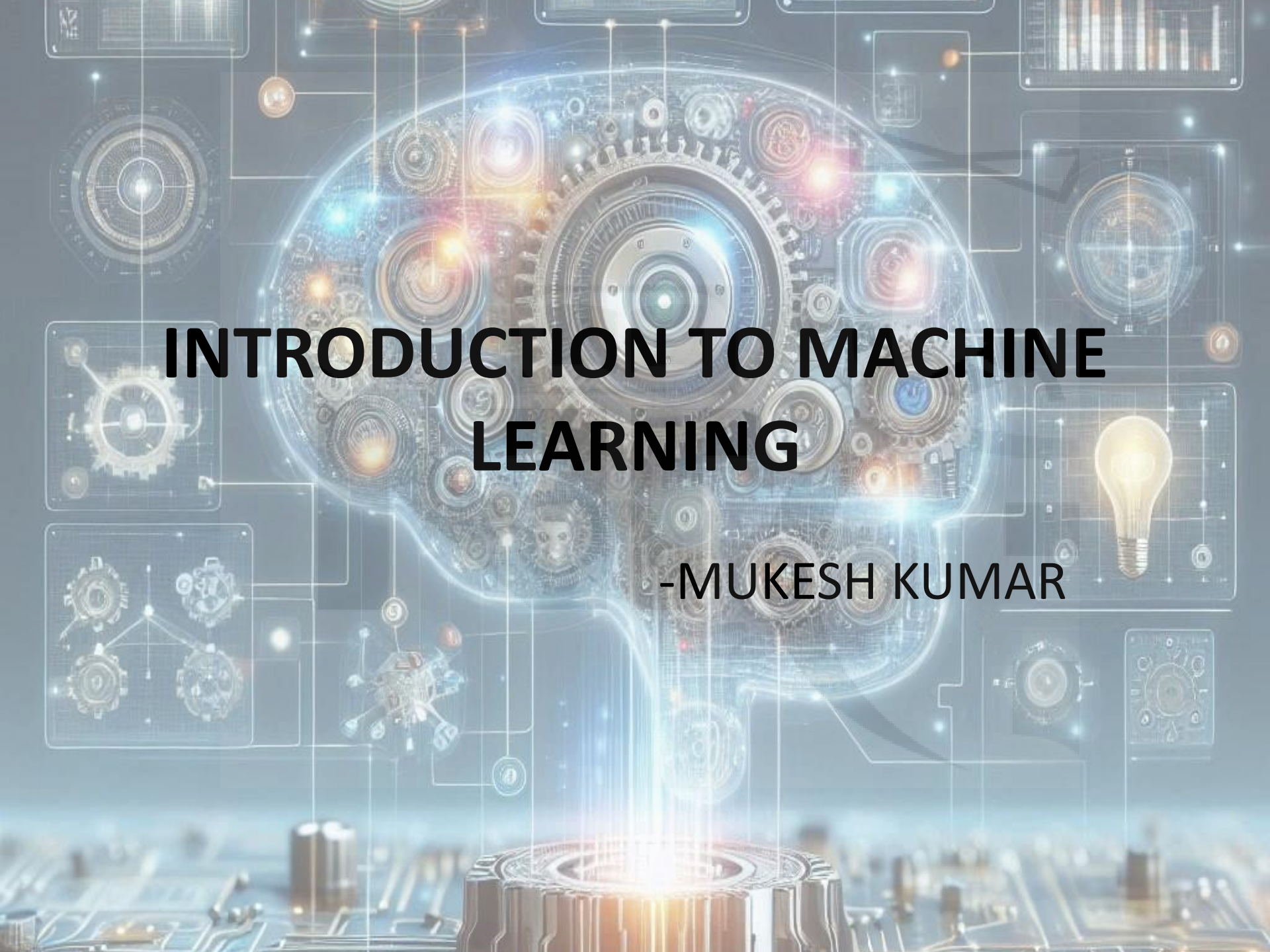
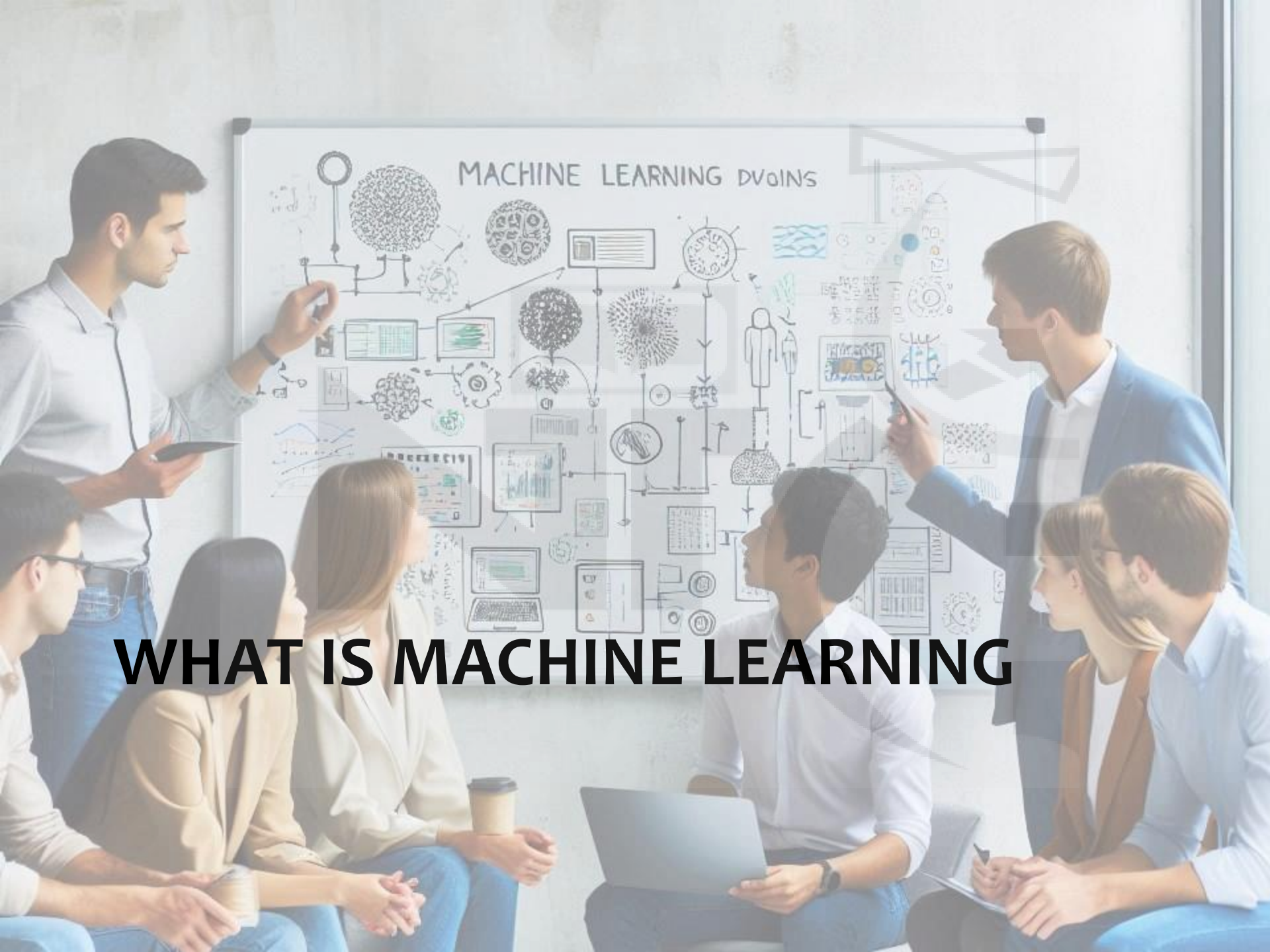


INTRODUCTION TO MACHINE LEARNING

-MUKESH KUMAR

AGENDA

- What is Machine Learning?
- Types of Machine Learning
- Applications of Machine Learning

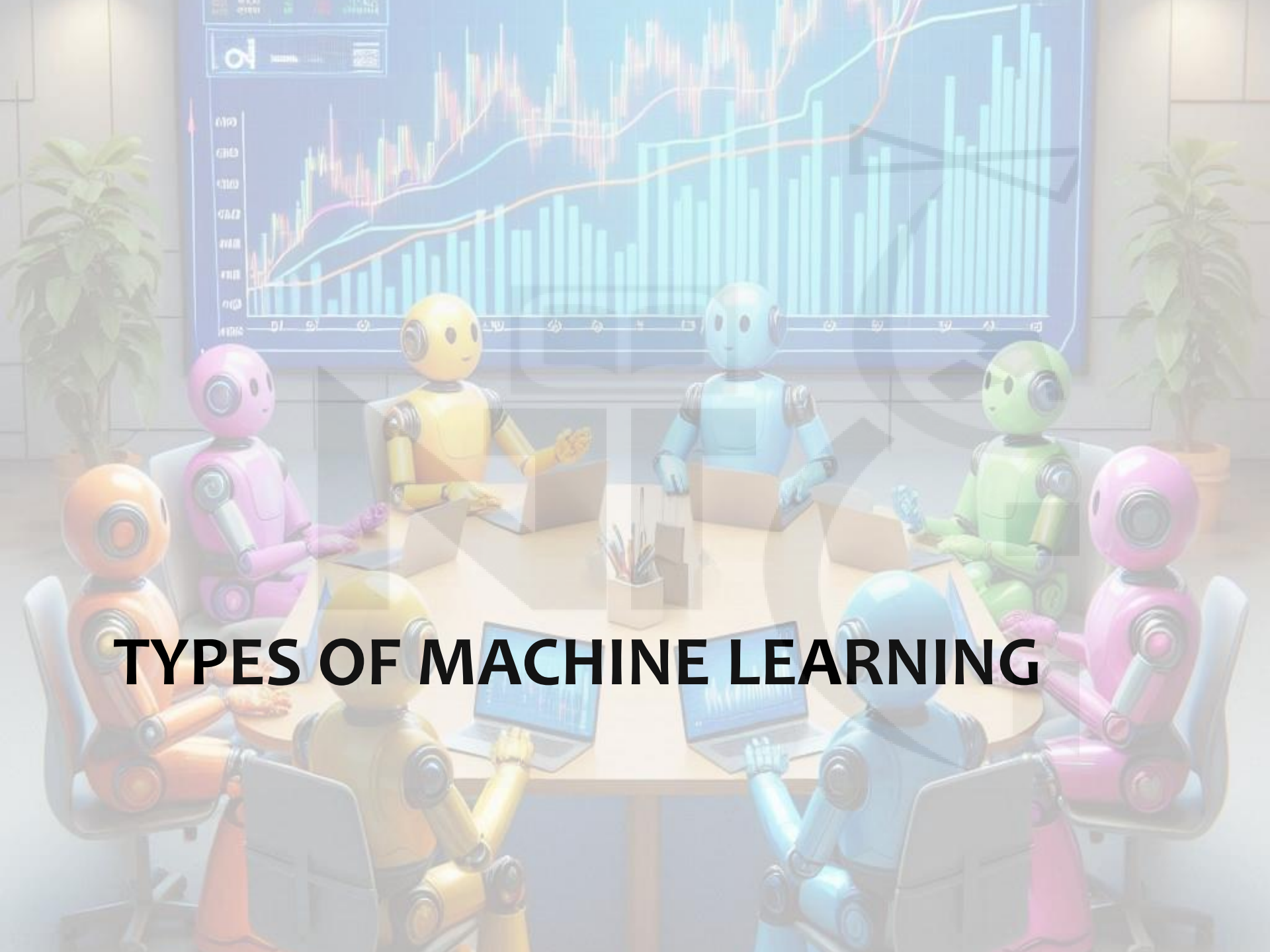


WHAT IS MACHINE LEARNING

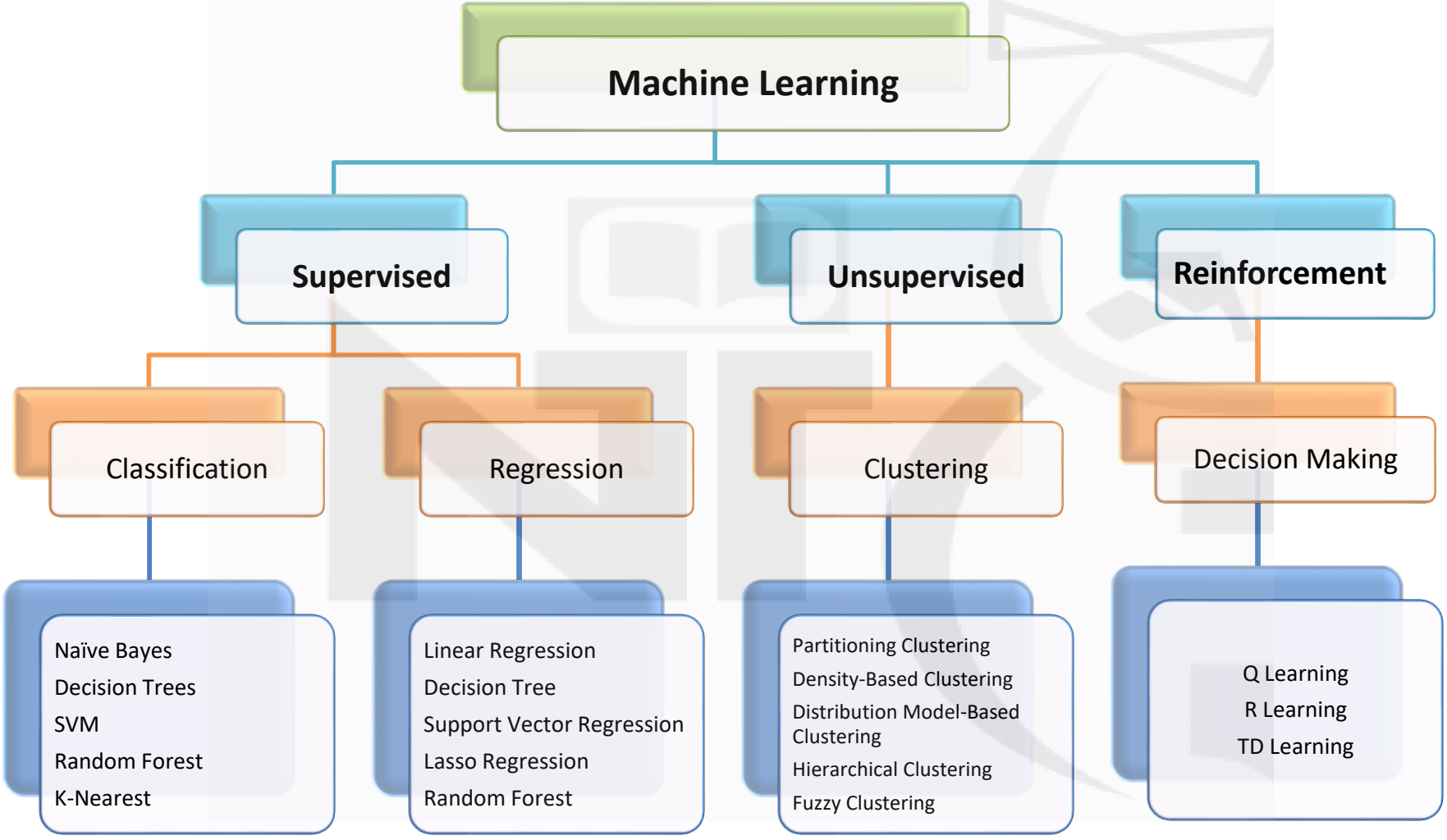
- Machine Learning (ML) is a subset of artificial intelligence (AI) that focuses on building systems that can learn from and make decisions or predictions based on data.

- Instead of being explicitly programmed to perform a task, ML models are trained on data to identify patterns and relationships, which they then use to make informed decisions.

- The idea is to enable computers to learn from data, improve over time without human intervention, and make predictions or decisions without being explicitly programmed for specific tasks.



TYPES OF MACHINE LEARNING


Machine Learning
Supervised
Unsupervised
Reinforcement
Classification
Regression
Clustering
Decision Making
Naïve Bayes
Decision Trees
SVM
Random Forest
K-Nearest
Linear Regression
Decision Tree
Support Vector Regression
Lasso Regression
Random Forest
Partitioning Clustering
Density-Based Clustering
Distribution Model-Based Clustering
Hierarchical Clustering
Fuzzy Clustering
Q Learning
R Learning
TD Learning

Supervised Learning

- In supervised learning, the model is trained on a labeled dataset, meaning that each training example is paired with an output label. The model learns to map inputs to the correct outputs and is then tested on new, unseen data

- **Example**: Predicting house prices based on features like size, location, and number of rooms.

- **Common Algorithms**: Linear Regression, Logistic Regression, Decision Trees, Support Vector Machines (SVM), Neural Networks.

Unsupervised Learning

- In unsupervised learning, the model is trained on data without any labeled responses. The goal is to identify underlying structures or patterns in the data.

- **Example**: Clustering customers into different segments based on purchasing behavior.

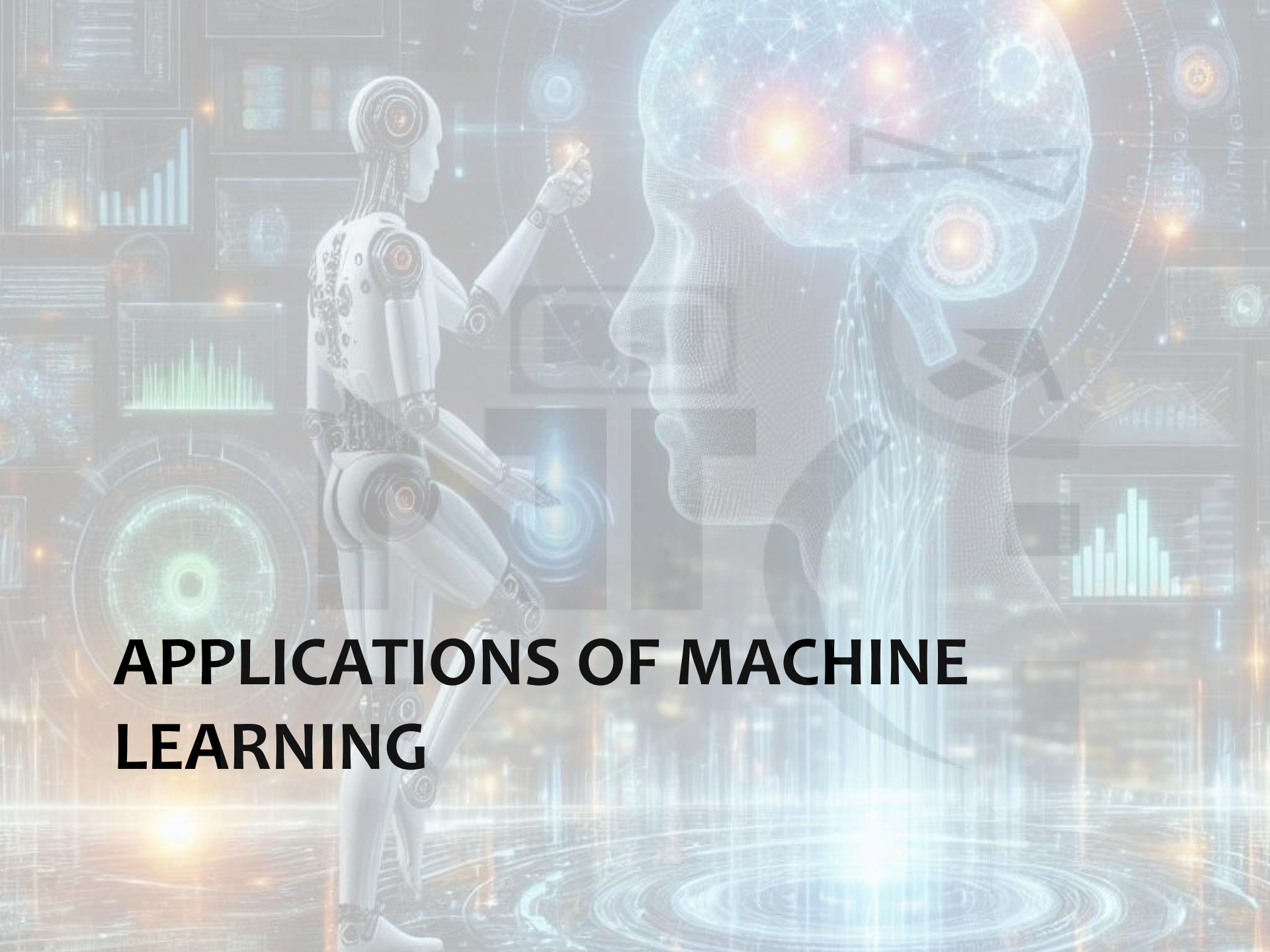
- **Common Algorithms**: k-Means Clustering, Hierarchical Clustering, Principal Component Analysis (PCA), Anomaly Detection.

Reinforcement Learning

- In reinforcement learning, the model (often referred to as an agent) learns to make decisions by taking actions in an environment to maximize cumulative reward. The agent learns through trial and error, receiving feedback in the form of rewards or penalties.

- **Example**: Training a robot to navigate through a maze, or developing a game-playing AI that learns strategies over time.

- **Common Algorithms**: Q-Learning, Deep Q-Networks (DQN), Policy Gradient Methods.



APPLICATIONS OF MACHINE LEARNING

Healthcare

- **Predictive Analytics**: Predicting patient outcomes, disease diagnosis (e.g., cancer detection).
- **Personalized Medicine**: Tailoring treatment plans based on individual patient data.
- **Medical Imaging**: Analyzing images (e.g., X-rays, MRIs) to detect abnormalities.

Finance

- **Algorithmic Trading**: Using historical data to predict stock market trends and execute trades.
- **Fraud Detection**: Identifying unusual patterns in transactions that may indicate fraudulent activity.
- **Credit Scoring**: Assessing the risk of lending money to a borrower

Retail

- **Recommendation Systems**: Suggesting products to customers based on their past behavior (e.g., Amazon, Netflix).
- **Customer Segmentation**: Grouping customers based on purchasing behavior to target marketing efforts.
- **Inventory Management**: Predicting demand to optimize stock levels.

Transportation

- **Autonomous Vehicles:** Self-driving cars that learn to navigate and make decisions on the road.
- **Route Optimization:** Finding the most efficient routes for delivery or transportation.

Manufacturing

- **Predictive Maintenance**: Predicting equipment failures before they occur to reduce downtime.
- **Quality Control**: Automatically detecting defects in products using image analysis.