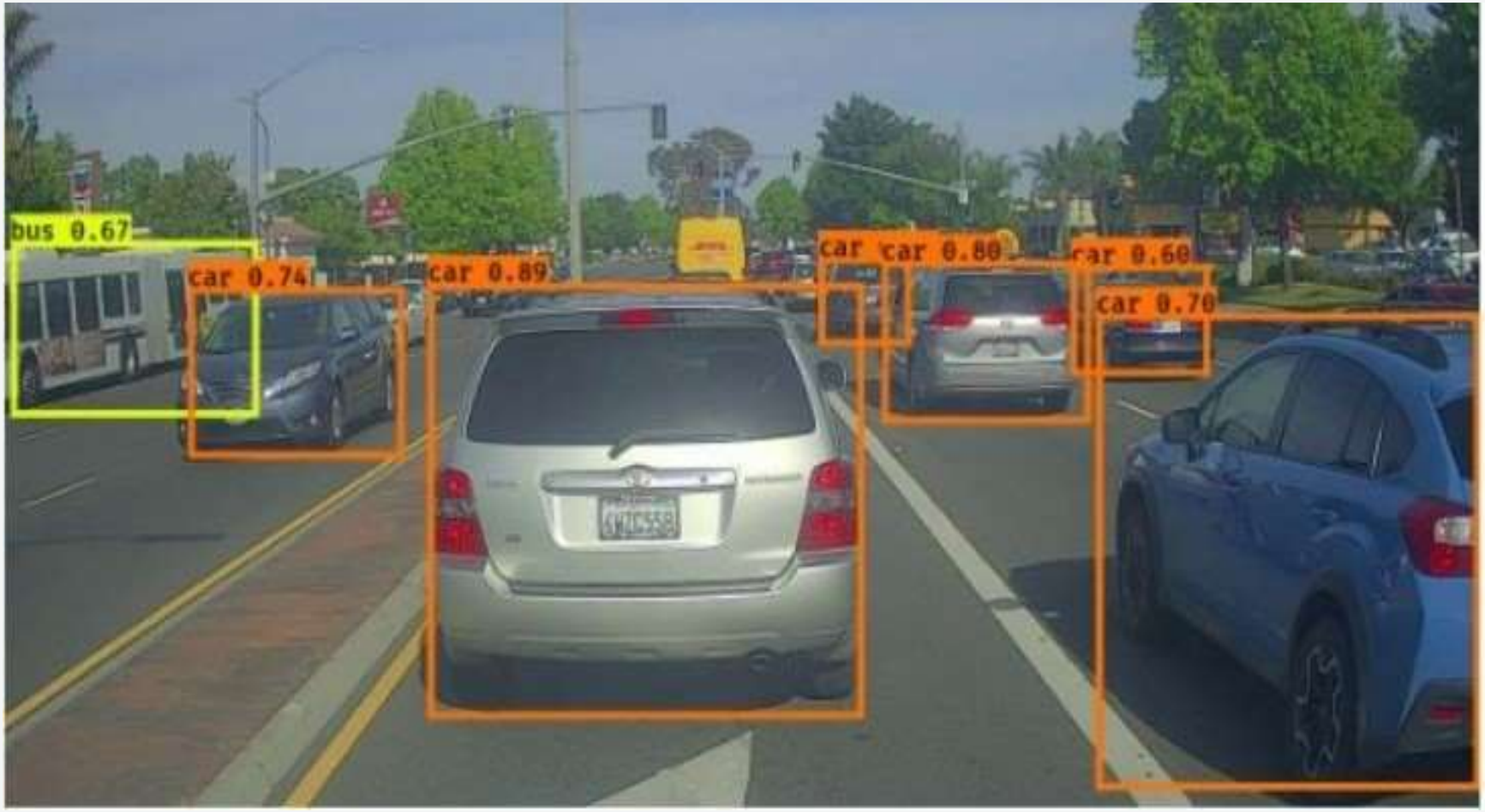


CONVOLUTIONAL NEURAL NETOWRK (CNN)

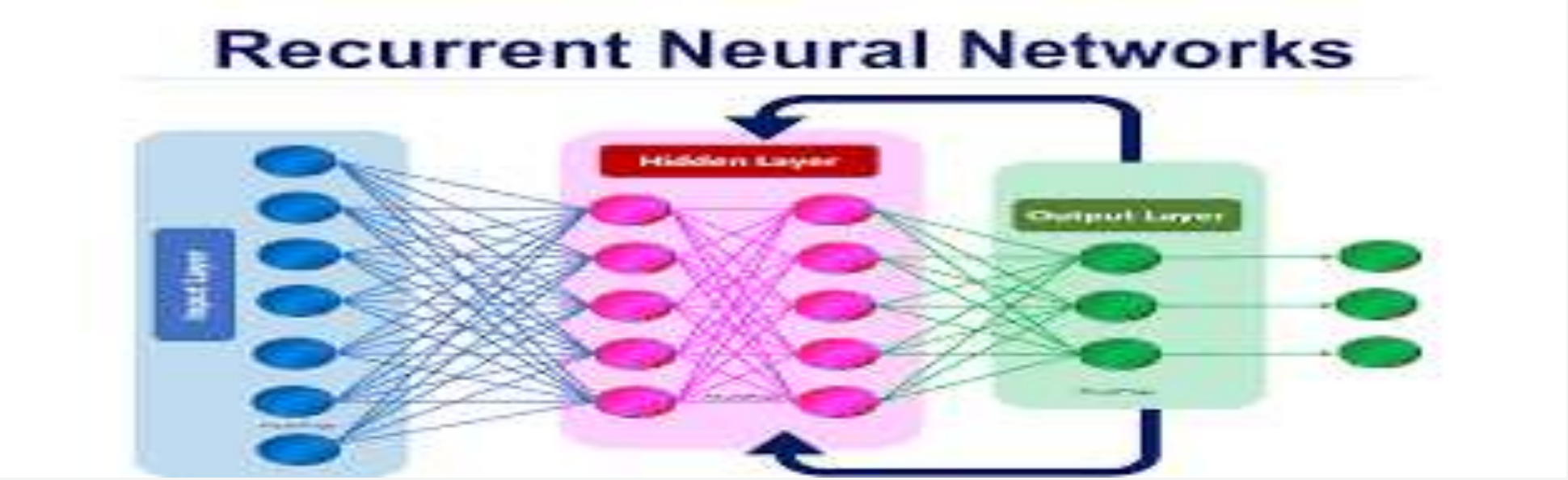
- In deep Learning, convolutional neural network (CNN, or ConvNet) is a class of deep neural network, most commonly applied to analyzing visual imagery like Image and Object recognition.



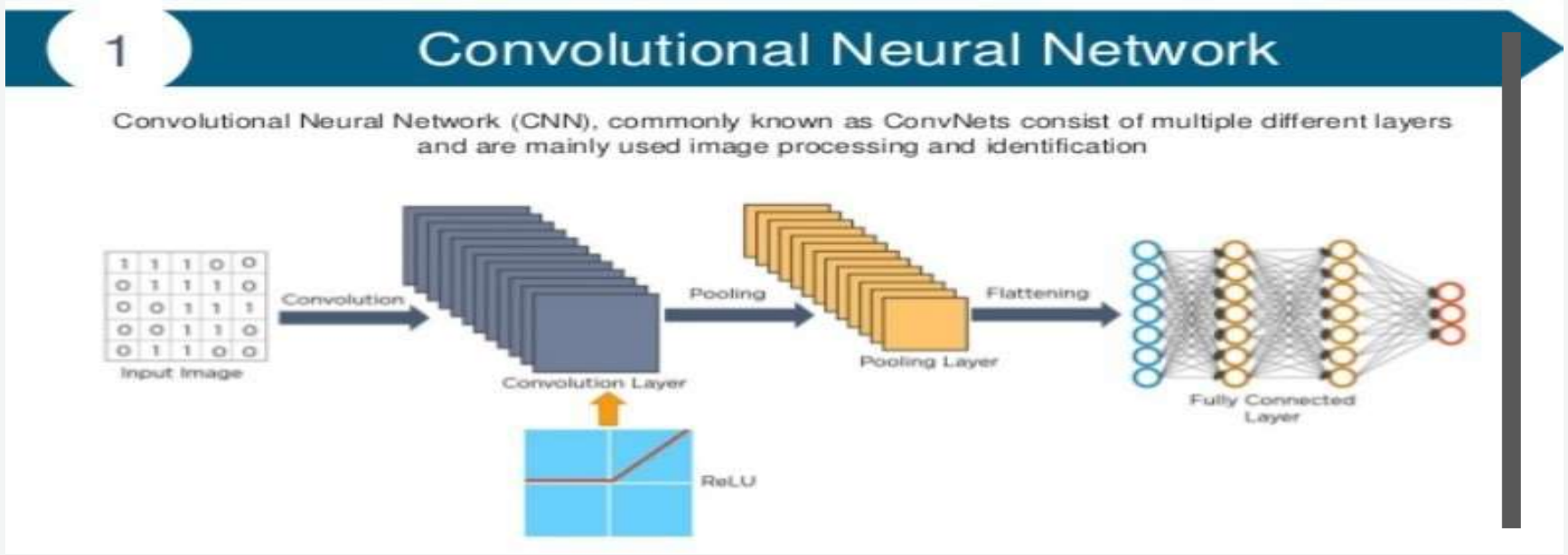
- Image recognition
- Object detection for self-driving cars
- Face recognition on social media
- Image analysis in healthcare



- In RNN the output from the previous step is feed as input to the next step, it can memorize the previous inputs due to internal memory.
- RNN have the possibility of
- processing the input of any length.
- RNN used for image captioning, time
- Series analysis, NLP, & machine translation.



- Deep Learning, a Convolutional Neural Network or CNN is a type of artificial neural network, which is widely used for image/object recognition and classification.
- Deep Learning thus recognizes objects in an image by using a CNN.

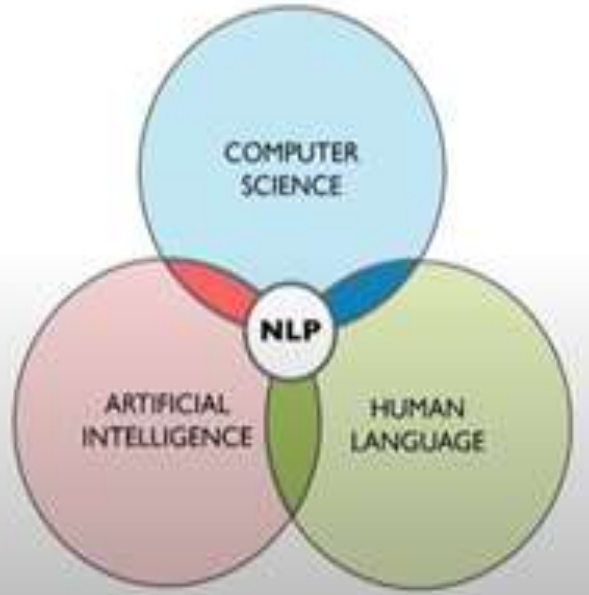



NLP
Natural language
processing

Introduction to Natural Language Processing

- Natural language processing (NLP) is the ability of a computer program to understand human language as it is spoken and written -- referred to as natural language. It is a component of artificial intelligence (AI).
- NLP has existed for more than 50 years and has roots in the field of linguistics. It has a variety of real-world applications in a number of fields, including medical research, search engines and business intelligence.

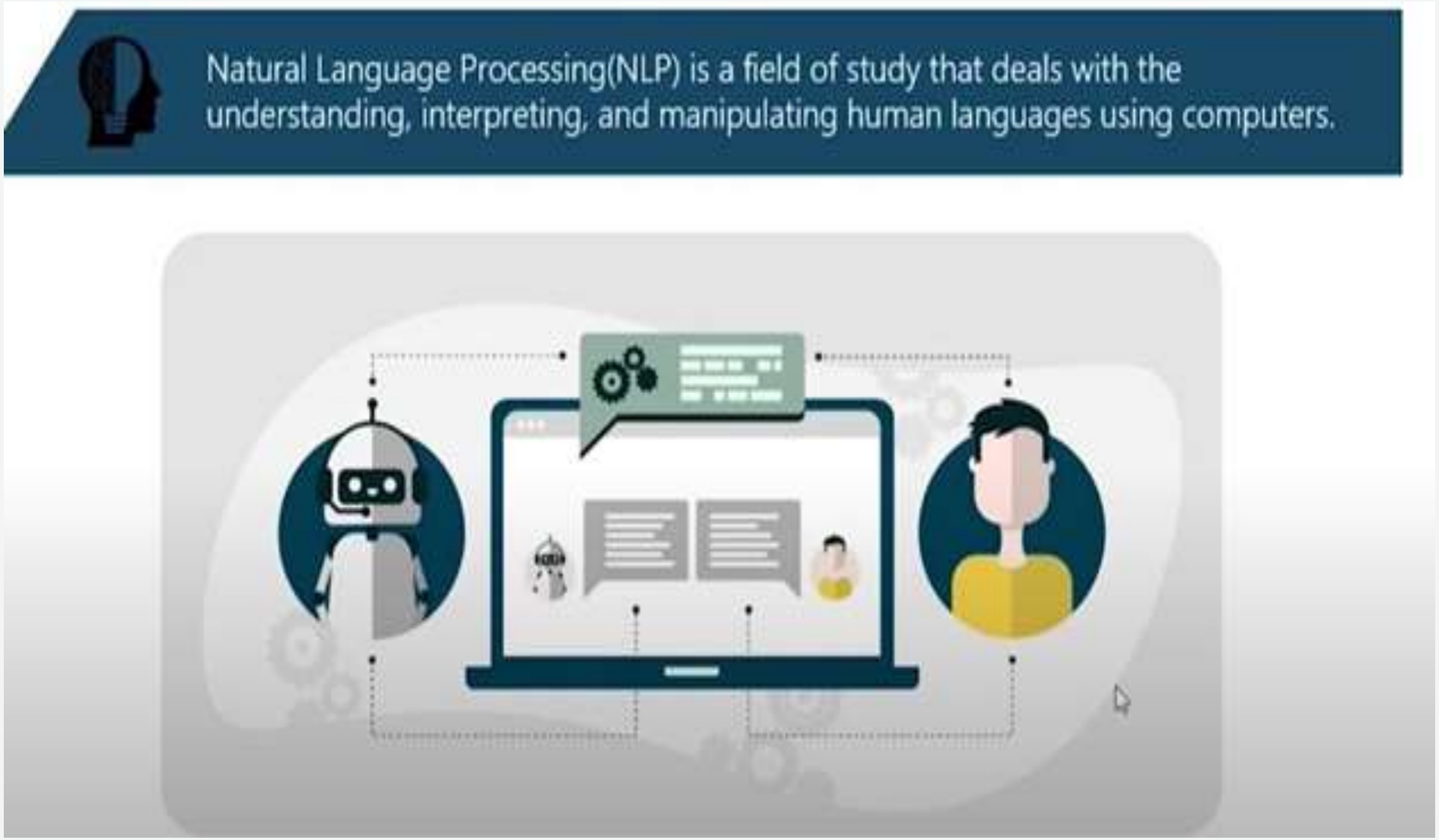
NLP: Natural Language Processing is a part of computer science and artificial intelligence which deals with human languages.



What is NLP?

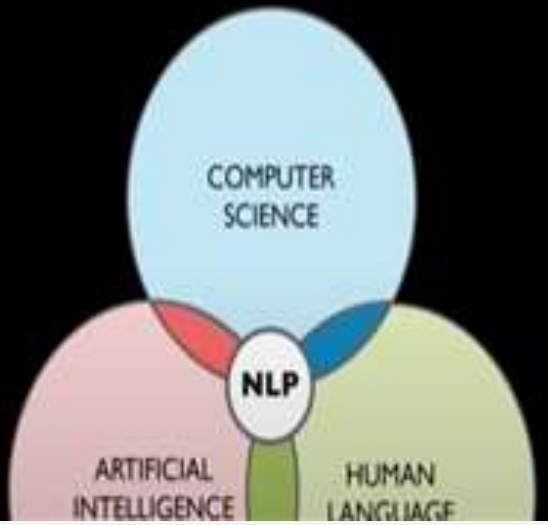
The ***GOAL*** here is to process or understand Natural Language in order to perform useful tasks like

- Making Appointments
- Buying Things
- Spell Checking
- Generating Response
- Social Media Monitoring .....


Natural Language Processing(NLP) is a field of study that deals with the understanding, interpreting, and manipulating human languages using computers.

Text Mining and NLP

Text Mining / Text Analytics is the process of deriving meaningful information from natural language text



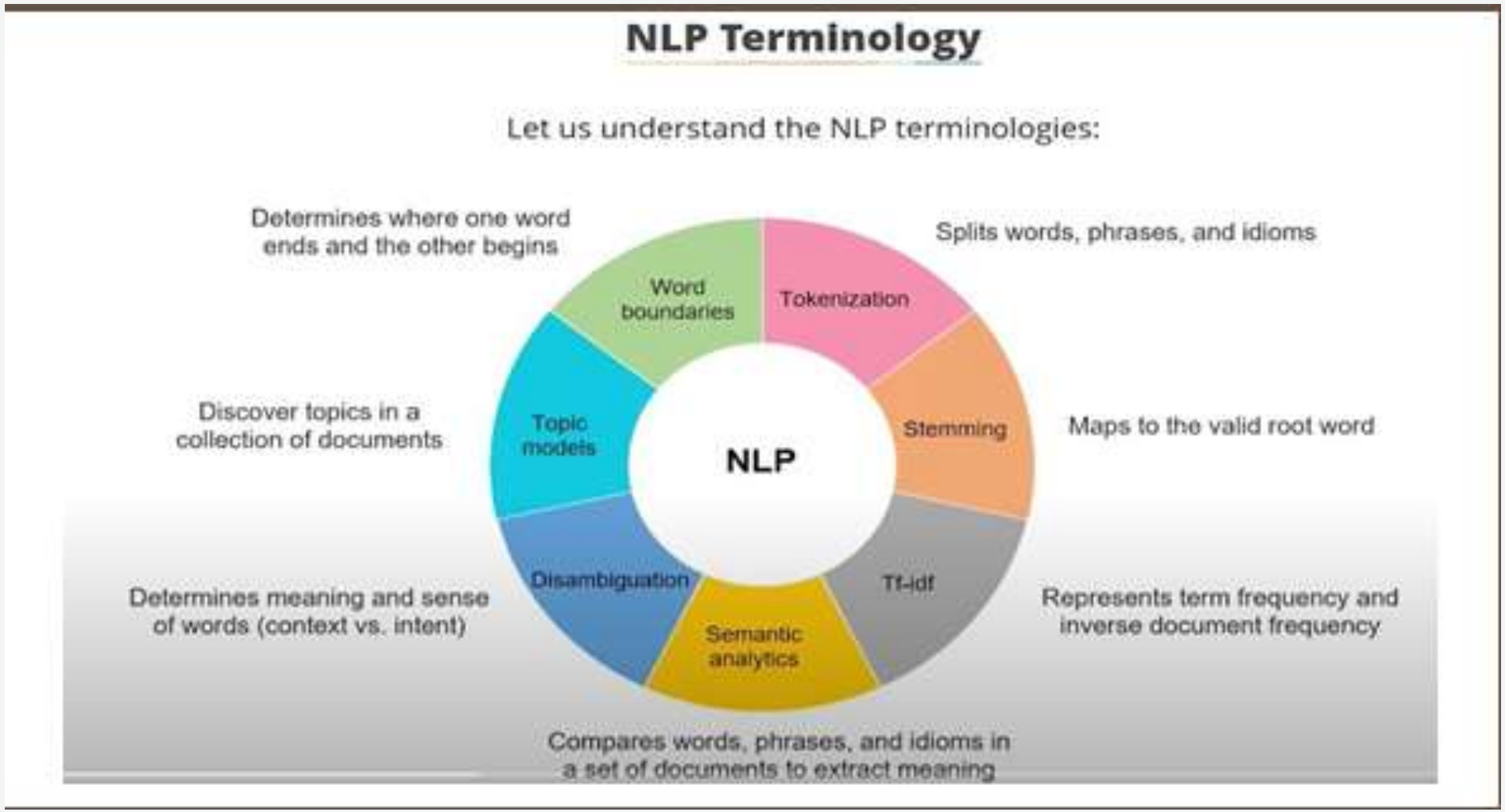
NLP in Text Mining

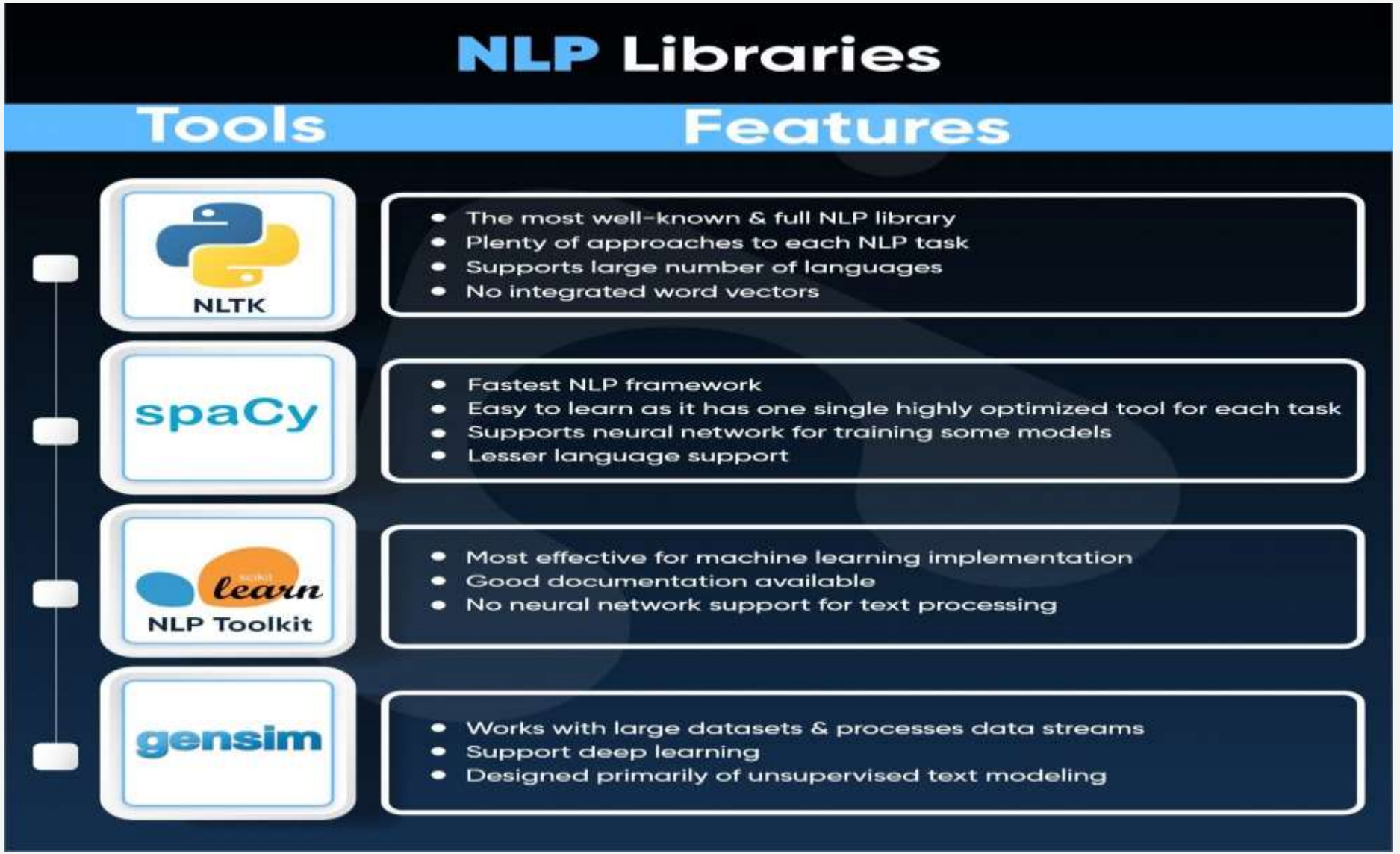
Since most of the significant information is written down in a Natural Language such as English, French, German, etc. and is not conveniently tagged.

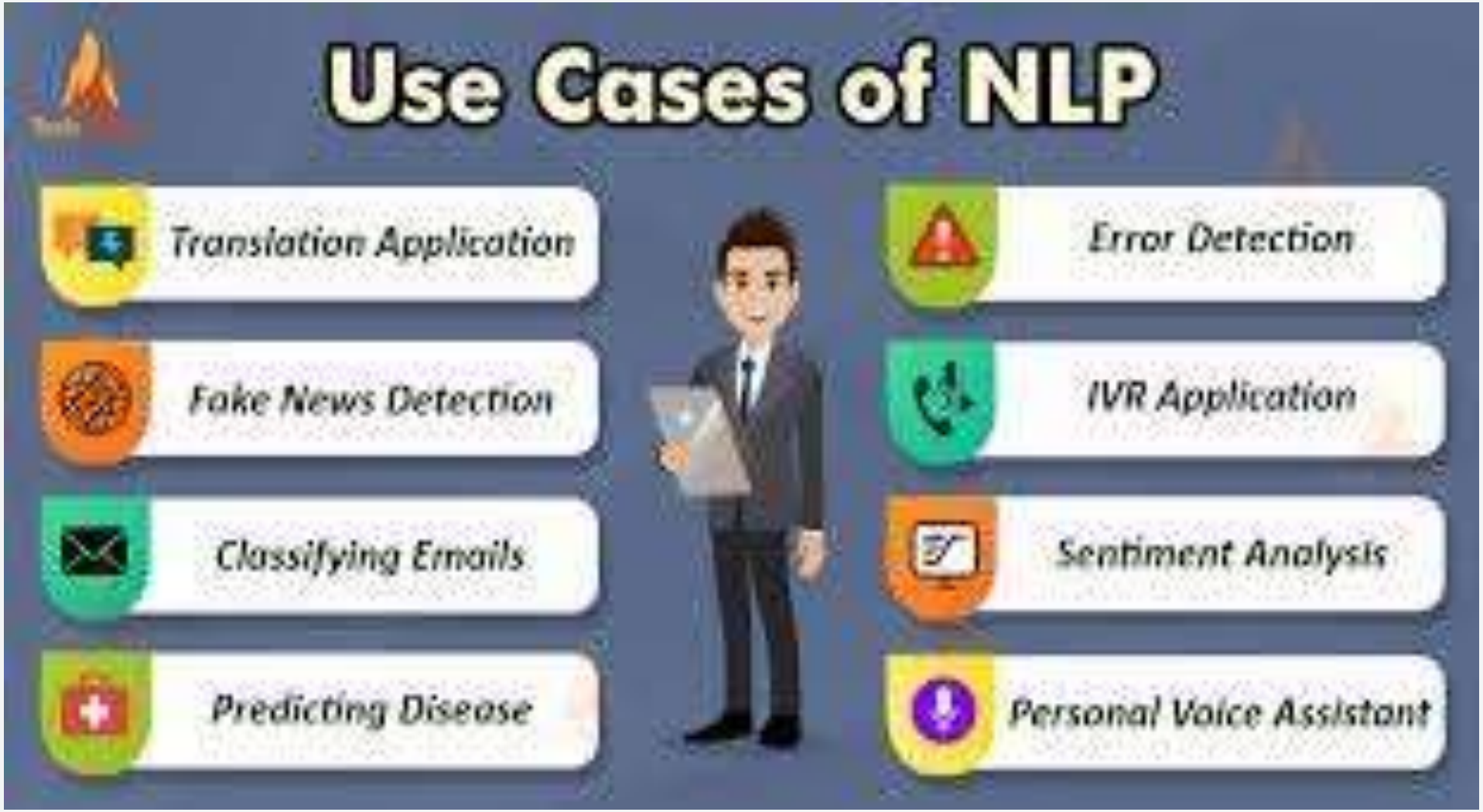
So after identification and extraction of the content needed for text analytics, we use different NLP techniques to extract meaningful information from it.

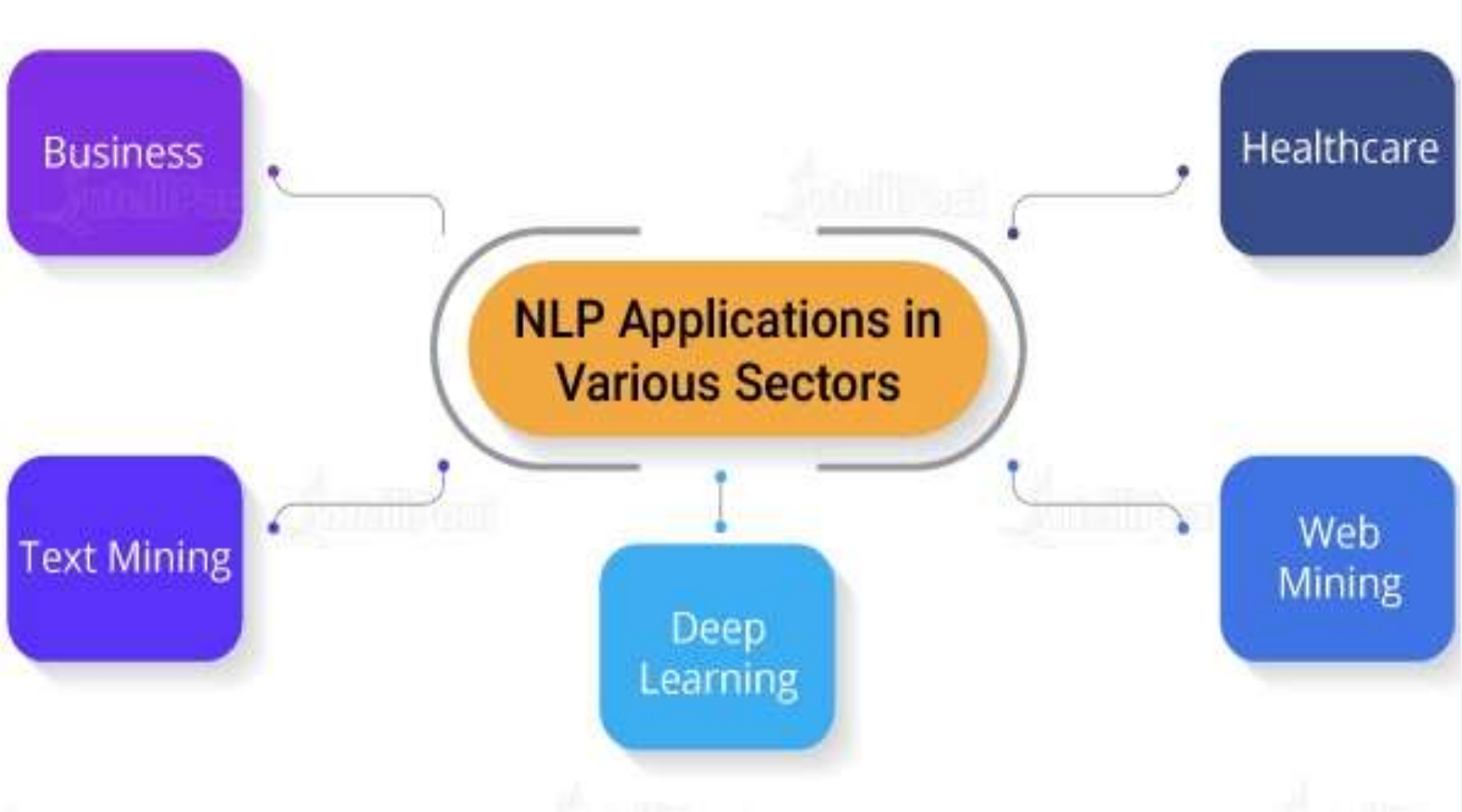
NLP helps computers to communicate with humans in their own language and perform other language-related tasks.

NLP makes it feasible for computers to read text, hear speech, interpret it, measure sentiment and determine which parts are important.


NLP Terminology
Let us understand the NLP terminologies:
Determines where one word ends and the other begins
Word boundaries
Tokenization
Splits words, phrases, and idioms
Discover topics in a collection of documents
Topic models
NLP
Stemming
Maps to the valid root word
Disambiguation
Tf-idf
Determines meaning and sense of words (context vs. intent)
Semantic analytics
Represents term frequency and inverse document frequency
Compares words, phrases, and idioms in a set of documents to extract meaning


NLP Libraries
Tools
Features
NLTK
The most well-known & full NLP library
Plenty of approaches to each NLP task
Supports large number of languages
No integrated word vectors
spaCy
Fastest NLP framework
Easy to learn as it has one single highly optimized tool for each task
Supports neural network for training some models
Lesser language support
scikit learn
NLP Toolkit
Most effective for machine learning implementation
Good documentation available
No neural network support for text processing
gensim
Works with large datasets & processes data streams
Support deep learning
Designed primarily of unsupervised text modeling

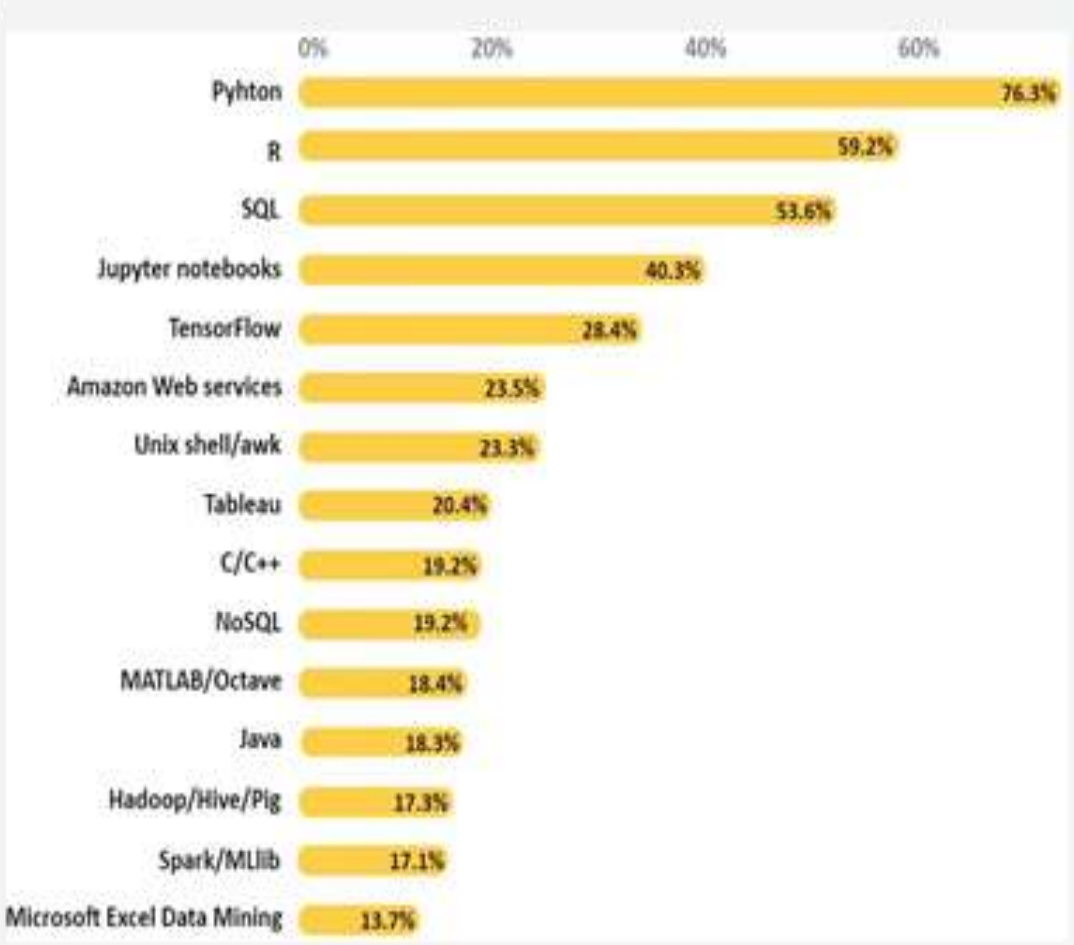

Use Cases of NLP
Translation Application
Fake News Detection
Classifying Emails
Predicting Disease
Error Detection
IVR Application
Sentiment Analysis
Personal Voice Assistant


Business
Healthcare
NLP Applications in Various Sectors
Text Mining
Deep Learning
Web Mining

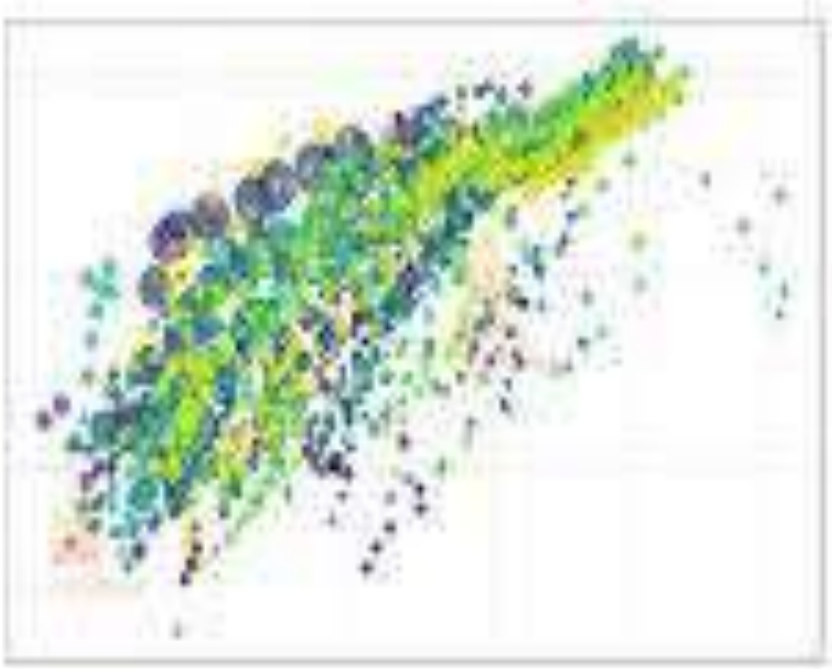

TOP PROGRAMMING
LANGUAGES FOR AI

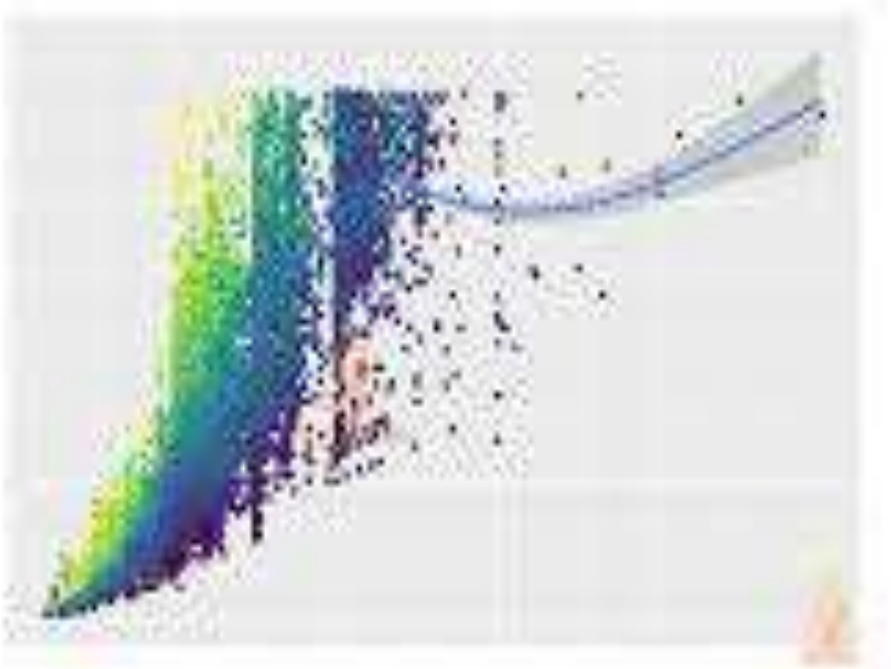
R Programming

Python & R programing language is the most dominant language to build AI model



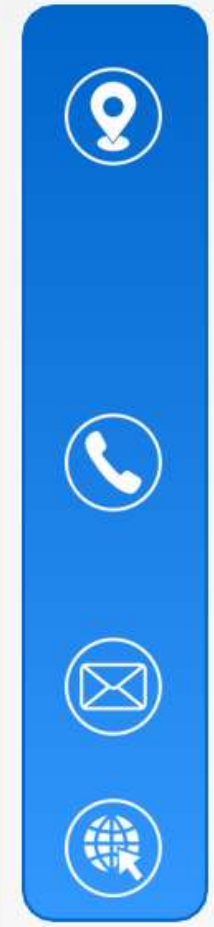
Data Visualization in R





Features of R programming Language

Thank You !!!



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