Artificial Intelligence

Presented By

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Artificial Intelligence is

[Robotic & Machine Control System

(Human Body + Motor Skill)

+

Cognitive Computing

(Human Brain + 5 Senses)

+

Data Science (ML/DL/Neural Network)

(Human Subconscious & Conscious Memory + Wisdom/Intuition/Six Sense)]

Apply on Big Data (5 V's)

(Volume + Velocity + Variety + Veracity + Value)

Domain		Sub Domain	Function
Artifitial Intelligence	Perception	Sensors	Collect & Stream Data
	Recognition	Image Processing & Recognition	Deep Learning (DL)
		Audio Processing & Recognition	
		Text Processing	Optical Character Recognition (OCR)
		Speech Processing & Recognition	Seech to Text
			Natural Language Processing (NLP)
	Memory	Long Term Memory	
		Short Term Memory	
Cognitive Computing	Machine Learning	Model Improvement & Generalization	Supervised Learning	Classification
				Regression
				Time Series Analysis
			Unsupervised Learning	Clustering
				Association Rules
				Sequential Pattern Mining
				Deep Learning (DL)
			Reinforcement Learning	Reinforcement Learning
	Retrieval	Search Algorithms	
	Decisioning	Rules	
		Optimization	Simplex
			Gradient Descent
	Responding	Complex Event Processing	
		Recommendation Engine	
		Natural Language Processing (NLP)	
	Interaction	Robotics	Machine Control Systems

Various Components of Artificial Intelligence?

MEMORY
- Long Term Data Storage
- Short Term Data Cache

RECOGNITION
- Image Processing & Recognition
- Audio Processing & Recognition
- Text Processing
- Speech Processing & Recognition

MACHINE LEARNING

Machine Learning is the development of algorithms that learn from given data.

- Supervised Learning

Algorithm is trained using past examples of targeted outcomes

- Unsupervised Learning

Algorithm finds patterns in data with no specific outcome

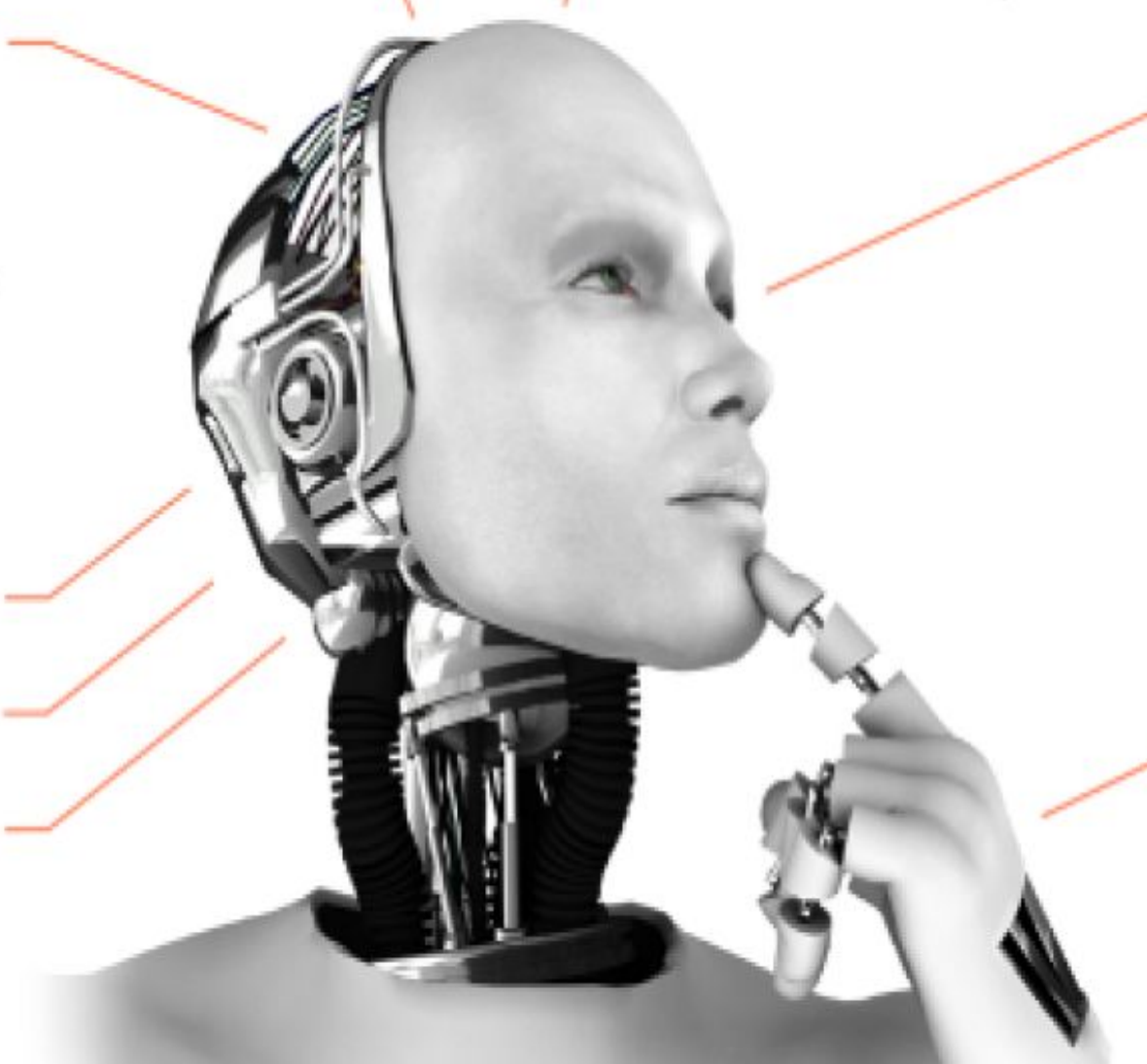
- Reinforcement Learning

Algorithm learns optimal patterns based on rewards for desired outcomes

RETRIEVAL
- Search Algorithms

DECISIONING
- Rules
- Optimization

RESPONSE
- Complex Event Processing
- Recommendation Engine
- Natural Language Generation



PERCEPTION

Seeing
- Cameras
- Scanners
- Digital Images

Hearing
- Microphones
- Digital Recordings

Feeling (Sensors)
- Temperature
- Vibration
- Location
- Orientation
- Motion

INTERACTION
- Robotics
- Machine Control Systems

Various Components of Artificial Intelligence in Real World?

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- Short Term Data Cache

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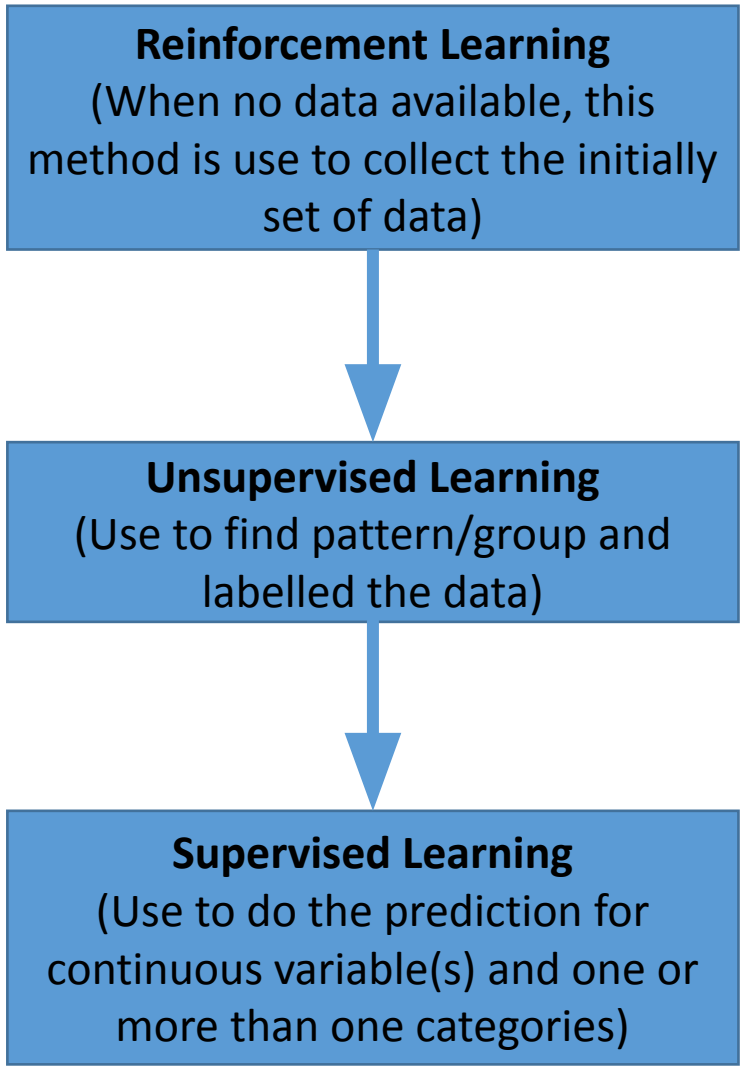
The Major Machine Learning/Deep Learning Algorithms Mind Map

Machine Learning/Deep Learning Workflow

Every machine learning workflow begins with these questions:

1. Do we have data set to execute the algorithm?
   {e.g. Reinforcement Learning}
2. Are the data labelled?
   {e.g. Unsupervised Learning}
3. What insights do you want to get from it?
   {e.g. predicting future values or categories (i.e. absolute or categorical) or finding pattern in the data}
4. What kind of data are you working with?
   {e.g. Continuous variable or Discrete variable}
5. How many categories you want to predict?
   {e.g. One Category, Two-class (two categories) or Multi-class classification (more than two categories}
6. How and where will those insights be applied?
   {e.g. Regression & Classification (predicting a disease, predicting fraud, predicting future sales, predicting expected machine breakdown) or Clustering (find hidden pattern, creating affinity groups etc.)

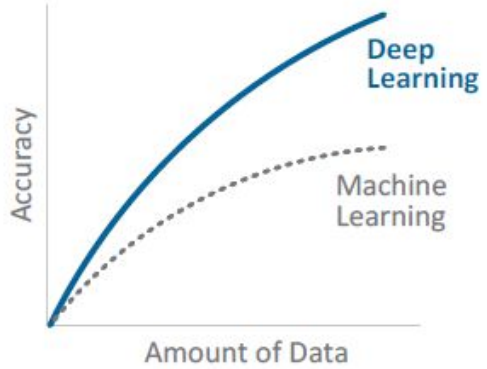
Answers to these questions will help us to decide whether to use supervised, unsupervised or reinforcement learning methods.



Why Deep Learning?

Traditional machine learning is generally composed of three steps:

1) Collection of raw data.
2) Architect feature extraction.
3) Program classifier/ detectors.



E.g. in life science domain, domain specific experts work to improve feature extraction and classification, and life science/medical experts add insights to develop the best algorithm.

But in deep learning, however, the neural network combines these steps without human intervention. This has radical and profound implications for the future of computer programming.

A number of deep learning algorithms have been developed and trained within days and weeks that outperform specialty programs developed over years. Most importantly, the deep learning algorithms were created by deep learning experts that did not have insight into the specific domain in question. For example, a deep learning algorithm designed to spot signatures of subatomic particles performed better than software written by physicists.

Definitions of Deep Learning

With a complex topic such as deep learning, it may be helpful to review several definitions:

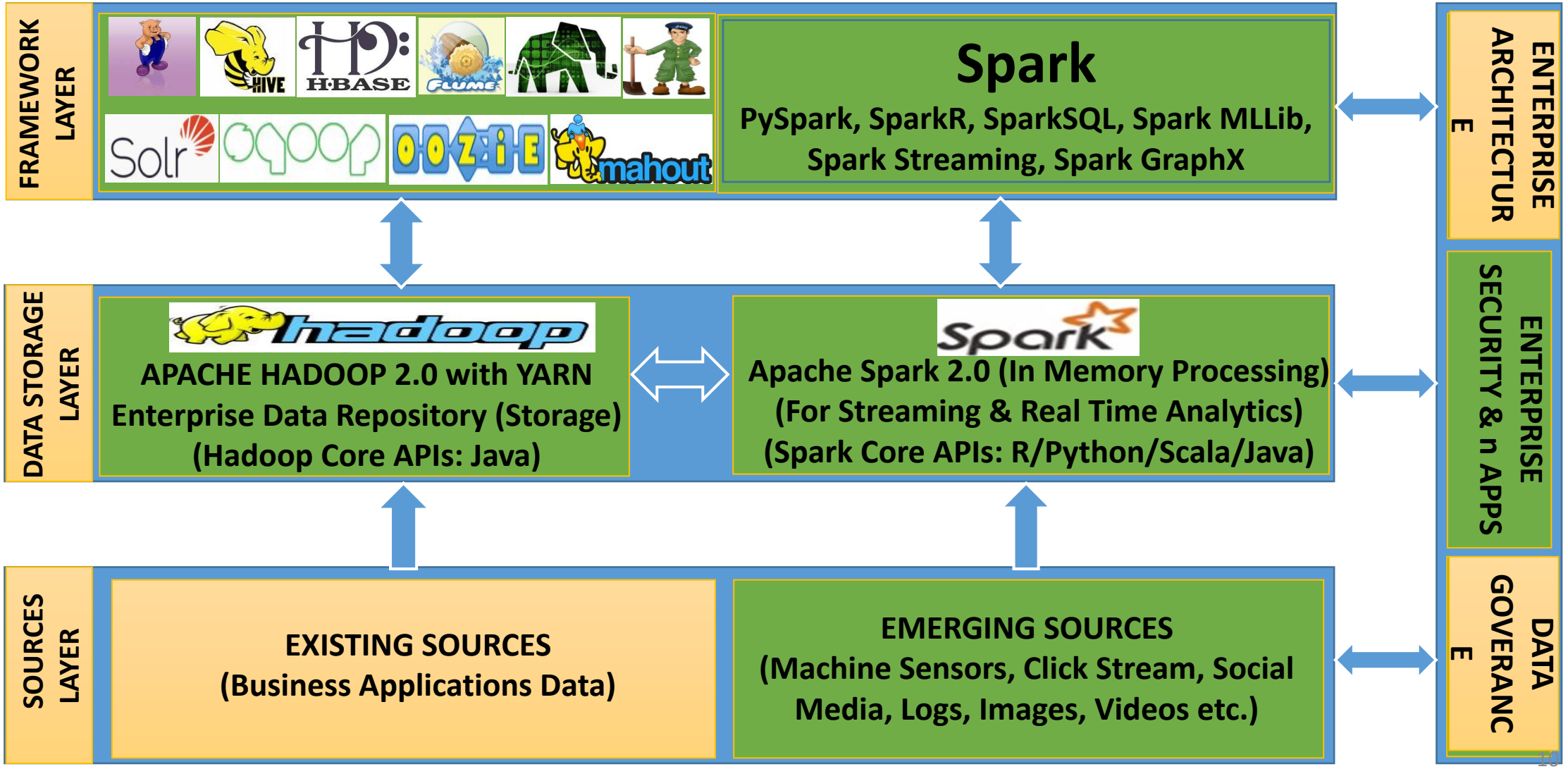
Definition 1: A class of machine learning techniques that exploit many layers of non-linear information processing for supervised or unsupervised feature extraction and transformation, and for pattern analysis and classification.

Definition 2: Deep learning is a set of algorithms in machine learning that attempt to learn in multiple levels, corresponding to different levels of abstraction. It typically uses artificial neural networks. The levels in these learned statistical models correspond to distinct levels of concepts, where higher-level concepts are defined from lower-level ones, and the same lower-level concepts can help to define many higher-level concepts.

Definition 3: Deep Learning is a new area of Machine Learning research, which has been introduced with the objective of moving Machine Learning closer to one of its original goals: Artificial Intelligence. Deep Learning is about learning multiple levels of representation and abstraction that help to make sense of data such as images, sound, and text.

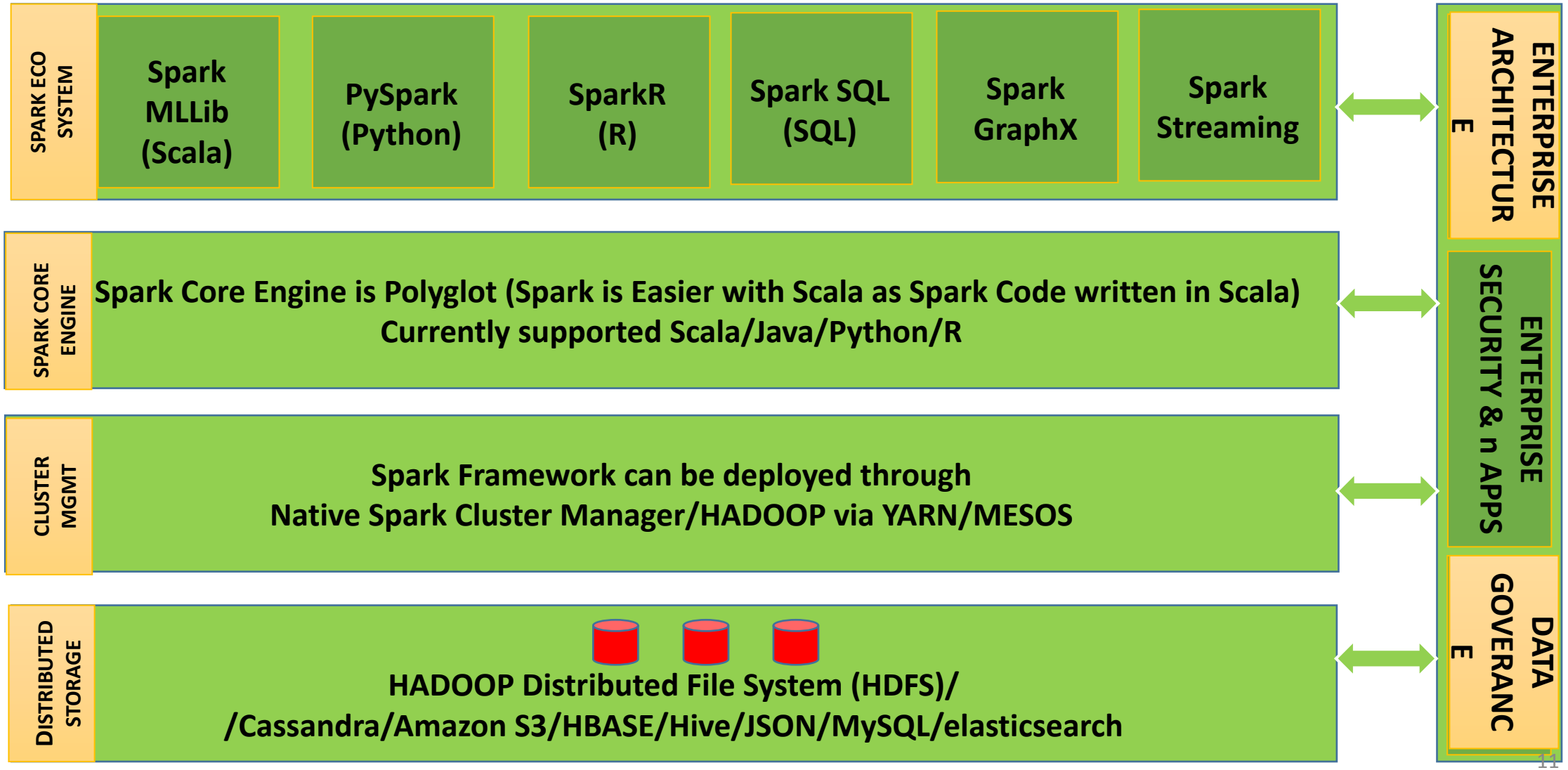
Scaling of AI System for Big Data Crunching (Architecture)

(For In Memory Processing & Real Time Analytics By using Apache Spark & Hadoop)

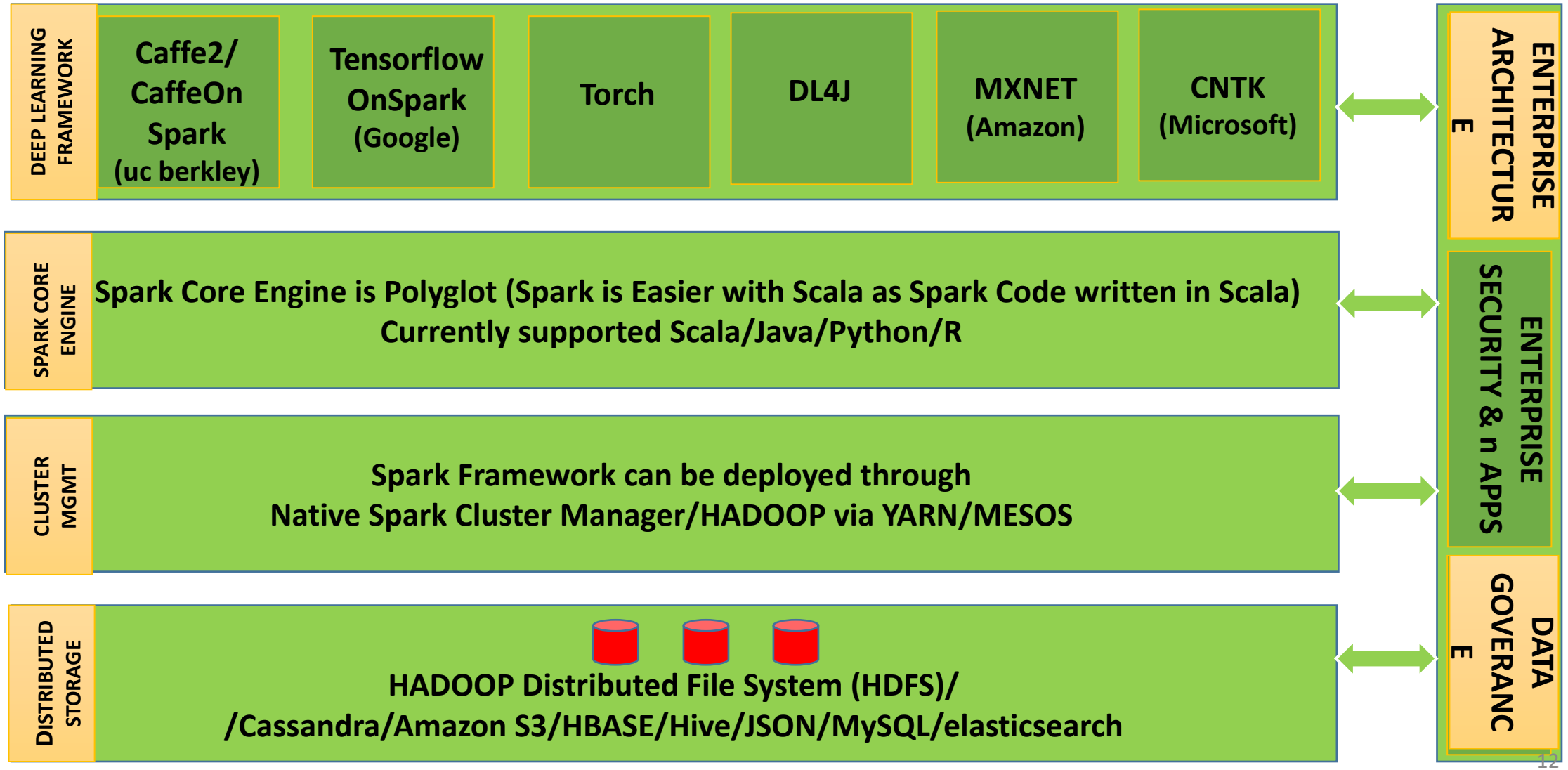


Machine Learning (Spark Framework) / Architecture

(For In Memory Processing & Real Time Analytics By using Apache Spark & Hadoop)



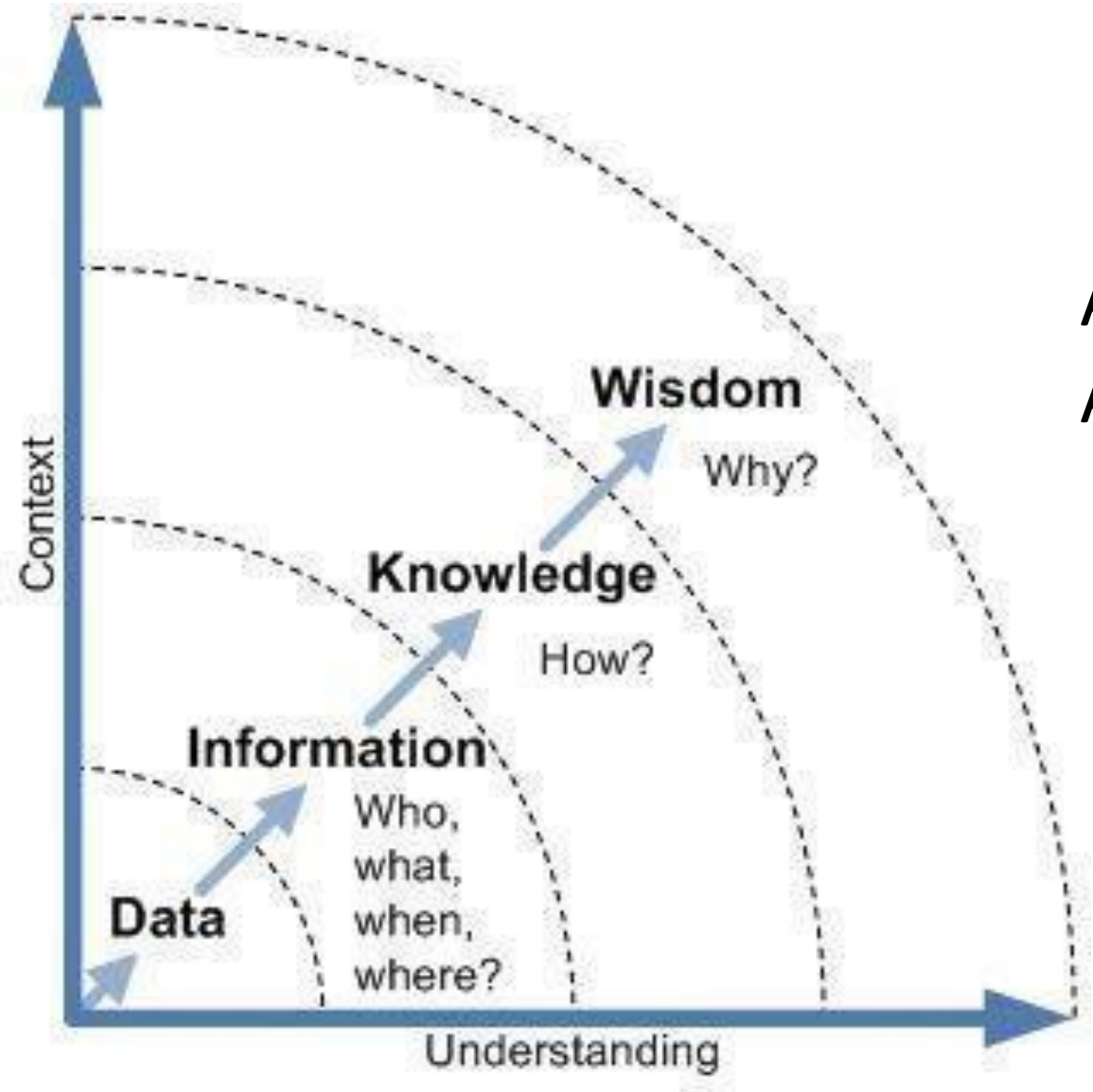
Deep Learning Framework / Architecture



Drivers for Data Science & AI Use Cases Implementation

1. Automation & Robotics.
2. Optimization (Accuracy, Speed & Agility).
3. More Accurate Business Insights.
4. Understand Customer from depth (360 Degree View).
5. Predict behavior of any entity.
6. Improve business performance/practice/process.
7. Completive differentiation identification of an organization.
8. To drive operational efficiency.
9. Faster response to business changes.
10. Identify risk and/or reduce fraud.
11. Monetize from analytics (ROI).
12. Development of new data driven applications.

Expectations from Data Science & Artificial Intelligence?



Artificial Wisdom or
Artificial Human Intelligence

Thank you!