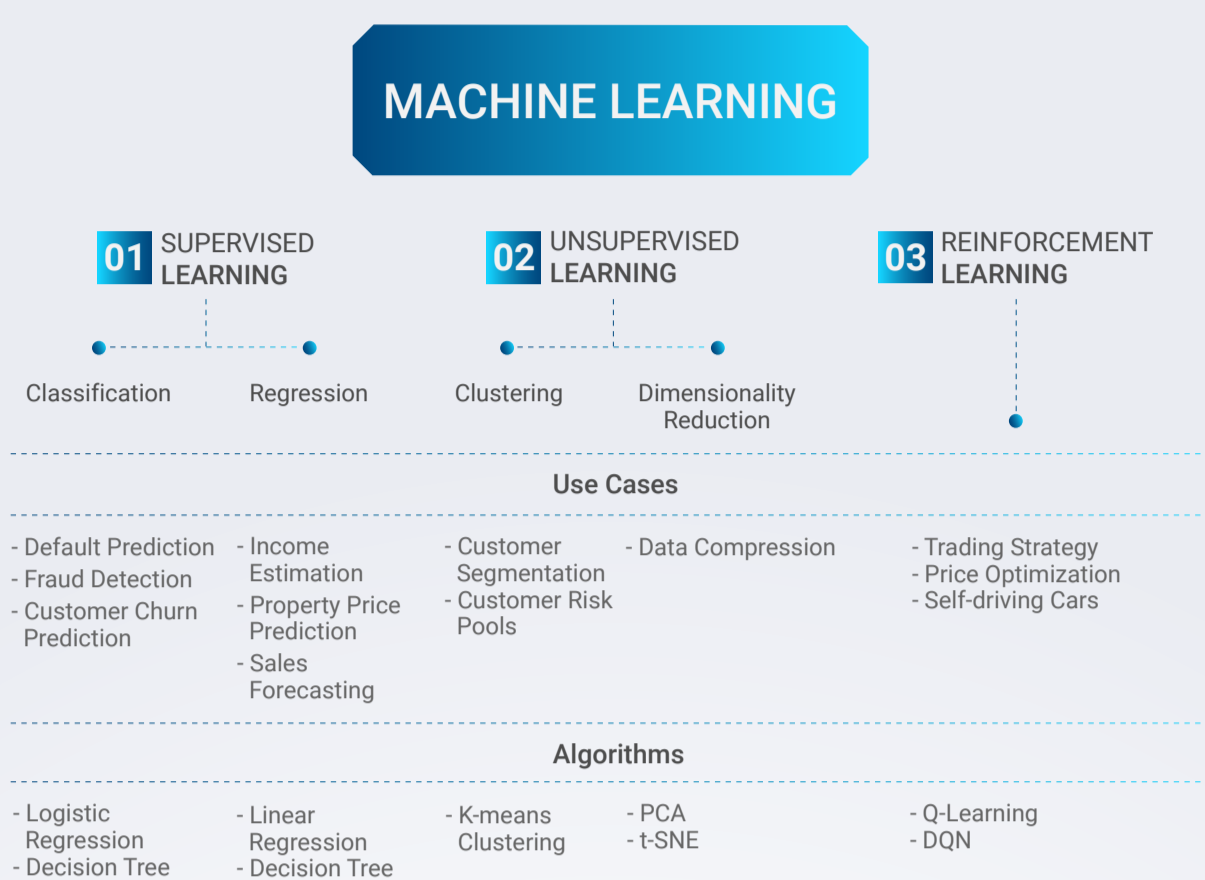Aptivaa

ML and DL Algorithms and Applications

In our previous blog we discussed the meaning of AI and ML and history of AI. Let's dive deeper and understand how these algorithms can lead to business benefits. Machine Learning algorithms can be divided into three broad categories:

MACHINE LEARNING

01 SUPERVISED LEARNING	02 UNSUPERVISED LEARNING	03 REINFORCEMENT LEARNING
Classification Regression	Clustering Dimensionality Reduction	

Use Cases

- Default Prediction - Fraud Detection - Customer Churn Prediction	- Income Estimation - Property Price Prediction - Sales Forecasting	- Customer Segmentation - Customer Risk Pools - Data Compression	- Trading Strategy - Price Optimization - Self-driving Cars

Algorithms

- Logistic Regression - Decision Tree	- Linear Regression - Decision Tree	- K-means Clustering - PCA - t-SNE	- Q-Learning - DQN

Supervised Learning:

Algorithm learns from a training data that contains human-supplied labels (such as good/bad, fraud/non-fraud, high-risk/ medium-risk/low-risk) for different observations.
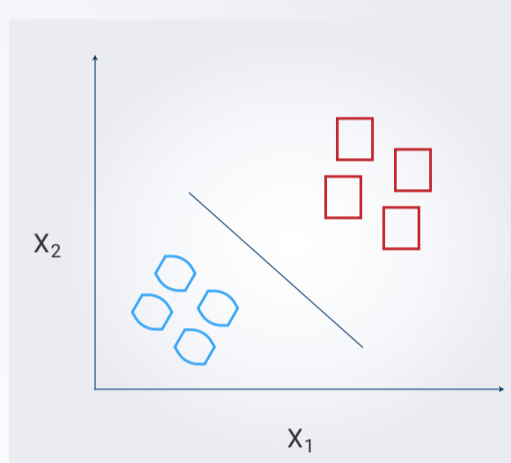
Classification:
The algorithm learns by identifying patterns that describe each label such as data pattern that distinguish fraudulent vs. non-fraudulent transactions. Common algorithms used for classification problems are Logistic Regression, Random Forest, Boosted Trees, ANN etc. Some of the questions that classification algorithms answer are:

classification of ML algorithm

- How can I identify potentially bad customers vs. good customers?
- Which of my customers are expected to churn?

Regression: The algorithm learns to predict value of a variable of interest (such as house prices) based on other variables (such as geography, area etc.). Common algorithms used include Linear Regression, Random Forest, Boosted Trees, ANN. Some of the questions that regression algorithms answer are:

- How do I estimate customer income for deciding if to lend and how much?
- What is my customer's expected lifetime value?
- How much can I recover from a defaulted loan?

Unsupervised Learning:

Algorithm learns from dataset that does not contain any label and predicts on basis of commonality of new observation w.r.t. existing pattern. Following are some of the applications of unsupervised learning algorithms:

- How do I segment my customers into separate groups for lending, marketing and portfolio management?
- How do I detect potentially anomalous or fraudulent applications?
- How do I detect potentially money laundering transactions?
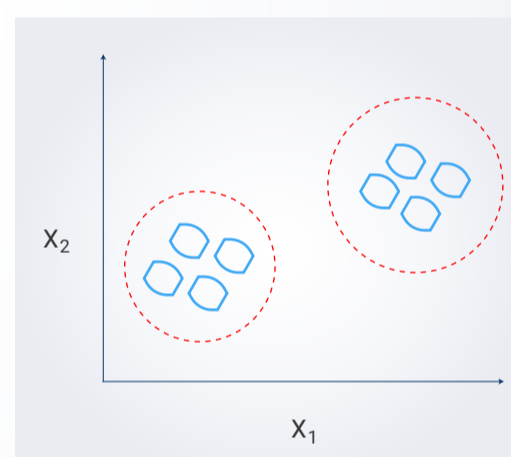
classification of ML algorithm

Reinforcement Learning:

Algorithm learns by trying to maximize reward it receives for its correct actions.

- Optimizing trading strategy

classification of ML algorithm

Deep Learning algorithm maybe classified as follows:

Artificial Neural Network:

NN to identify patterns in tabular structured data and solve both classification and regression problems. ANN maybe used for both supervised learning (Default prediction, Churn prediction) and unsupervised learning (anomaly detection).

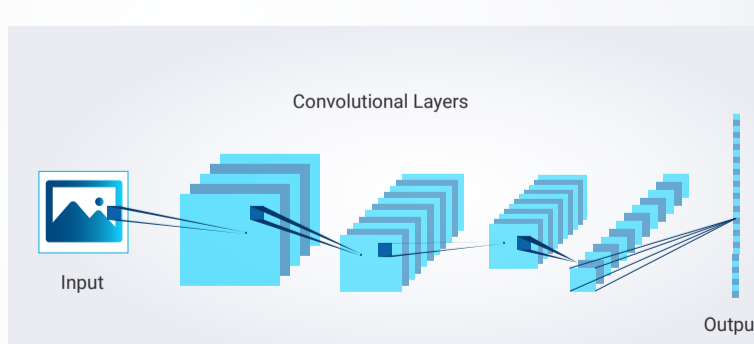Input Nodes   Hidden Nodes   Output Nodes
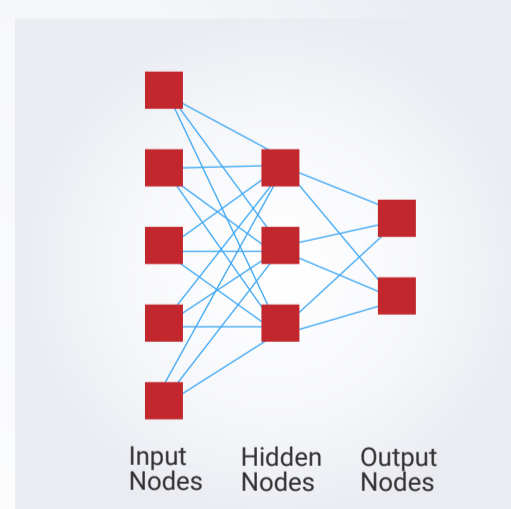
classification of Deep Learning models

Convolutional Neural Networks:

NN to identify patterns in image datasets. Use cases include:

- Face identification and recognition
- Customer KYC and Fraud detection on basis of image data
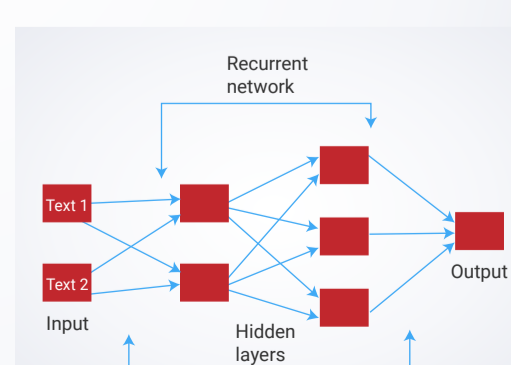- Character recognition from scanned documents such as bank statements

classification of Deep Learning models

Recurrent Neural Networks:

NN to identify patterns and understand natural language data i.e. data in which sequence of information is important. For instance, if we change the sequence of characters in words, it would result in gibberish. Use cases for RNN include:

- Chatbots
- Automated document generation using Natural Language Generation
- Sentiment analysis for tweets about an organization

classification of Deep Learning models