Artificial Intelligence

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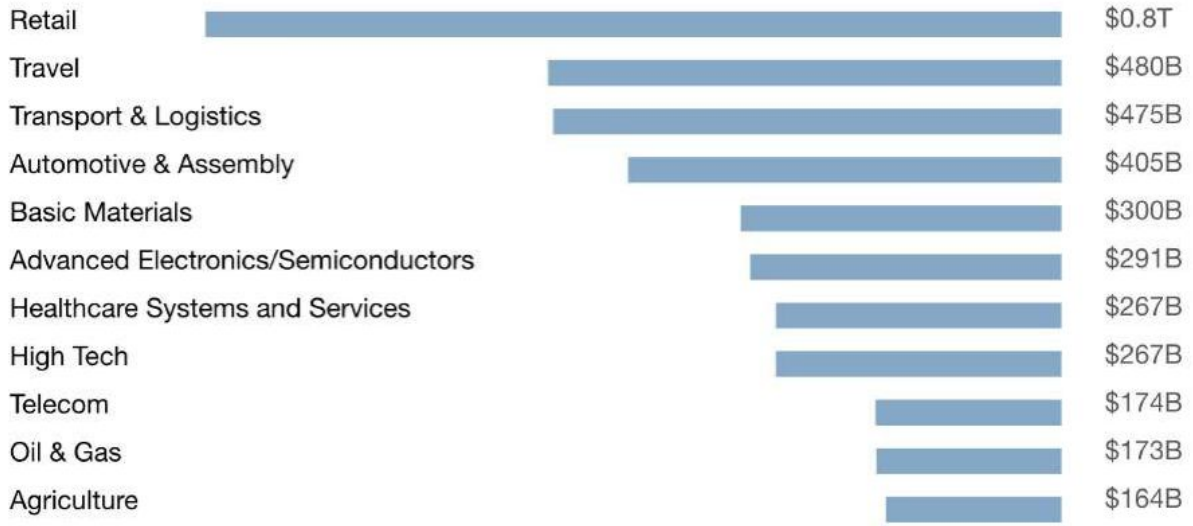
Artificial Intelligence

Artificial Intelligence is the branch of computer science concerned with development of methods that allow computers to learn without explicit programming.

Introduction

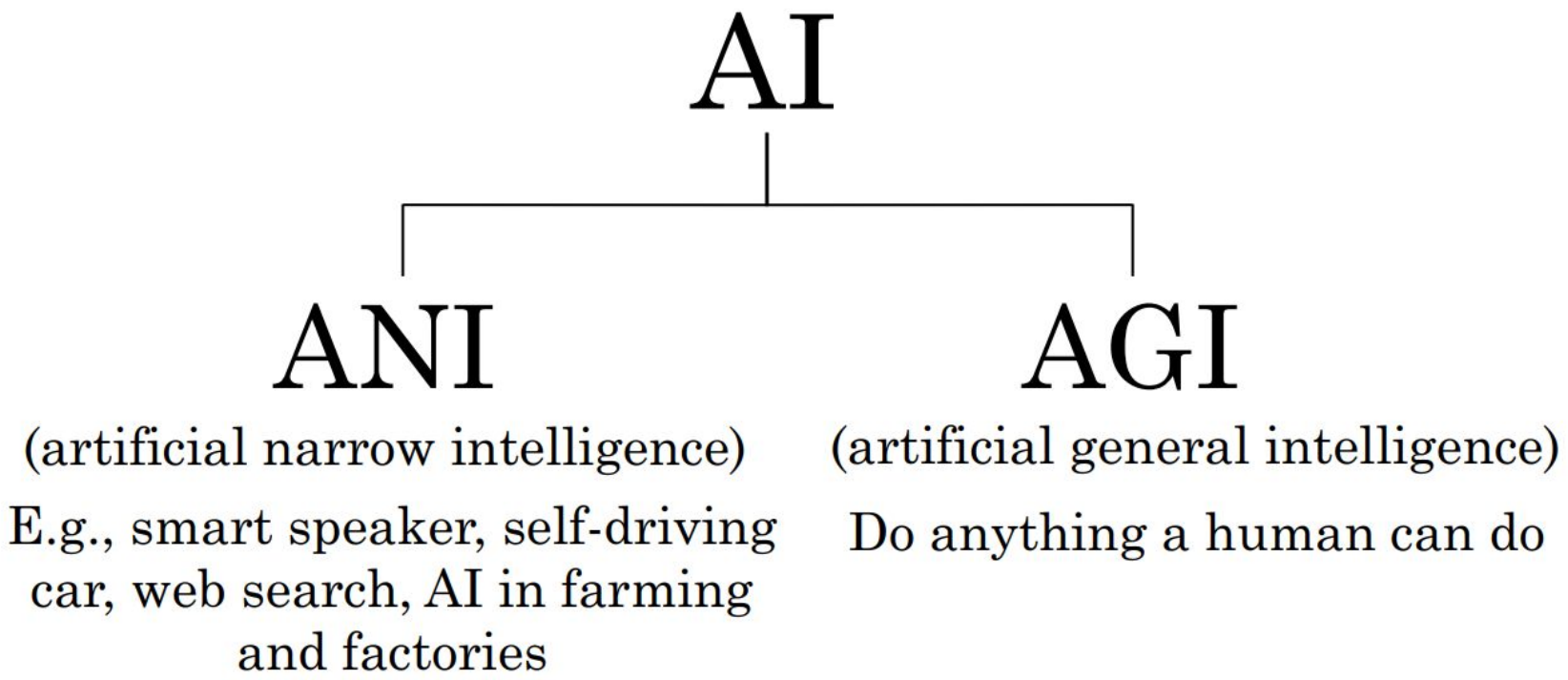
AI value creation by 2030

$13 trillion



Source1: McKinsey Global Institute
Source2: AI for Everyone (Deeplearning.ai)

Demystifying AI

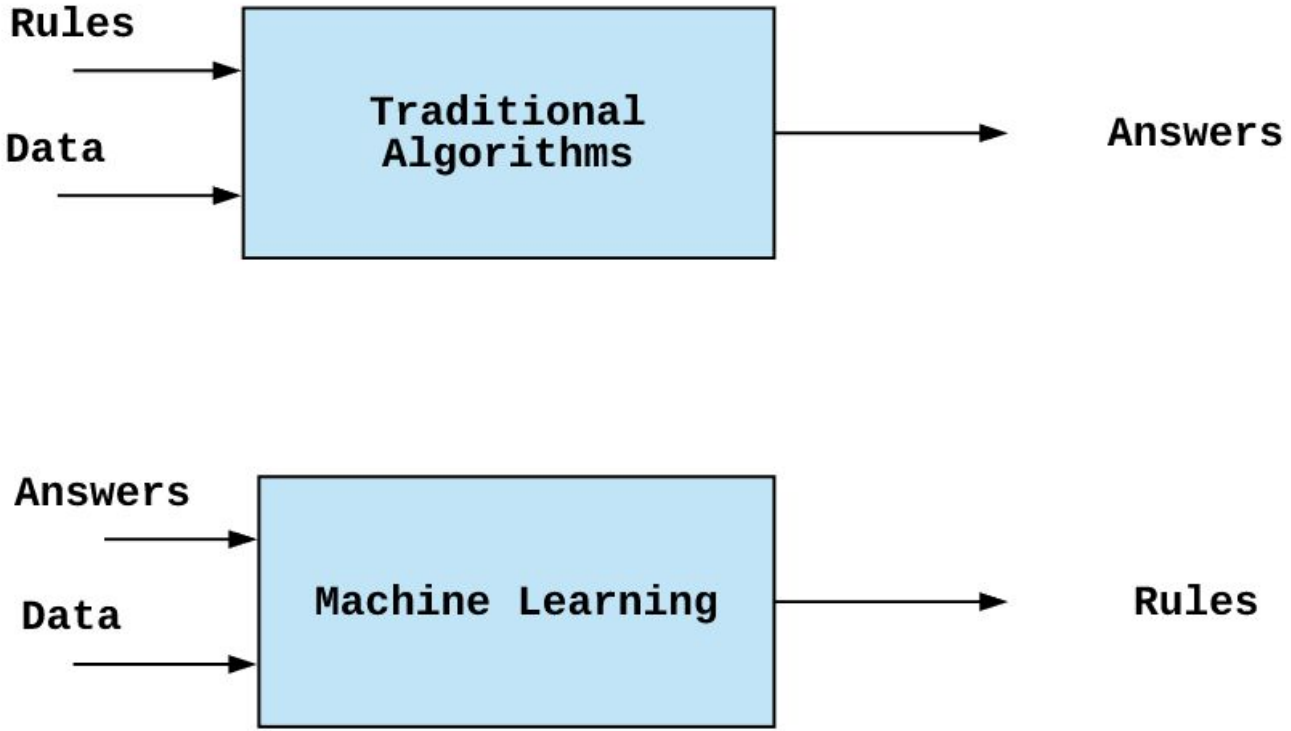


Source: Deeplearning.ai

Most Popular Way to Do AI: Machine Learning

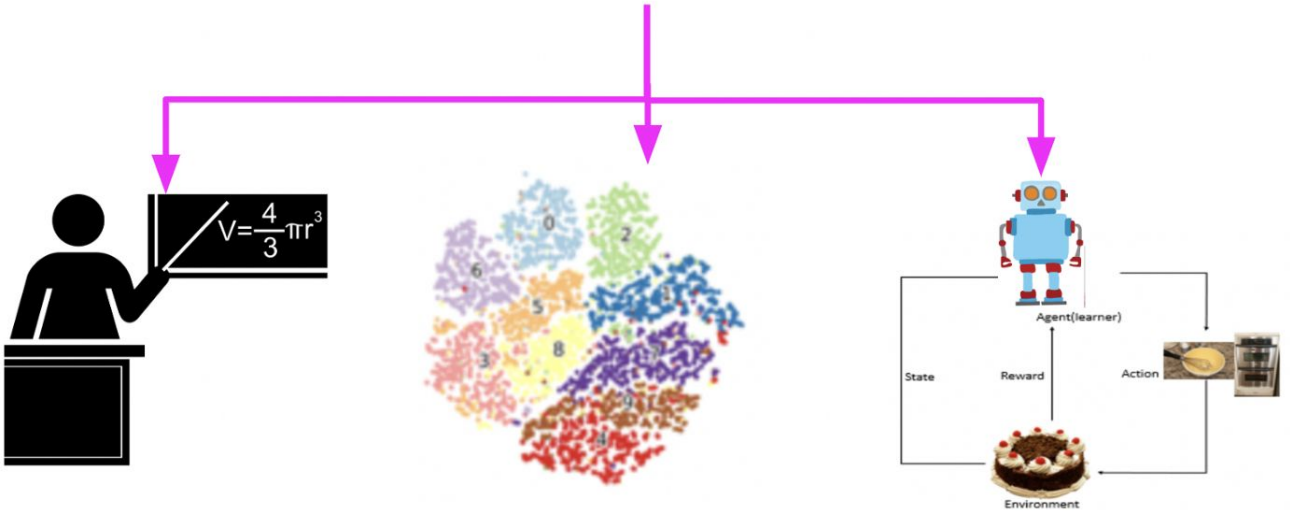
Machine Learning is a branch of AI, which focuses on methods, that can learn from examples and experience instead of relying on hard-coded rules and make predictions on new data.

Difference in ML and Classical AI



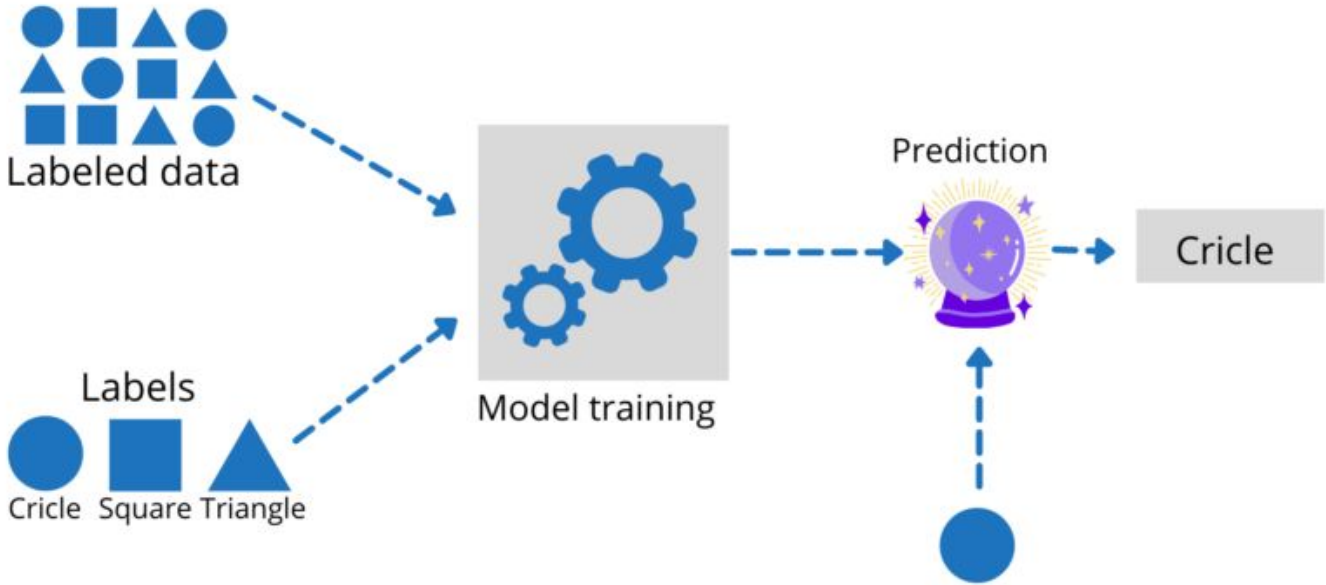
Types of Machine Learning

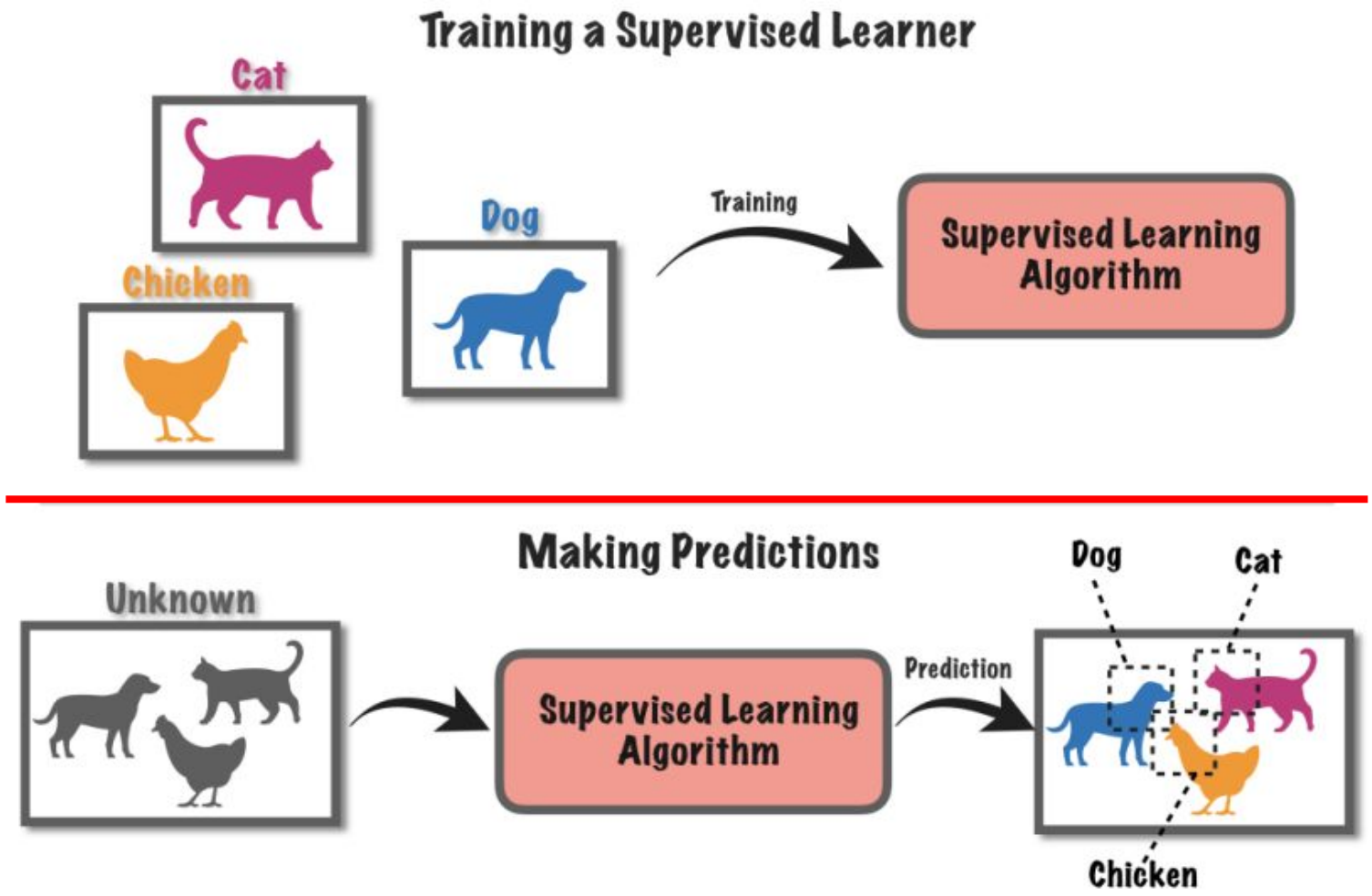
1. Supervised Learning (learning with labeled data)
2. Unsupervised Learning (discover patterns in unlabeled data)
3. Reinforcement learning (learn to act based on feedback/rewards)



Supervised Learning | Unsupervised Learning | Reinforcement Learning

Supervised learning



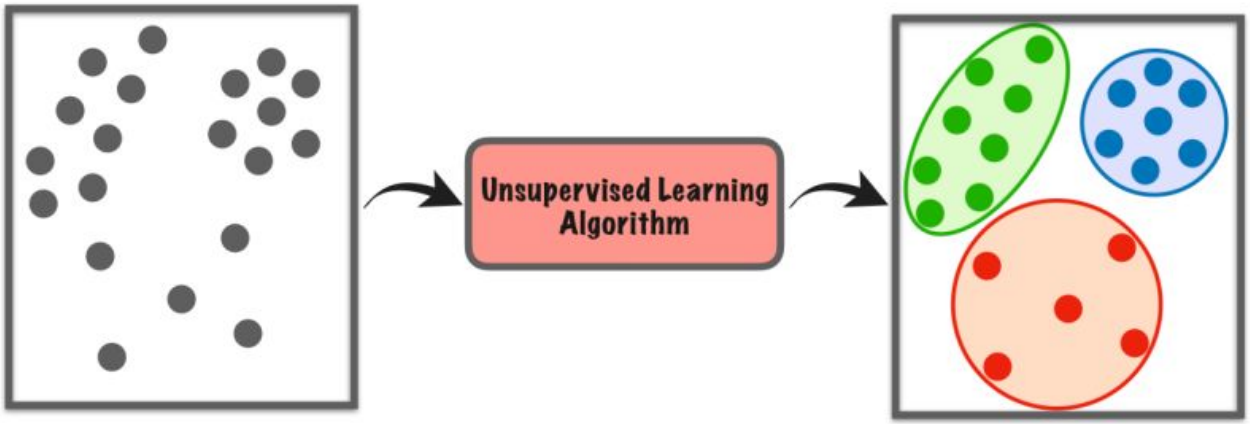

Training a Supervised Learner
Cat
Chicken
Dog
Training
Supervised Learning Algorithm
Making Predictions
Unknown
Supervised Learning Algorithm
Prediction
Dog
Cat
Chicken

Supervised Learning Applications

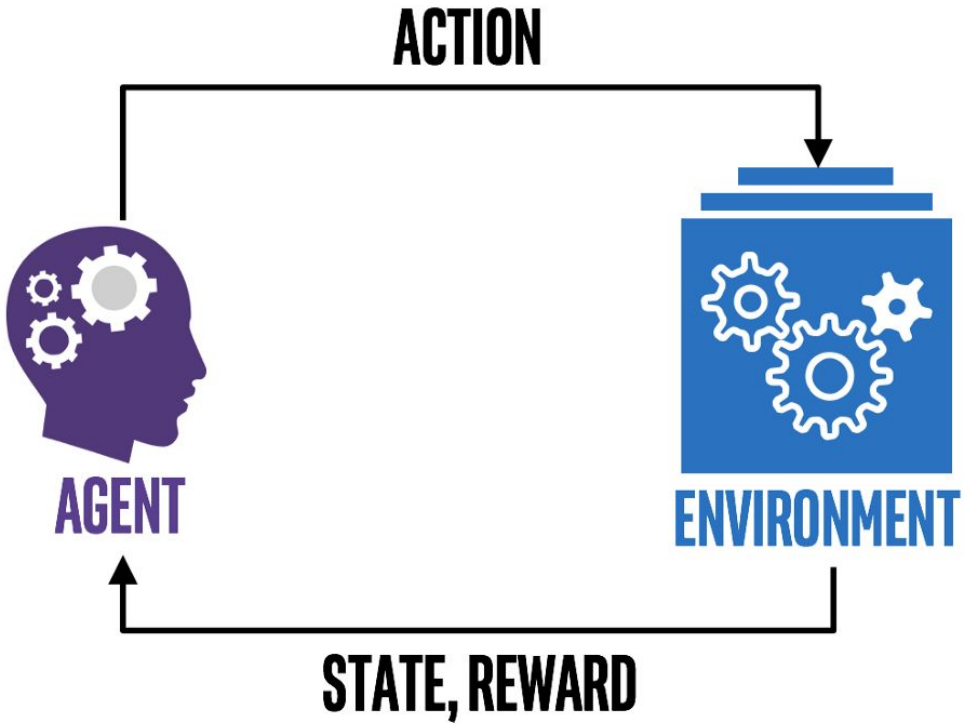
Input (A)	Output (B)	Application
email	spam? (0/1)	spam filtering
audio	text transcripts	speech recognition
English	Chinese	machine translation
ad, user info	click? (0/1)	online advertising
image, radar info	position of other cars	Self-driving car
image of phone	defect? (0/1)	visual inspection

Unsupervised learning

1- Clustering
2- Dimensionality Reduction
3- Anomaly Detection



Reinforcement Learning (Carrot and Stick Learning)



Artificial Intelligence

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Machine Learning

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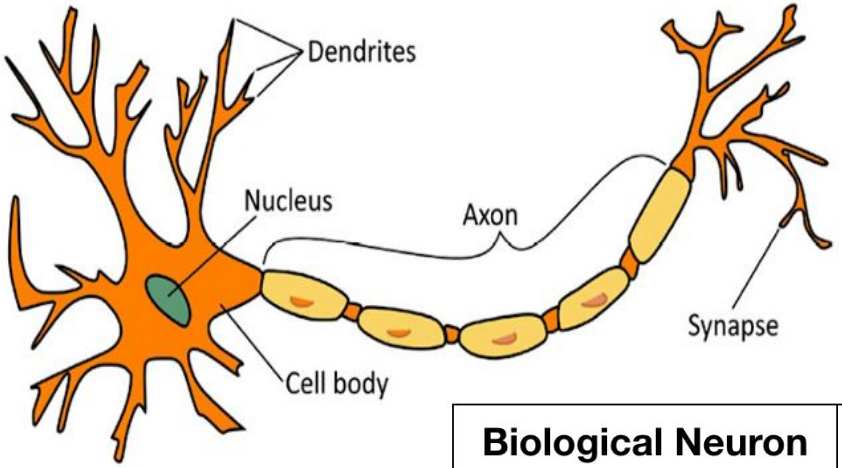
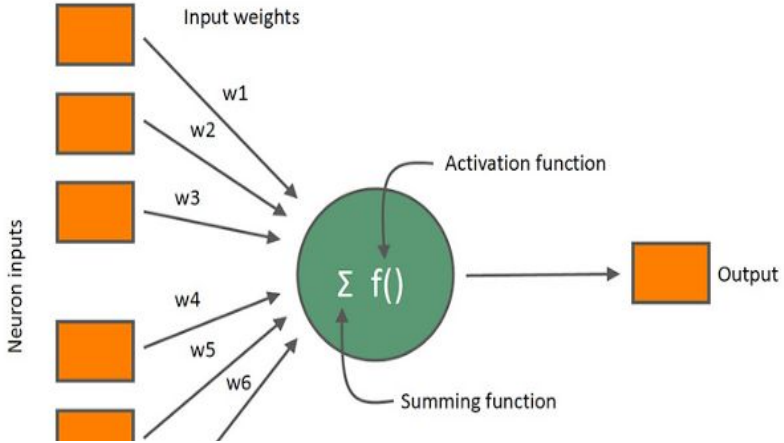
Deep Learning

Subfield of Machine Learning that focuses on Neural Networks (Inspired from Biological neurons) to develop learning models.

Biological Neuron

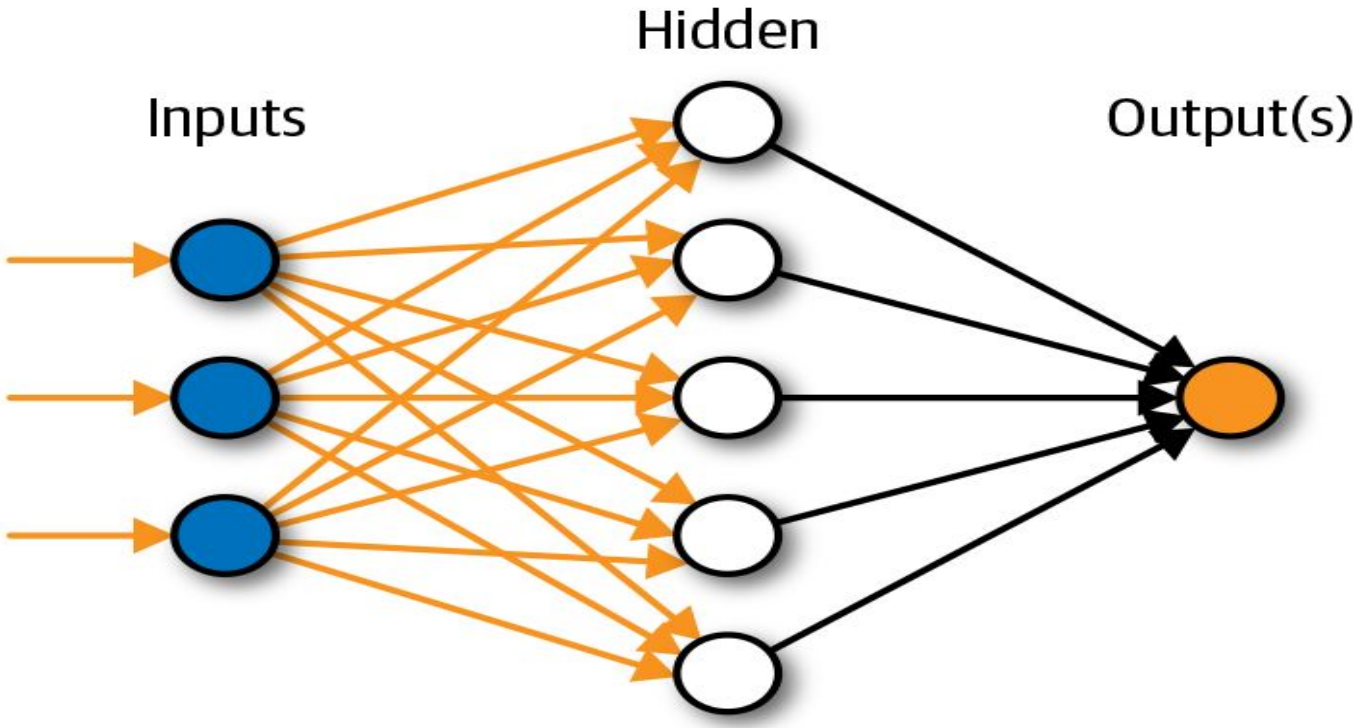


Artificial Neuron

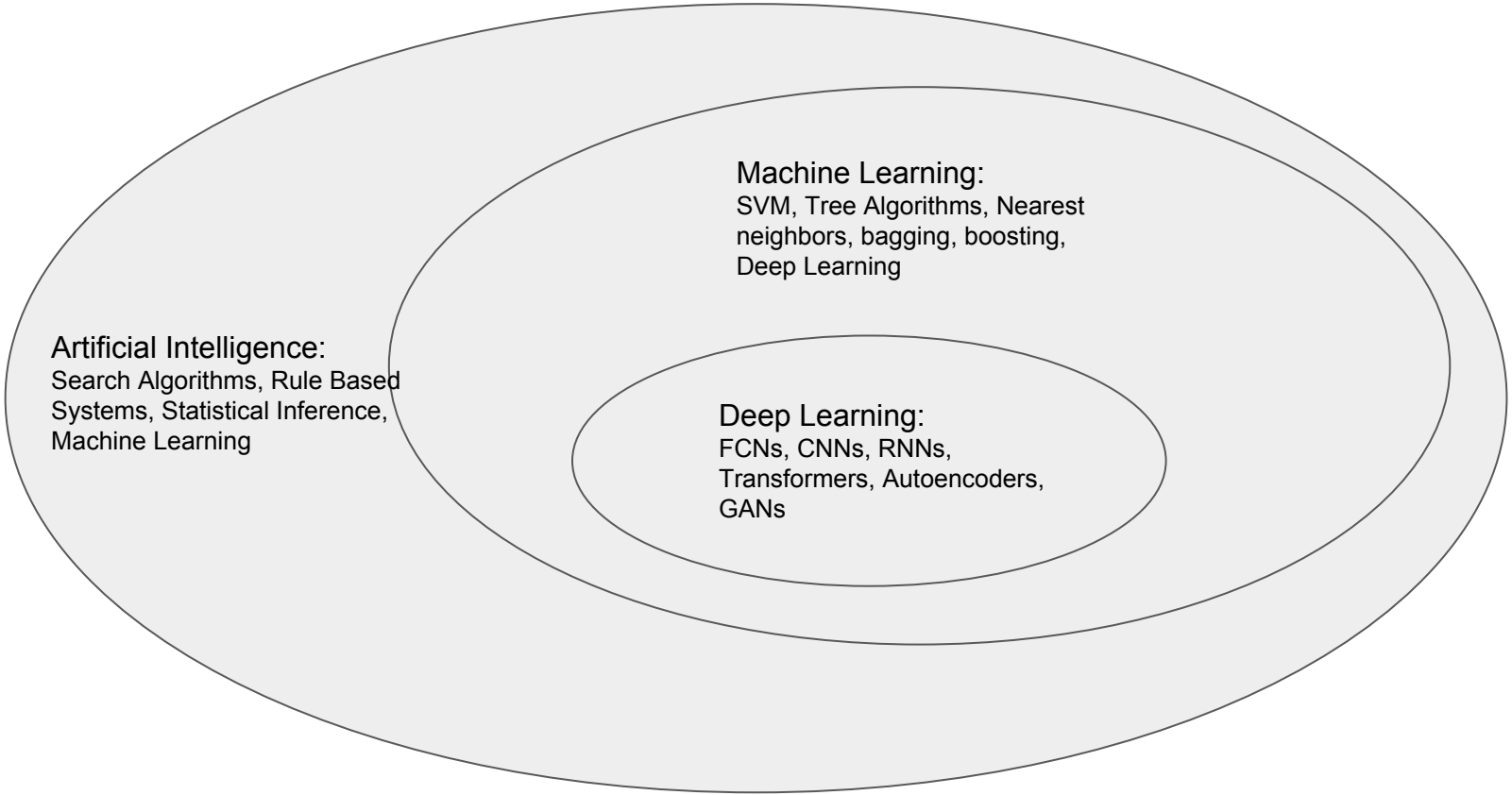


Biological Neuron	Artificial Neuron
Dendrites	Input
Cell Nucleus(Soma)	Node
Axon	Output
Synapse	Interconnections

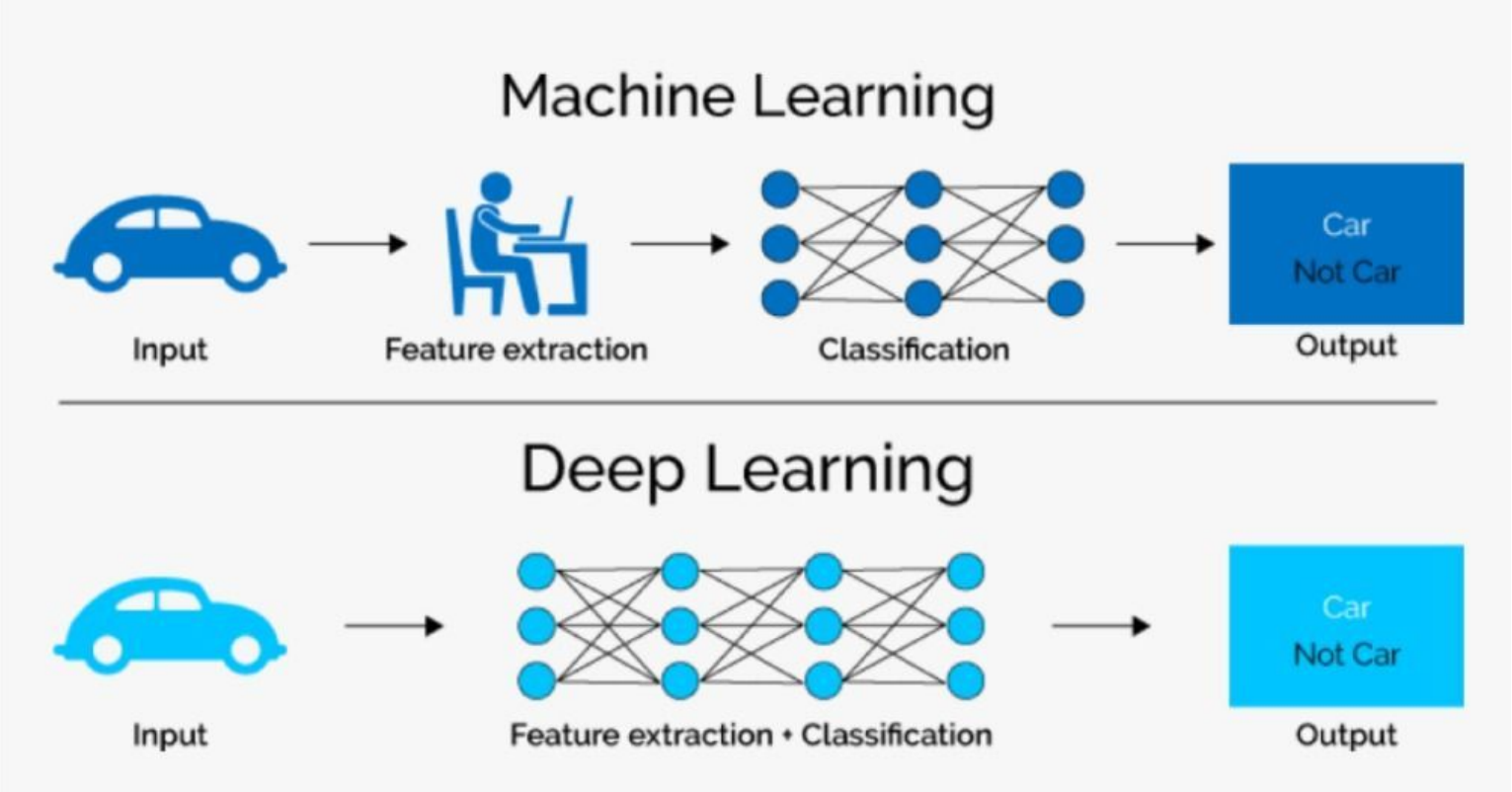
Neural Network



Relationship in AI, ML and DL



ML vs. DL


Machine Learning
Input
Feature extraction
Classification
Car
Not Car
Output
Deep Learning
Input
Feature extraction + Classification
Car
Not Car
Output

Generative AI

1- Text Generation (ChatGPT)

2- Image generation (Dall-E2)

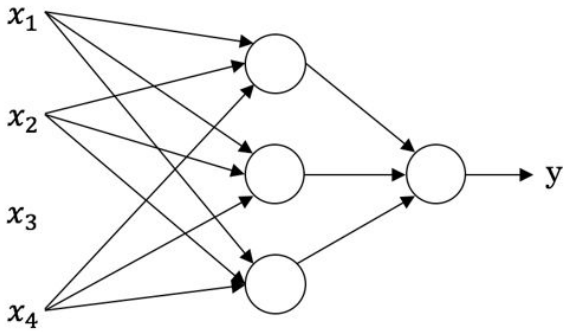
3- Music Generation (Music-LM)

4- Video Generation (RunwayML Gen-2)

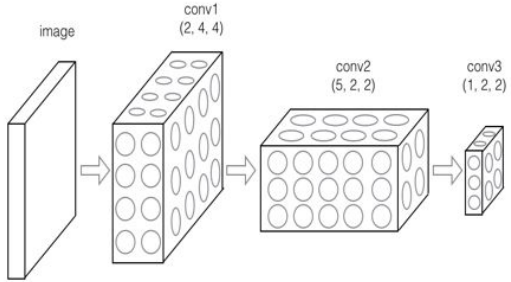
Questions ?

Learning with Neural Networks (Deep Learning)

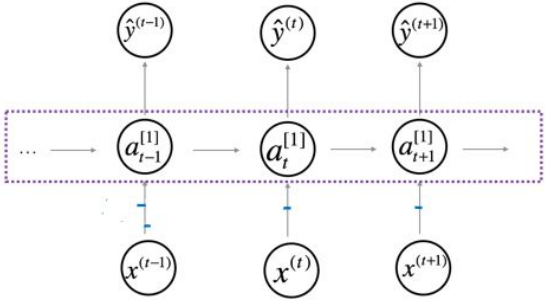
Types of Neural Networks



Standard NN

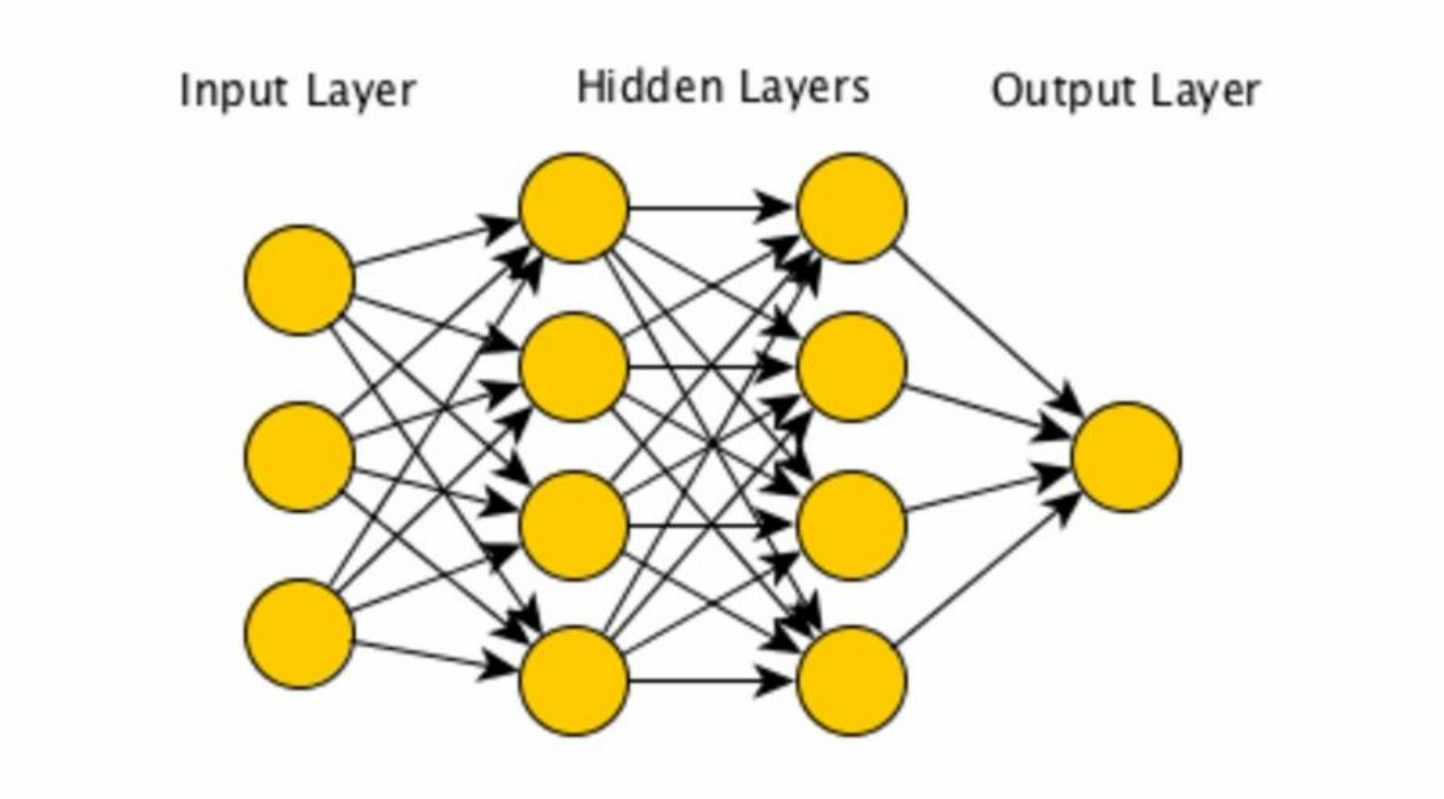


Convolutional NN



Recurrent NN

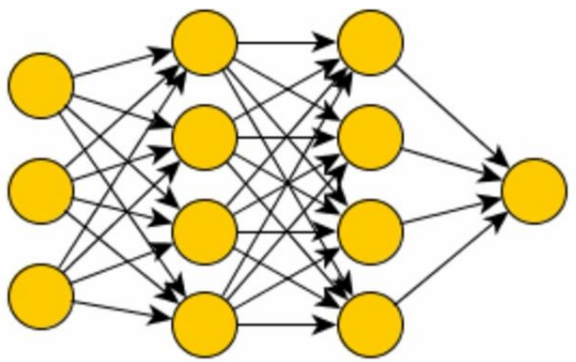
Standard Neural network



Standard Neural Network

Applications include:

1. Classification
2. Regression
3. Representation Learning



Limitations:

1. Computationally Expensive
2. Can not share parameters
3. Feasible for only small Datasets