AI, GenAI & Agentic AI for Automotive Leaders and Developers

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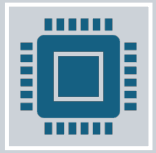
🔧 Prerequisites

Basic knowledge of Python (functions, control flow)

Familiarity with automotive workflows,



systems, and product lifecycles

Lab Setup Requirements

- Laptop with Python 3.10+, Jupyter Notebook, VS Code
- Libraries: numpy, pandas, scikit-learn, matplotlib, openai, langchain, chromadb
- Access to Azure OpenAI or Google Gemini APIs
- Internet connectivity, Excel, and sample automotive datasets

🎓 Trainer Deliverables

- Pre-reading PDFs on AI, GenAI, Prompting
- Setup guide for labs (for technical team)
- Sample notebooks and visual examples
- Hackathon guidance
- Final review and open Q&A

Program Outcomes for Management Teams

Clearly understand AI, GenAI, and Agentic AI in business context

Evaluate where to invest in AI inside your automotive enterprise

Identify use cases with measurable ROI

Build leadership confidence in leveraging AI responsibly

Align technical and business teams on AI vision

Day-Wise Outline

Day 1: AI/ML/DL – Foundation for Automotive Innovation

Day 2: AI Leadership, Risk Management & Storytelling with Data

Day 3: Generative AI and Document Automation

Day 4: Strategic Thinking – Competing in the AI Age

Day 5: Introduction to Agentic AI and Innovation Hackathon

Day 1

AI/ML/DL – Foundation for Automotive Innovation

Objective

Provide leaders

Understanding of AI, ML, DL

Applications in automotive.

Day 1

What is AI, ML, DL

Definitions and Differences

Use of AI in Automotive

Safety, Maintenance, Manufacturing

Python Libraries Overview

Day 1

Use Case: Predictive Maintenance using sensor data

Demo: Build a basic model that predicts EV motor failure

Case Study: AI Use in Tesla, BMW, Toyota

Demo Focus: How AI predicts problems before they happen

In the age of artificial intelligence,

luxury is not just how it feels

it’s how it *thinks*.

Imagine a vehicle

That not only responds

to your touch

but *anticipates*

your needs...

A car that understands
the terrain, the weather,
your mood
and *adjusts everything for you*.

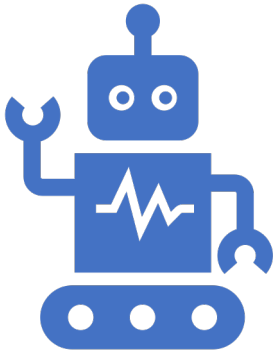
This is not a dream.

This is **Jaguar Land Rover powered by AI.**

What is Artificial Intelligence?

- Artificial : Man-made
- Intelligence: Thinking Power
- A Man-made Thinking Power

Artificial Intelligence (AI)



Simulation of human intelligence in machines.

Programmed to think, learn, and make decisions.

Artificial Intelligence (AI)

AI ENABLES SYSTEMS TO PERFORM TASKS

TYPICALLY REQUIRE HUMAN INTELLIGENCE,

SUCH AS PROBLEM-SOLVING, UNDERSTANDING LANGUAGE,

RECOGNIZING PATTERNS, AND DECISION-MAKING

AI in Automotive

AI ENABLES

A VEHICLE OR

AUTOMOTIVE SYSTEM

TO **ACT INTELLIGENTLY**.

AI Examples

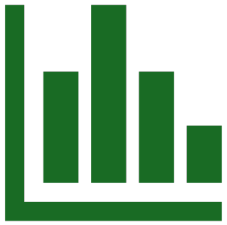
Voice-activated assistants

“Hey Mercedes” or

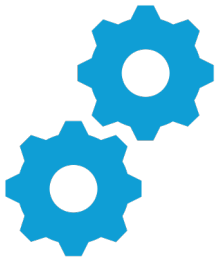
Tesla voice commands

AI Examples

AI-based Predictive Maintenance



AI monitors vehicle telemetry



predicts part failures

AI Examples

DRIVER BEHAVIOR MONITORING SYSTEMS

DETECT DROWSINESS OR

DISTRACTION

How JLR Uses AI?

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Predictive Terrain Response

LAND ROVER'S AI ANALYZES CAMERA AND SENSOR DATA

TO ADAPT SUSPENSION, TRACTION, AND ENGINE TORQUE

IN REAL-TIME FOR *ANY* LANDSCAPE

FROM DESERTS TO GLACIERS.

Smart Cabin Experience

Jaguar’s AI adjusts climate,

seat position, ambient lighting, and

infotainment based on

driver mood, preferences, and

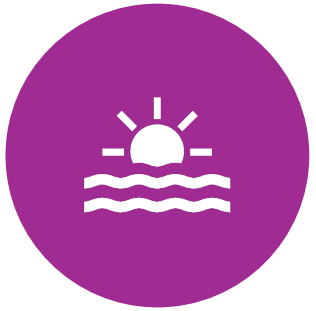
even biometric cues like fatigue.

Adaptive Cruise and Navigation

AI-POWERED NAVIGATION DOESN'T JUST OFFER ROUTES

IT *LEARNS* YOUR DRIVING STYLE AND ADAPTS,

AVOIDS CONGESTION, AND



EVEN SUGGESTS SCENIC DRIVES.

Driver Monitoring System

USING AI VISION, JLR

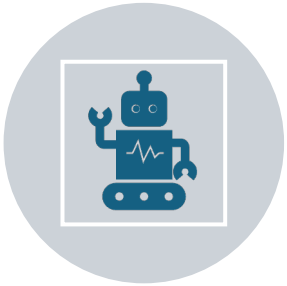
DETECTS DROWSINESS OR DISTRACTION

PREVENTING ACCIDENTS BEFORE THEY HAPPEN.

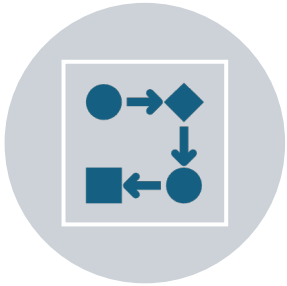
Self-Learning Vehicles

Land Rover remembers

your routes, music, contacts, and behavior.



Becomes a *personalized AI co-pilot*



that evolves with you.

Why AI in the Automotive Domain?

Safety: Proactive risk detection and accident prevention

Performance: Real-time terrain response, energy optimization

Luxury: Hyper-personalized driving experiences

Why AI in the Automotive Domain?

Sustainability: AI-driven efficiency in electric models

Autonomy: Moving towards intelligent self-driving capability

Brand Value: Reinventing legacy through intelligent innovation

Why AI in the Automotive Domain?

When machines learn, luxury evolves.

Jaguar Land Rover is not just building cars

it’s building **intelligent journeys**.

Machine Learning (ML)

Machine Learning is a subset of AI

Focuses on enabling machines

to learn from data

Without being explicitly programmed.

Machine Learning (ML)

ML ALGORITHMS IDENTIFY

PATTERNS AND RELATIONSHIPS IN DATA,

ALLOWING SYSTEMS TO IMPROVE

THEIR PERFORMANCE OVER TIME.

Key Features of ML

Relies on data and statistical models.

Continuously learns and improves.

ML In Automotive

ML helps the system

adapt and improve its behavior

based on **experience (data).**

ML Examples

Fuel efficiency optimization

based on driving history

Personalized Infotainment

Recommendations for drivers

ML Examples

Predictive supply chain

analytics for

spare parts management

What is Deep Learning (DL)?

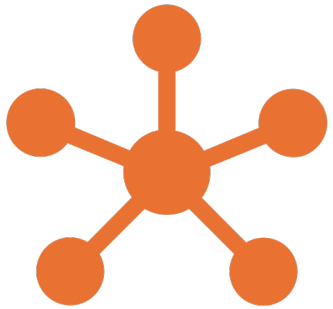
DL is a **subset of ML**

uses complex **neural networks**

to learn from **unstructured data**

like images, audio, and video.

Key Feature



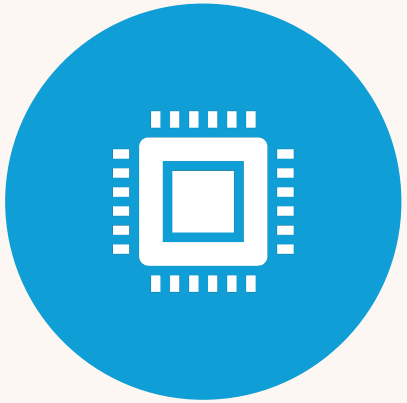
Multi-layered neural networks

mimic the human brain

DL In Automotive

DL IS AT THE HEART OF

AUTONOMOUS DRIVING AND



COMPUTER VISION SYSTEMS.

DL Examples

Object detection in self-driving cars

(pedestrians, traffic signs, lanes)

Driver facial recognition

for personalization or security

DL Examples

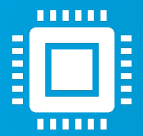
Natural Language Processing (NLP)

for advanced voice recognition

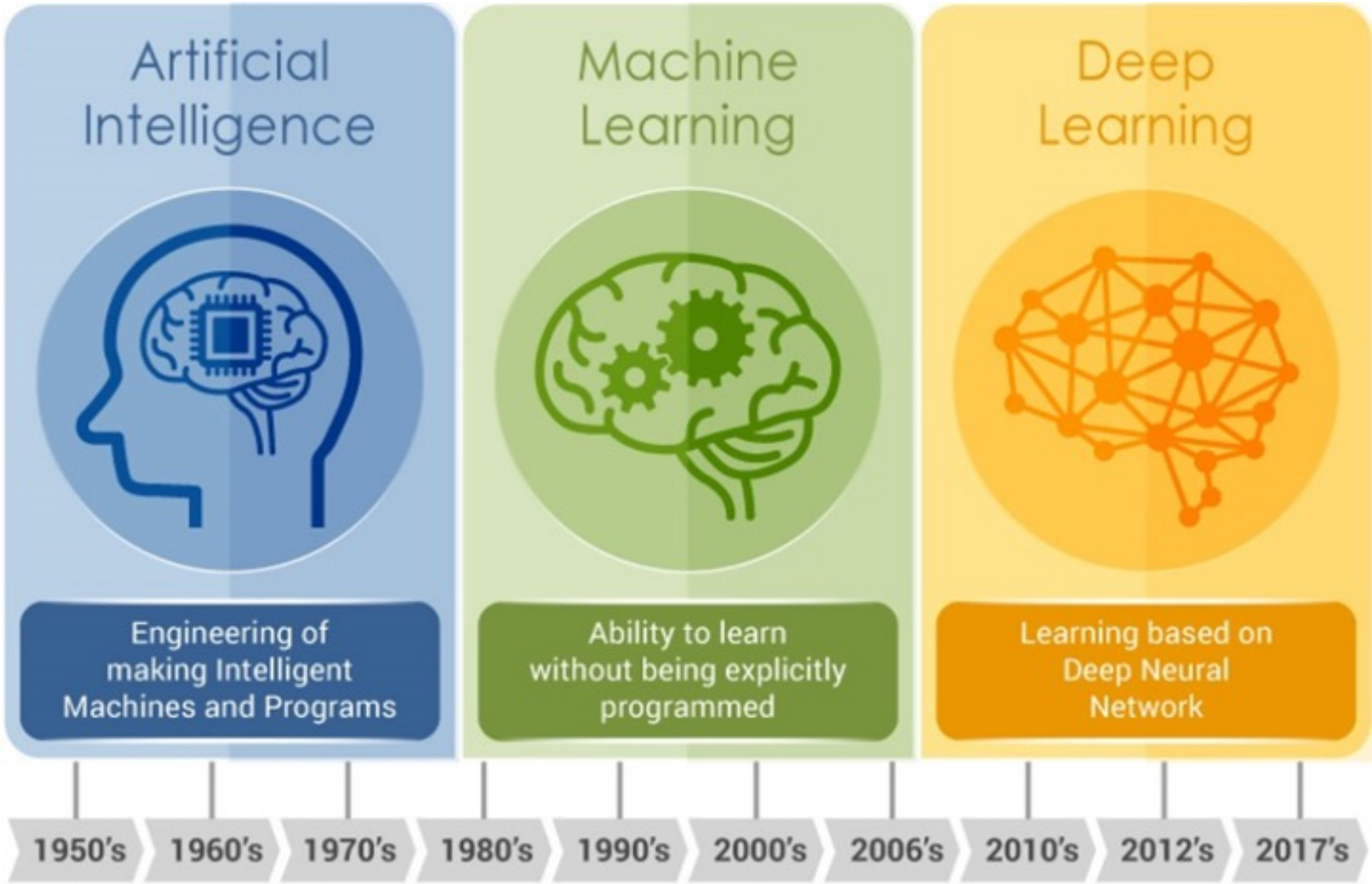
AI vs ML vs DL

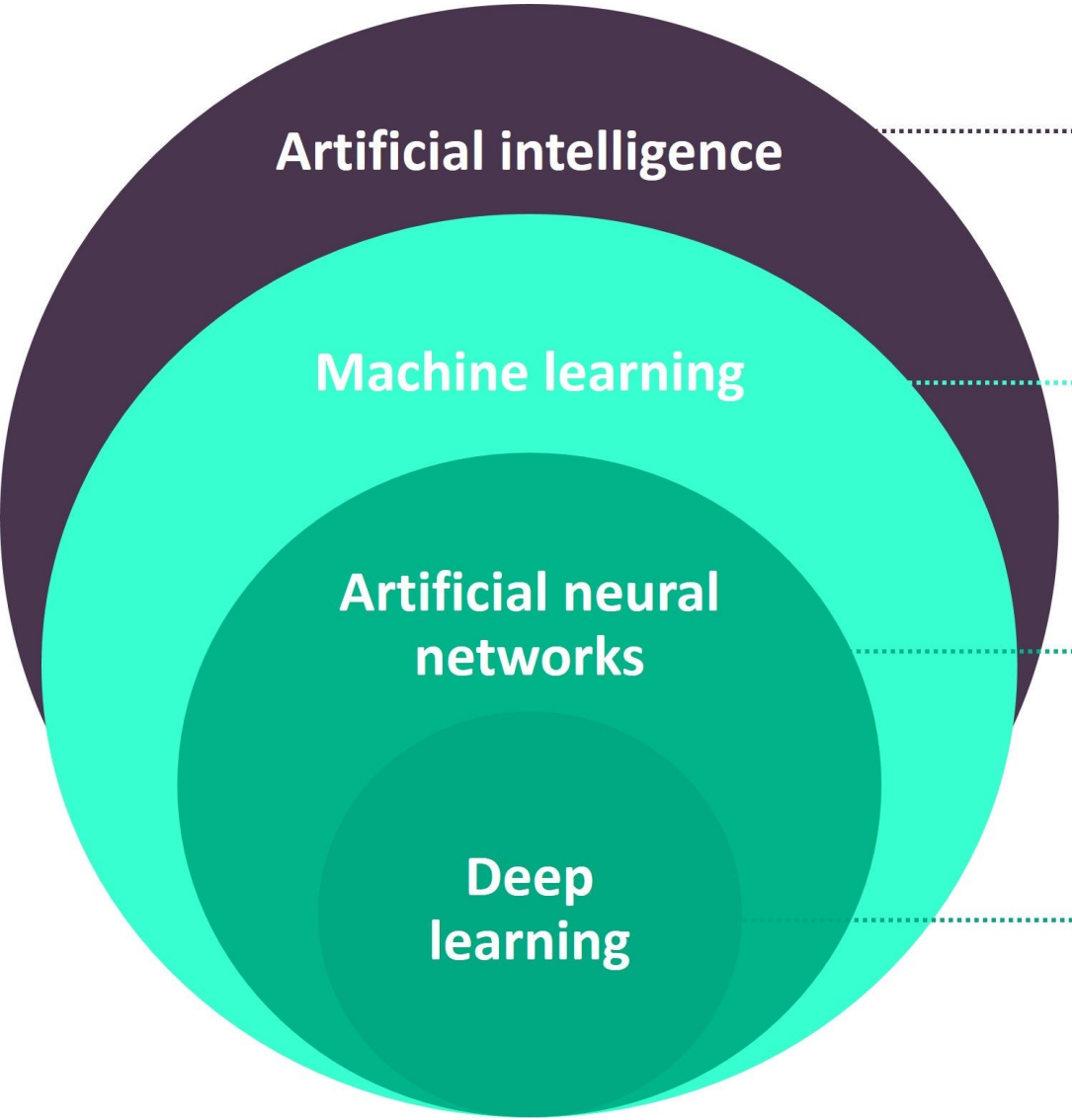
AI means getting a computer to mimic human behavior in some way.

Machine learning is a subset of AI, and it consists of the techniques that enable computers to figure things out from the data and deliver AI applications.



Deep learning, meanwhile, is a subset of machine learning that enables computers to solve more complex problems.


Artificial Intelligence
Machine Learning
Deep Learning
Engineering of making Intelligent Machines and Programs
Ability to learn without being explicitly programmed
Learning based on Deep Neural Network
1950's
1960's
1970's
1980's
1990's
2000's
2006's
2010's
2012's
2017's



Artificial intelligence (AI)

Any techniques that enable machines to solve a task in a way like humans do

Machine learning (ML)

Algorithms that allow computers to learn from examples without being explicitly programmed

Artificial neural networks (ANN)

Brain-inspired machine learning models

Deep learning (DL)

A subset of ML which uses deep artificial neural networks as models and automatically builds a hierarchy of data representations

Why Artificial Intelligence?

CREATE SOFTWARE OR DEVICES

SOLVE REAL-WORLD PROBLEMS

WITH ACCURACY.

HEALTH ISSUES

MARKETING

TRAFFIC ISSUES

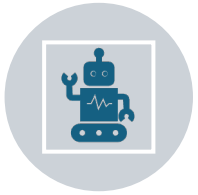
What is Artificial Intelligence?

AI stands for Artificial Intelligence

Mimics human intelligence in tasks

Includes reasoning and decision-making

AI spans multiple technological domains



Used in automation and robotics

What is Machine Learning?

- ML is a subset of AI
- Learns patterns from provided data
- Improves over time with feedback
- Includes supervised and unsupervised types
- Used in predictions and classifications

What is Deep Learning?

- DL is a subset of ML
- Uses deep neural networks for tasks
- Handles large and complex datasets
- Performs image and speech recognition
- Requires significant computational power

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Definition	The broad concept of creating intelligent systems that can simulate human intelligence.	A subset of AI focused on using data and algorithms to enable systems to learn and improve from experience.	A specialized subset of ML that uses neural networks with multiple layers to process large amounts of data.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Scope	Encompasses all intelligent systems, including rule-based systems, logic-based systems, and learning systems.	Focuses specifically on algorithms that learn patterns and relationships from data.	Concentrates on building and training deep neural networks.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Techniques Used	Expert systems, rule-based programming, machine learning, deep learning, and more.	Supervised, unsupervised, and reinforcement learning algorithms.	Deep neural networks, including CNNs (Convolutional Neural Networks) and RNNs (Recurrent Neural Networks).

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Data Dependency	May work with minimal or no data (e.g., rule-based AI).	Requires structured data for training models.	Requires large amounts of labeled or unlabeled data for training.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Key Components	Problem-solving, reasoning, knowledge representation, and learning.	Algorithms like linear regression, decision trees, k-means clustering, and SVM.	Neural networks with layers like input, hidden, and output.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Complexity	Relatively broader and includes simpler methods like logic systems.	Moderately complex, as it requires feature engineering and model selection.	Highly complex, as it automates feature extraction and involves large-scale computations.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Hardware Dependency	Can run on standard computational hardware.	May need specialized hardware for large datasets.	Requires high-performance GPUs or TPUs for training.

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Applications	Robotics, Expert Systems, Virtual Assistants, Game AI.	Spam filtering, Product recommendations, Fraud detection.	Image recognition, Speech recognition, Natural Language Processing (NLP).

AI, ML, and Deep Learning

Aspect	Artificial Intelligence	Machine Learning	Deep Learning
Human Involvement	May require human input for rule-setting and logic programming.	Requires human input for feature selection and model training.	Minimal human intervention; learns features automatically.

Illustrative Relationship

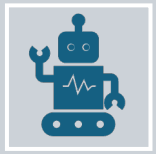
AI is the big picture: AI aims to create intelligent machines.

ML is a subset of AI: ML focuses on learning from data to achieve AI's goals.

Deep Learning is a subset of ML: DL uses neural networks to automate and improve learning for complex problems.

Example

AI: A chatbot that answers questions intelligently.

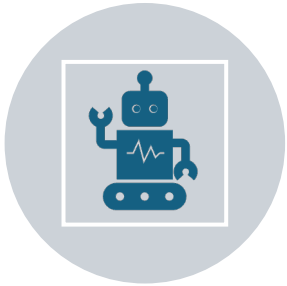


ML: The chatbot learns user preferences using machine learning algorithms.

DL: The chatbot uses a deep neural network to understand natural language and context better.

Conclusion

AI is the goal.

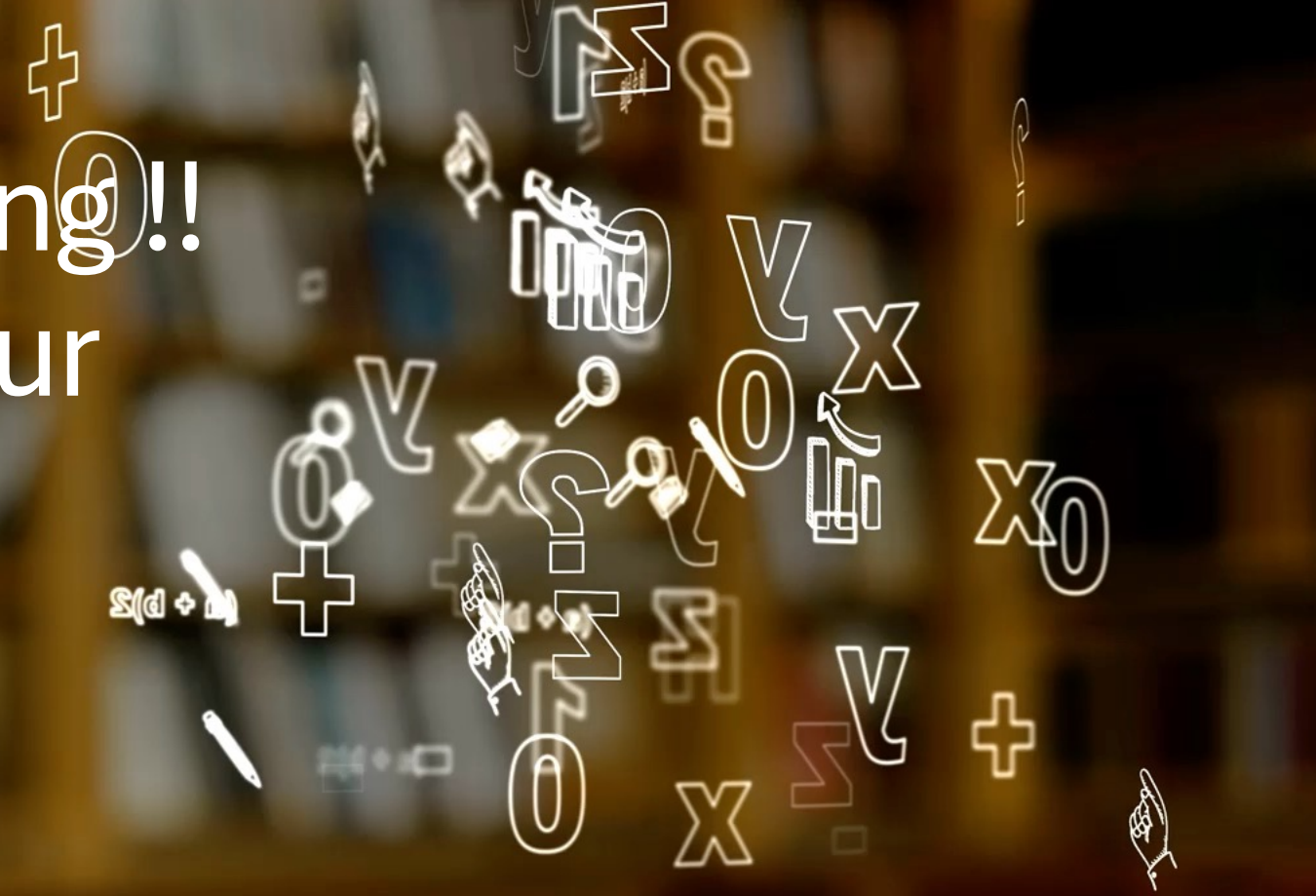


ML is one way to achieve AI.

Deep Learning is a powerful technique within ML,

particularly for processing large and complex data sets.

Happy Learning!! Thanks for Your Patience ☺



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