

INDIAN SCHOOL AL WADI AL KABIR

UNIT 1.

**INTRODUCTION TO AI_
AI PROJECT CYCLE_AI ETHICS
CLASS IX**

What is Artificial Intelligence?

When a machine...

- Mimics human intelligence
- Can solve real-world problems
- Improves on its own from past experiences
- Can predict and make decisions on its own

...it can be termed as Artificially Intelligent!

How to make machine intelligent?





Some AI Applications

Some AI Applications

Face Lock in Smartphones

Smartphones nowadays come with the feature of face locks in which the smartphone's owner can set up his/her face as an unlocking mechanism for it. The front camera detects and captures the face and saves its features during initiation. Next time onwards, whenever the features match, the phone is unlocked.

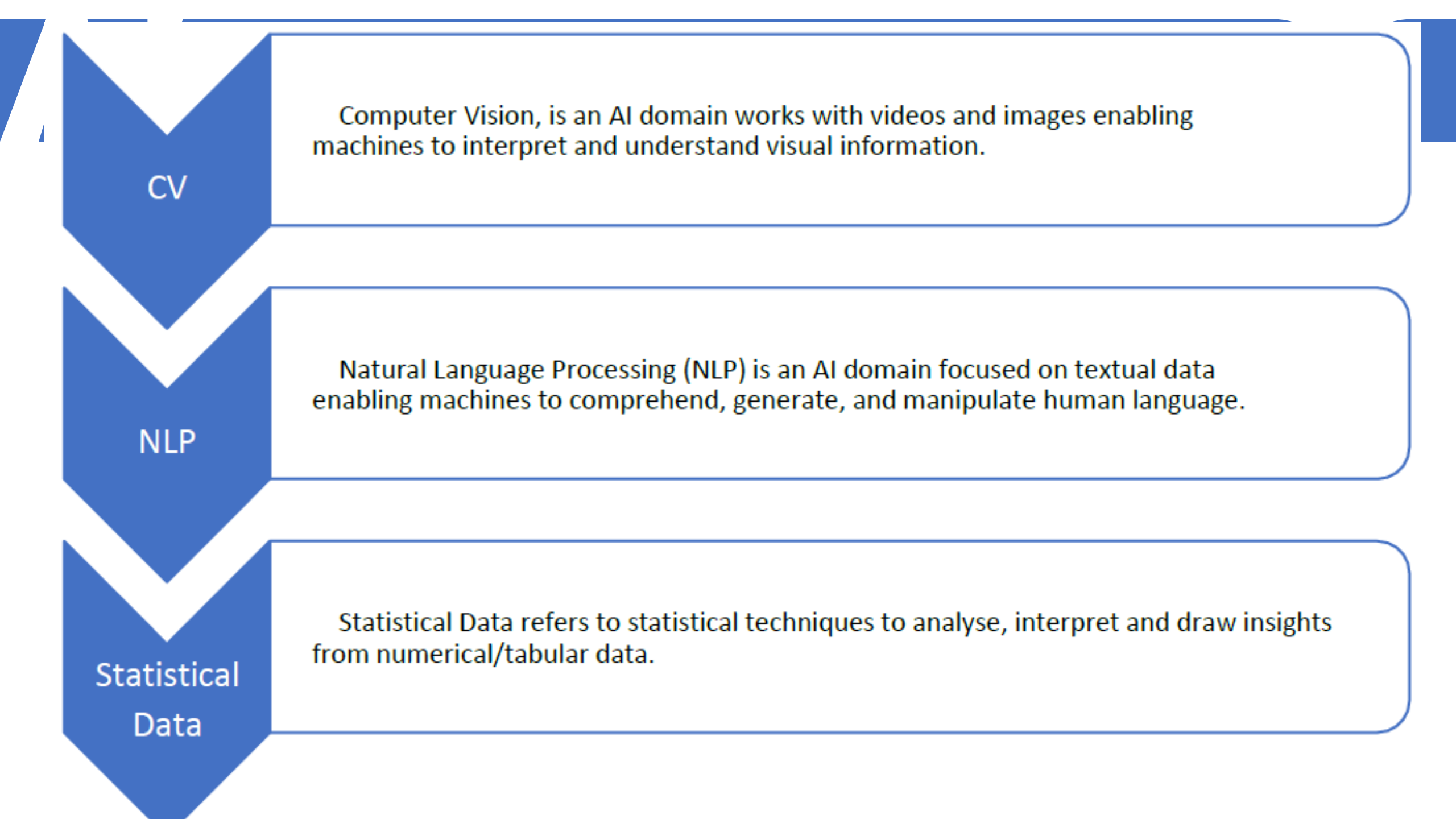
Smart assistants

Smart assistants like Apple's Siri and Amazon's Alexa recognize patterns in speech, then infer meaning and provide a useful response.

Fraud and Risk Detection

Finance companies decided to bring in data scientists to rescue them from losses. Over the years, banking companies learned to divide and conquer data via customer profiling, past expenditures, and other essential variables to analyse the probabilities of risk and default. Moreover, it also helped them to push their banking products based on customer's purchasing power.

Medical Imaging: For the last decades, computer supported medical imaging application that has been a trustworthy help for physicians. It doesn't only create and analyse images, but also becomes an assistant and helps doctors with their interpretation. The application is used to read and convert 2D scan images into interactive 3D models that enable medical professionals to gain a detailed understanding of a patient's health condition.



CV

Computer Vision, is an AI domain works with videos and images enabling machines to interpret and understand visual information.

NLP

Natural Language Processing (NLP) is an AI domain focused on textual data enabling machines to comprehend, generate, and manipulate human language.

Statistical
Data

Statistical Data refers to statistical techniques to analyse, interpret and draw insights from numerical/tabular data.



AI PROJECT CYCLE

- Life cycle of AI project
- **Project Cycle** is a step-by-step process to solve problems using **proven scientific methods** and drawing inferences about them.
- AI PROJECT CYCLE STEPS
 1. Problem Scoping
 2. Data Acquisition
 3. Data Exploration
 4. Modeling
 5. Evaluation
 6. Deployment

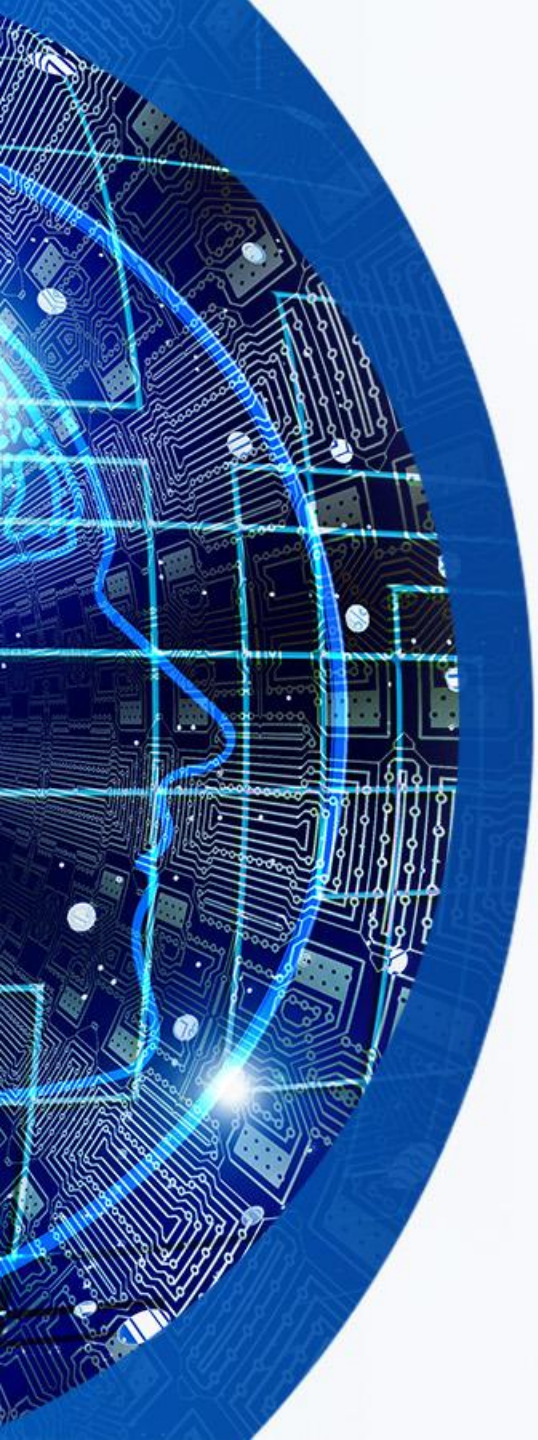


Problem Scoping

4Ws in Problem Scoping

- **Who?** - Refers that who is facing a problem and who are the stakeholders of the problem.
- **What?** - Refers to what is the problem and how you know about the problem.
- **Where?** - It is related to the context or situation or location of the problem.
- **Why?** - Refers to why we need to solve the problem and what are the benefits to the stakeholders after solving the problem.

The final outcome of problem scoping is the problem statement template.



Data Acquisition

- You need to acquire data which will become the base of your project as it will help you understand what the parameters that are related to problem scoping are.
 - You go for data acquisition by collecting data from various reliable and authentic sources.
1. **Training Data:** The collected data through the system is known as training data. In other words the input given by the user in the system can be considered as training data.
 2. **Testing Data:** The result data set or processed data is known as testing data. In other words, the output of the data is known as testing data.
 - Eg: to make an Artificially Intelligent system which can predict the salary of any employee based on his previous salaries.
 - The previous salary data here is known as Training Data while the next salary prediction data set is known as the Testing Data
 - For any AI project to be efficient, the training data should be authentic and relevant to the problem statement scoped. .



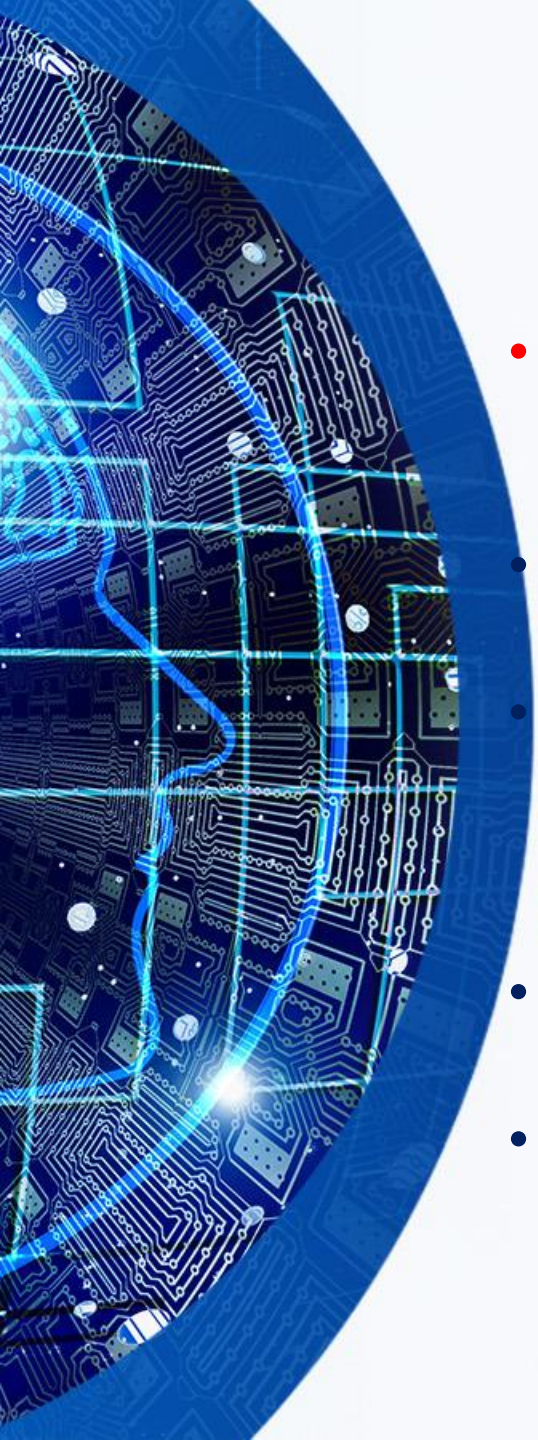
Data Exploration

- Data Exploration refers to the techniques and tools used to visualize data through complex statistical methods.

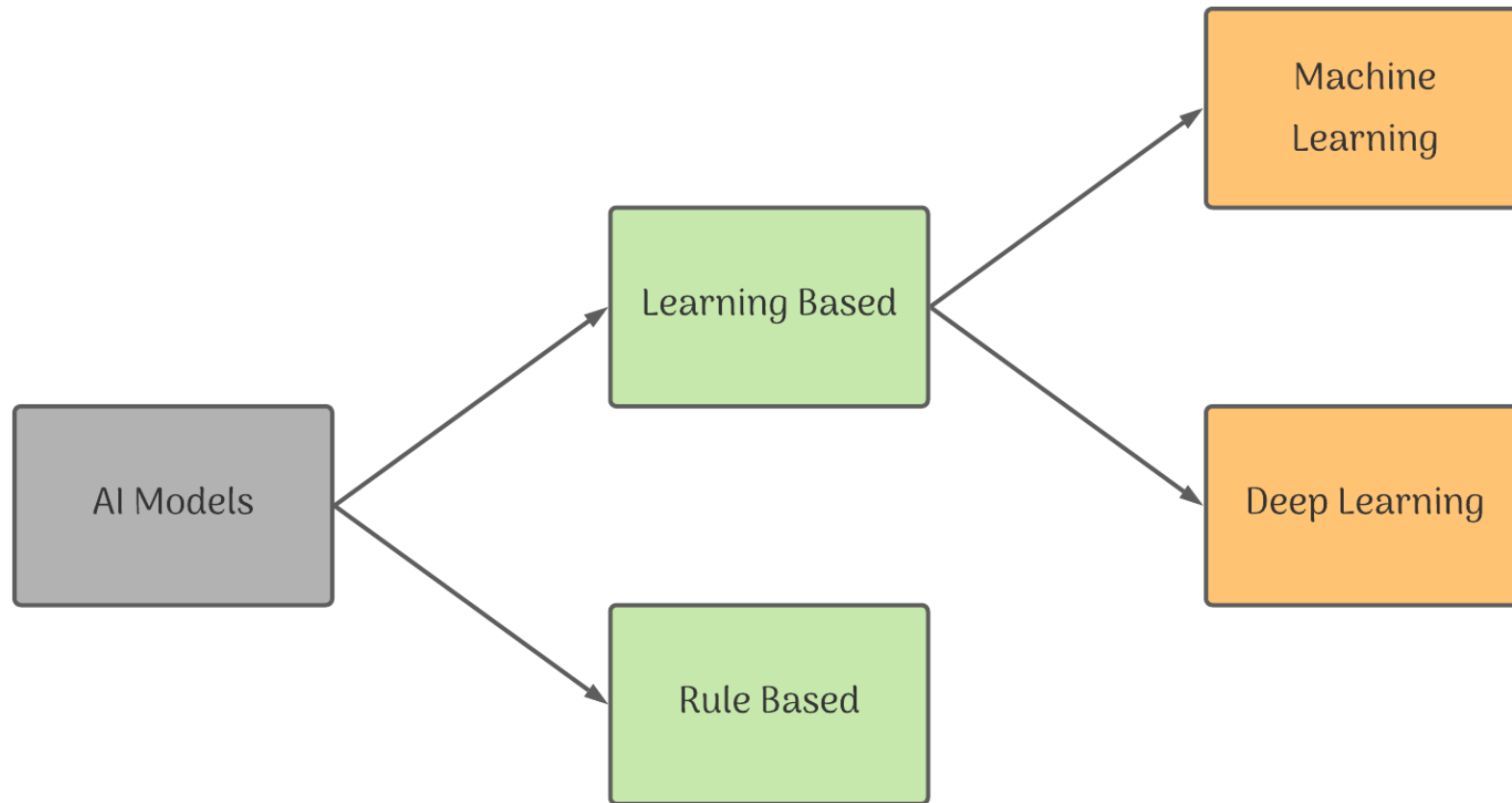
Advantages of Data Visualization

- ❖ A better understanding of data
- ❖ Provides insights into data
- ❖ Allows user interaction
- ❖ Provide real-time analysis
- ❖ Help to make decisions
- ❖ Reduces complexity of data
- ❖ Provides the relationships and patterns contained within data
- ❖ Define a strategy for your data model
- ❖ Provides an effective way of communication among users

Modelling

- 
- AI Modelling refers to developing algorithms, also called models which can be trained to get intelligent outputs. That is, writing codes to make a machine artificially intelligent.
 - The graphical representation makes the data understandable for humans as we can discover trends and patterns out of it.
 - But when it comes to machine accessing and analysing data, it needs the data in the most basic form of numbers (which is binary – 0s and 1s) and when it comes to discovering patterns and trends in data, the machine goes for mathematical representations of the same.
 - The ability to mathematically describe the relationship between parameters is the heart of every AI model.
 - Thus, whenever we talk about developing AI models, it is the mathematical approach towards analysing data which we refer to.

Modelling

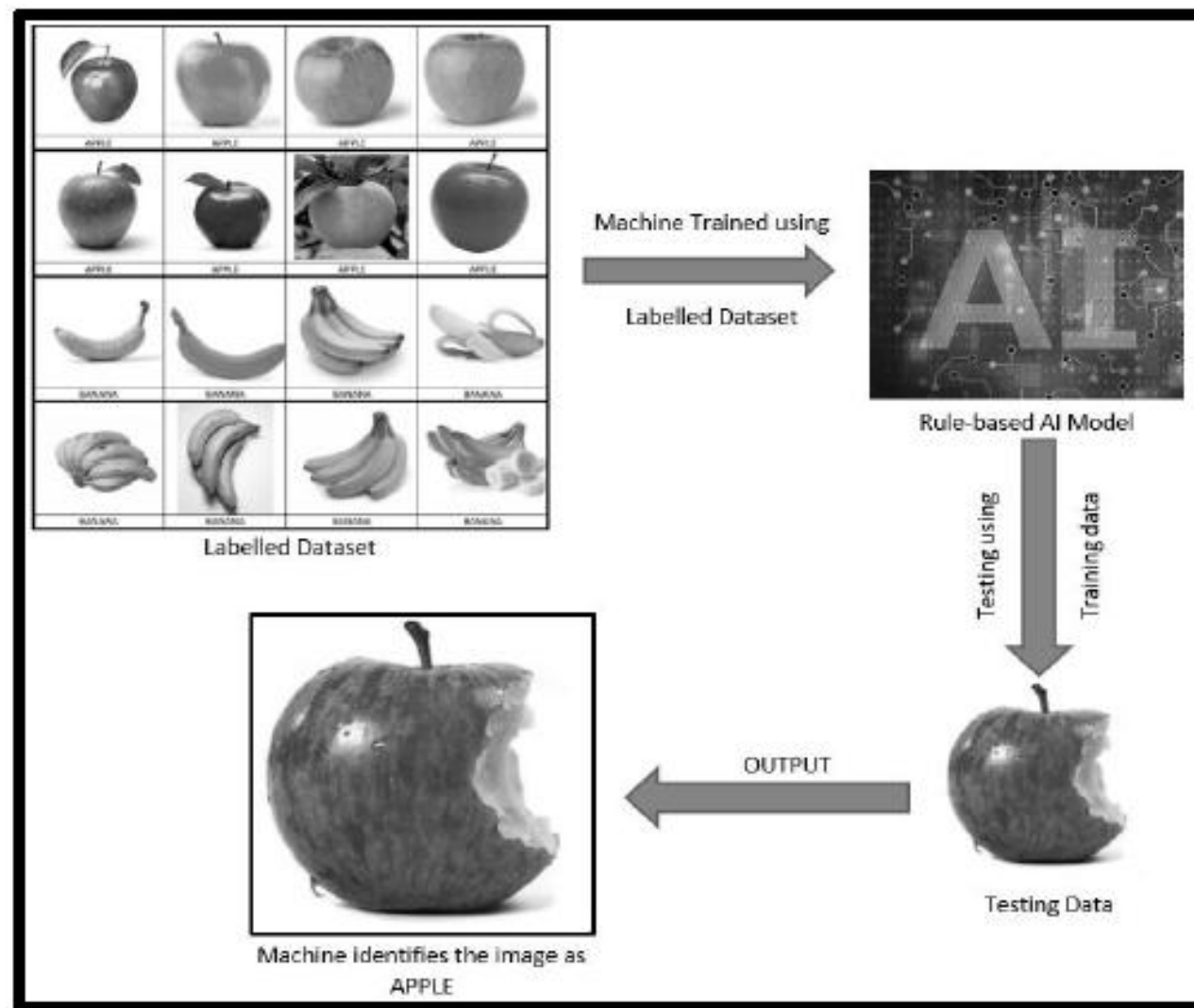
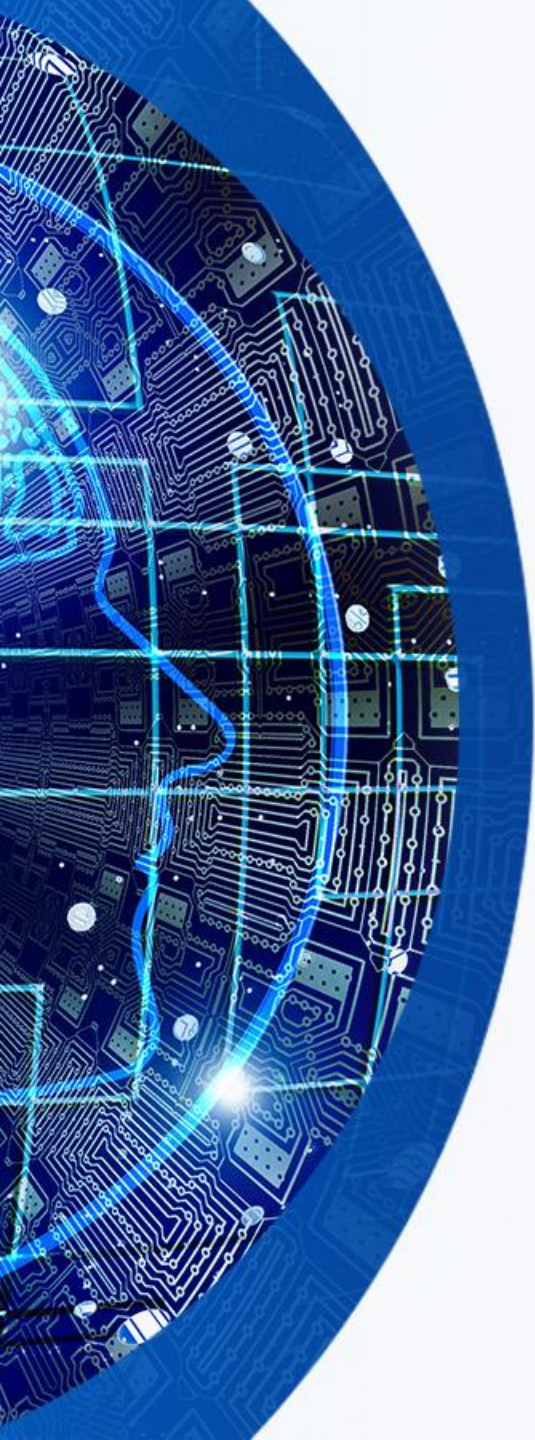


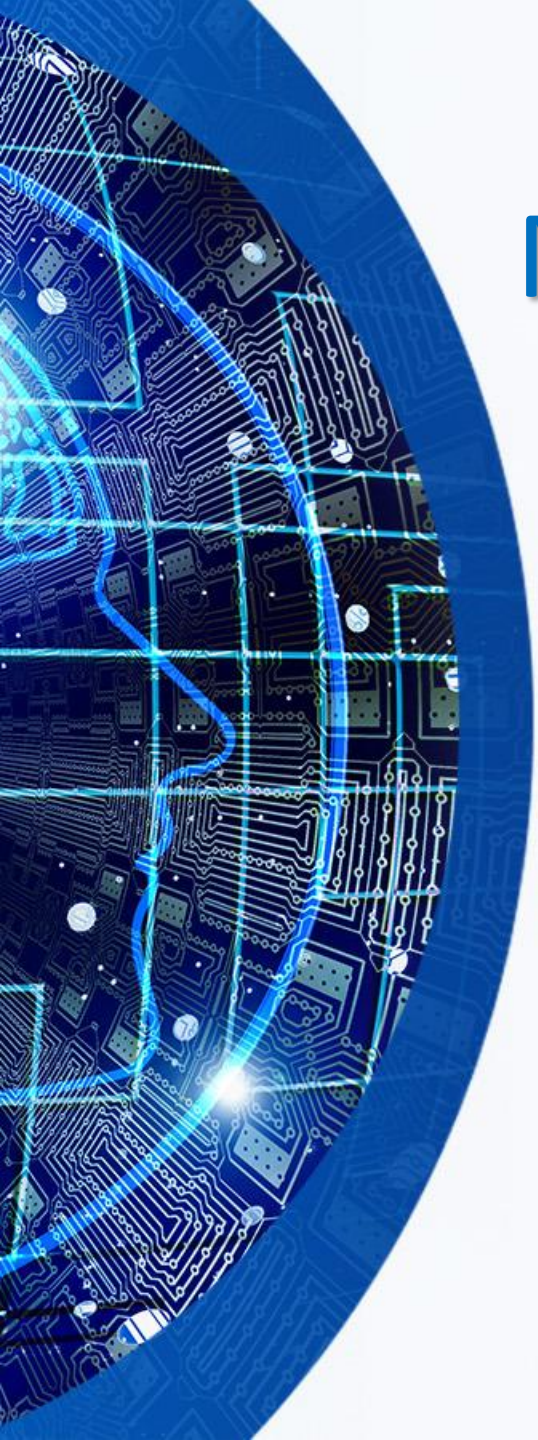
Modelling



Rule Based Approach :

- Rule Based Approach Refers to the AI modelling where the relationship or patterns in data are defined by the developer.
- The machine follows the rules or instructions mentioned by the developer, and performs its task accordingly.
- To train your machine, you feed this data into the machine and label each image as either apple or banana.
- Now if you test the machine with the image of an apple, it will compare the image with the trained data and according to the labels of trained images, it will identify the test image as an apple.
- This is known as Rule based approach. The rules given to the machine in this example are the labels given to the machine for each image in the training dataset.

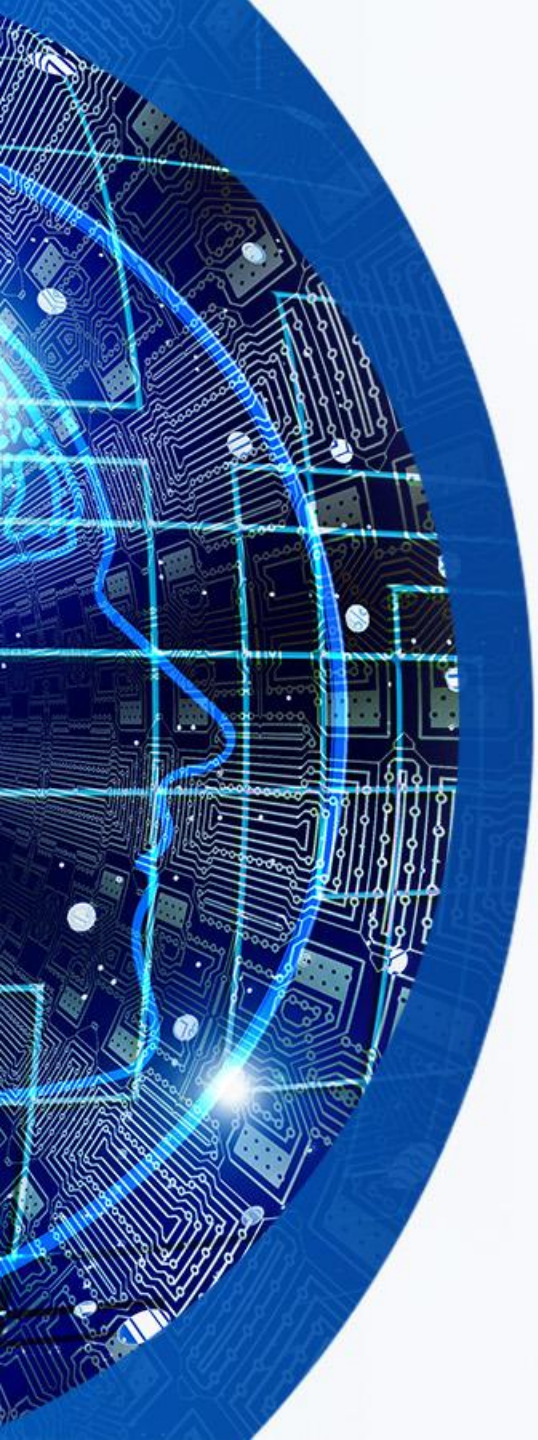




Modelling

Learning Based Approach

- AI modelling where the relationship or patterns in data are not defined by the developer.
- In this approach, random data is fed to the machine and it is left on the machine to figure out patterns and trends out of it.
- Generally this approach is followed when the data is unlabeled and too random for a human to make sense out of it. Thus, the machine looks at the data, tries to extract similar features out of it and clusters same datasets together.
- In the end as output, the machine tells us about the trends which it observed in the training data.



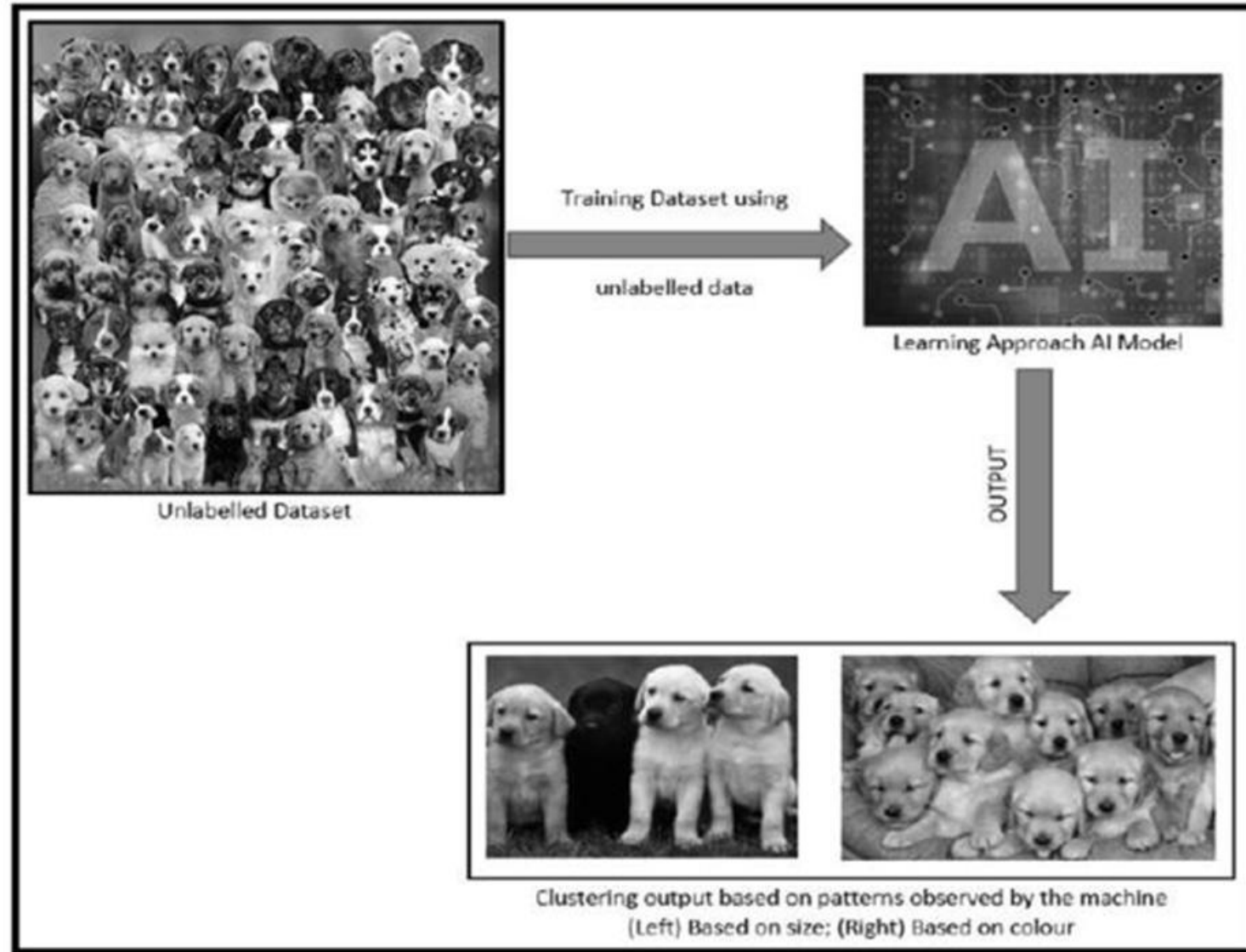
Modelling

Learning Based Approach

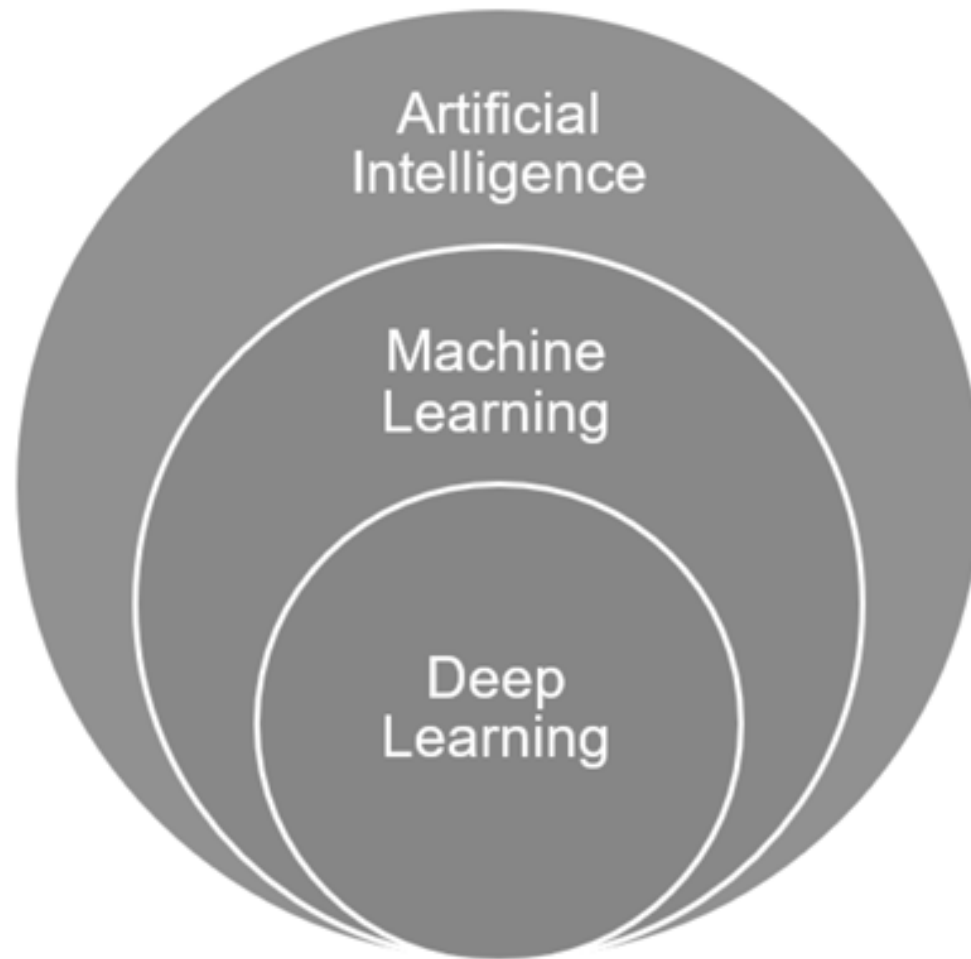
- For example, suppose you have a dataset of 1000 images of random stray dogs of your area.
- Now you do not have any clue as to what trend is being followed in this dataset as you don't know their breed, or colour or any other feature.
- Thus, you would put this into a learning approach based AI machine and the machine would come up with various patterns it has observed in the features of these 1000 images.
- It might cluster the data on the basis of colour, size, fur style, etc. It might also come up with some very unusual clustering algorithm which you might not have even thought of!

Modelling

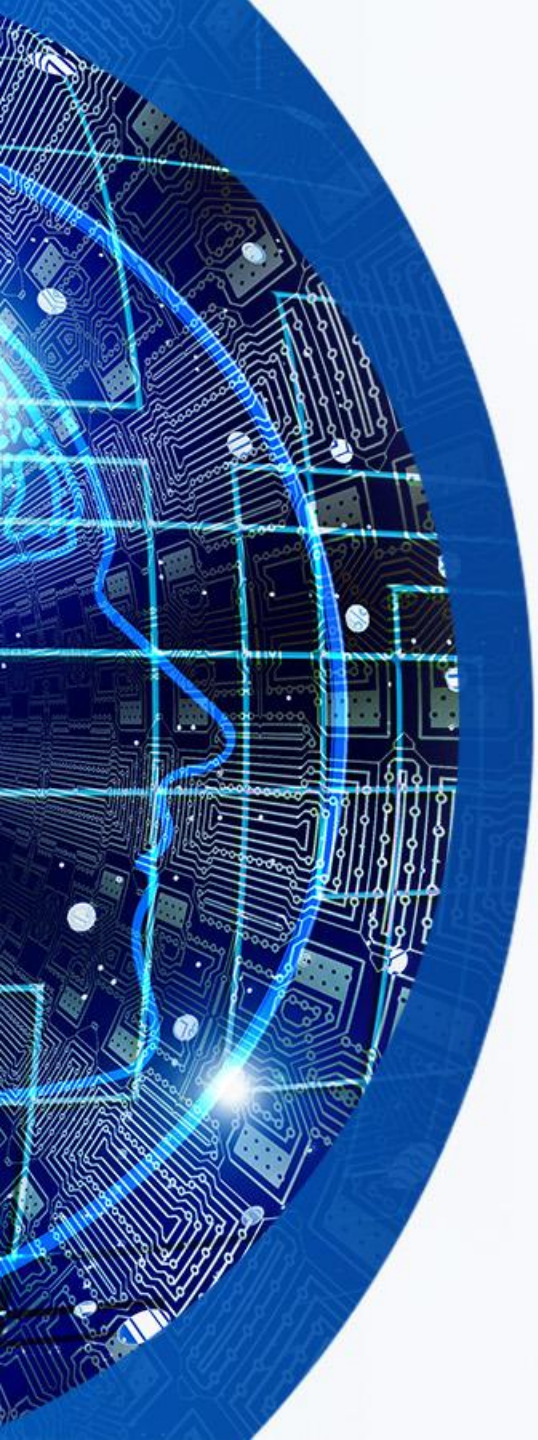
Learning Based AI Model



Modelling



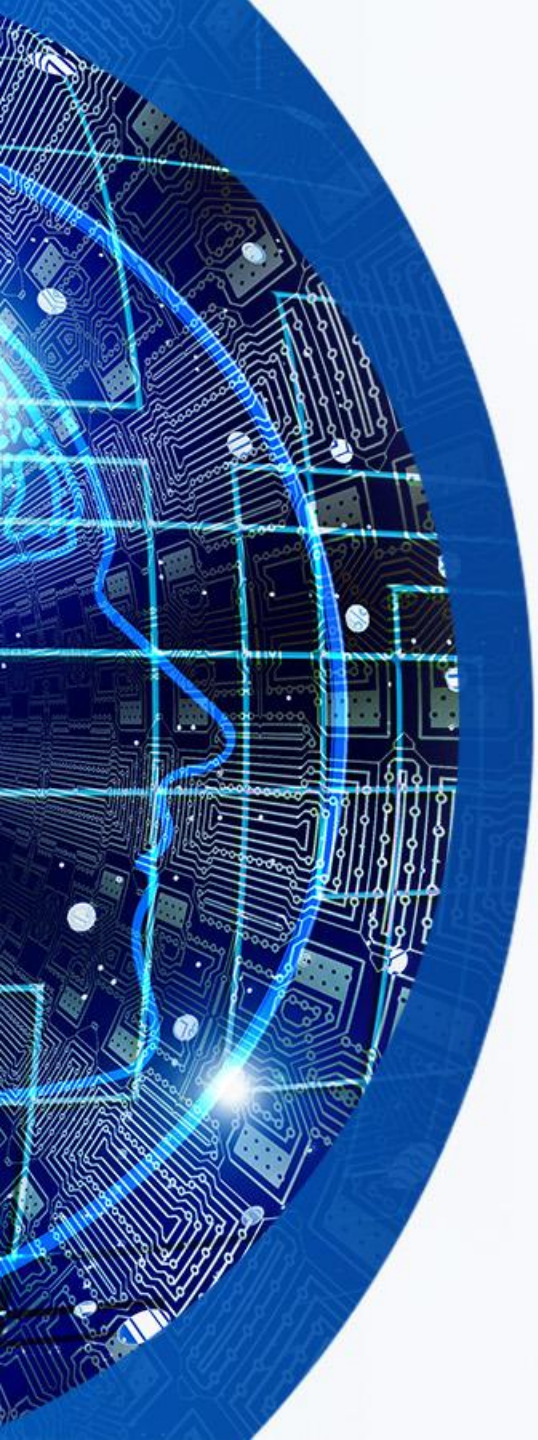
As you can see in the Venn Diagram, Artificial Intelligence is the umbrella terminology which covers machine and deep learning under it and Deep Learning comes under Machine Learning. It is a funnel type approach where there are a lot of applications of AI out of which few are those which come under ML out of which very few go into DL.



Modelling

- **Artificial Intelligence**, or AI refers to any technique that enables computers to mimic human intelligence.
 - An artificially intelligent machine works on algorithms and data fed to it and gives the desired output.
- **Machine Learning**, or ML for short, enables machines to improve at tasks with experience.
 - The machine here learns from the new data fed to it while testing and uses it for the next iteration. The machine learns from its mistakes and takes them into consideration in the next execution.
 - It improvises itself using its own experiences.
- **Deep Learning**, or DL for short, enables software to train itself to perform tasks with vast amounts of data.
 - In deep learning, the machine is trained with huge amounts of data which helps it into training itself around the data. Such machines are intelligent enough to develop algorithms for themselves.

Deep Learning is the most advanced form of Artificial Intelligence out of these three. Then comes Machine Learning which is intermediately intelligent and Artificial Intelligence covers all the concepts and algorithms which, in some way or the other mimic human intelligence.



AI vs ML vs DL

Artificial Intelligence	Machine learning	Deep Learning
AI represents stimulated intelligence in machines.	ML is the practice of getting machines to make decisions without being programmed.	It is artificial neural network to solve the complex problems.
AI is a subset of data science.	ML is the subset of AI and data science.	DL is the subset of AI , ML and data science.
AI aims toward building machines that are capable to think like humans	ML aims to learn through data to solve problems.	DL aim to build neural network that automatically discover patterns for feature detection



EVALUATION

Introduction

In the Evaluation stage, we will explore different methods of evaluating an AI model. Model Evaluation is an integral part of the model development process. It helps to find the best model that represents our data and how well the chosen model will work in the future

What is evaluation?

Evaluation is the process of understanding the reliability of any AI model, based on outputs by feeding test dataset into the model and comparing with actual answers. There can be different Evaluation techniques, depending of the type and purpose of the model. Remember that It's not recommended to use the data we used to build the model to evaluate it. This is because our model will simply remember the whole training set, and will therefore always predict the correct label for any point in the training set. This is known as overfitting.



DEPLOYMENT

What is deployment?

Deployment as the final stage in the AI project cycle where the AI model or solution is implemented in a real-world scenario. Key Steps in Deployment Process the key steps involved in the deployment process: a. Testing and validation of the AI model b. Integration of the model with existing systems c. Monitoring and maintenance of the deployed model. Some examples of successful AI projects that have been deployed in various industries, such as self driving cars, medical diagnosis systems, and chatbots.

AI can be used on Mobile Apps, Website Apps, etc.



Ethics and Morality

Ethical Questions: Examples of Ethical questions

- If a shopkeeper gives me back more money than what is due, is it better to return it? Or should I keep it with me?
- Is taking pens from a library considered stealing?
- Is taking extra paper napkins from a restaurant considered theft?
- You order a new dress from Amazon and after wearing it on your friends birthday party, you returned it stating the reason inappropriate fitting.

Moral Questions: Examples of moral questions

- Is it OK to lie? If so, under what circumstances?
- If a family is hungry and has no other way to get food, is it OK to steal food from a rich store owner? Why or why not?
- Is a collective decision made by people, always, right? Or can it be wrong?

Morals	Ethics
▪ The beliefs dictated by our society.	▪ The guiding principles to decide what is good or bad.
▪ Morals are not fixed and can be different for different societies.	▪ These are values that a person themselves chooses for their life.
▪ Examples: ▪ Always speak the truth ▪ Always be loyal ▪ Always be generous	▪ Examples: ▪ Is it good to speak the truth in all situations? ▪ Is it good to be loyal under all circumstances? ▪ Is it necessary to always be generous?



AI Ethics

AI ethics refers to the set of moral principles and guidelines that govern how artificial intelligence systems are designed, developed, and used so that they are **safe, fair, and beneficial to humans**.

● The following principles in AI Ethics affect the quality of AI solutions

- Human Rights
- Bias
- Privacy
- Inclusion

Human Rights: Basic rights that every person has, like freedom, safety, education, and equality.

In AI: When we use AI, we must ensure it does not harm people or take away their rights.

Example: If a camera system is used in public places, it should be for safety, not to constantly watch students unfairly.

Bias : When something is unfair or favors one side more than the other.

In AI: If AI is **trained** on wrong or incomplete data, it may treat some people unfairly.

Example: If an AI for job interviews has only been trained with data of men, it may favor men over women.

Privacy : Keeping personal information safe and not sharing it without permission.

In AI: AI tools often collect data (like names, photos, or locations). This must be protected.

Example: If a health app collects your heartbeat data, it should not share it with others without your consent.

Inclusion : Making sure everyone is included and no one is left out.

In AI: Technology should work for all people, regardless of language, ability, or background.

Example: A voice assistant should understand both male and female voices, and also different accents.