Introduction of Deep Learning
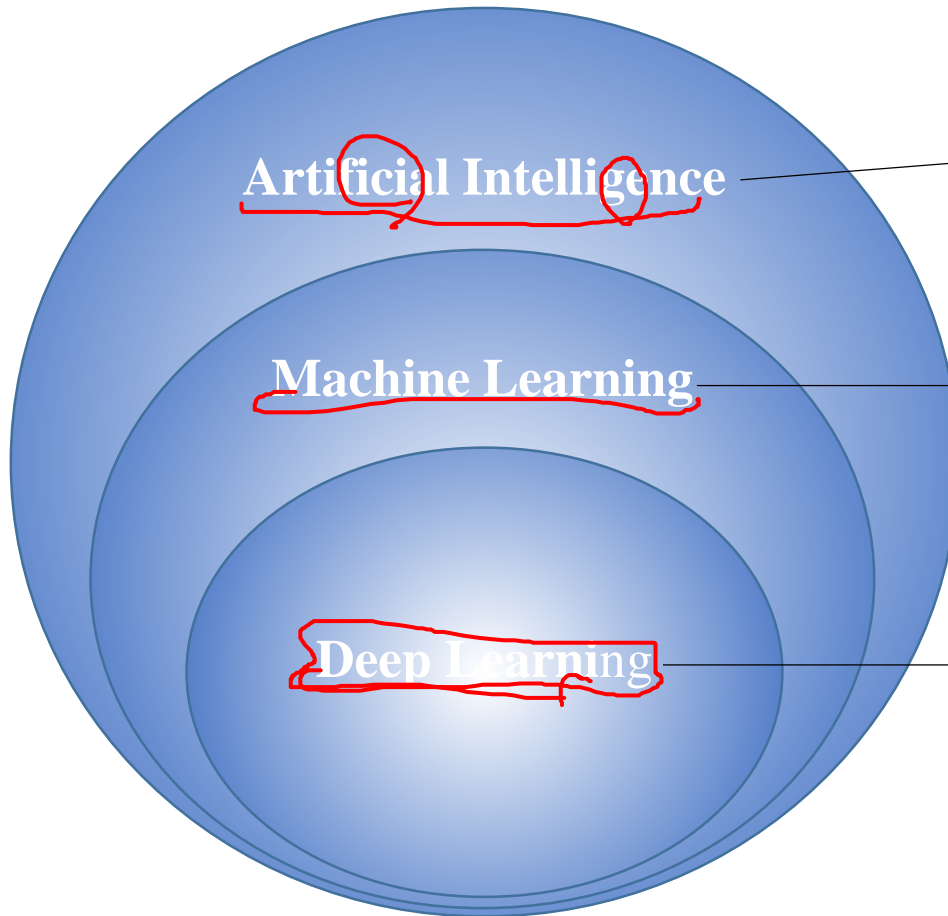# Deep Neural Network

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Deep Learning

Artificial Intelligence

Machine Learning

Deep Learning
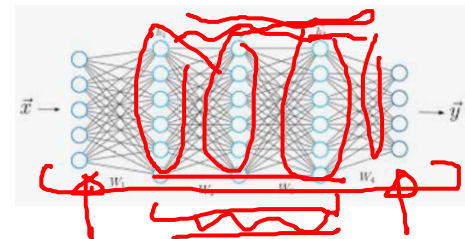
Artificial Intelligence
A technique which enables machine to mimic human behavior

Machine Learning
Subset of AI technique which use statistical methods to enable machine to improve with experience

Deep Learning
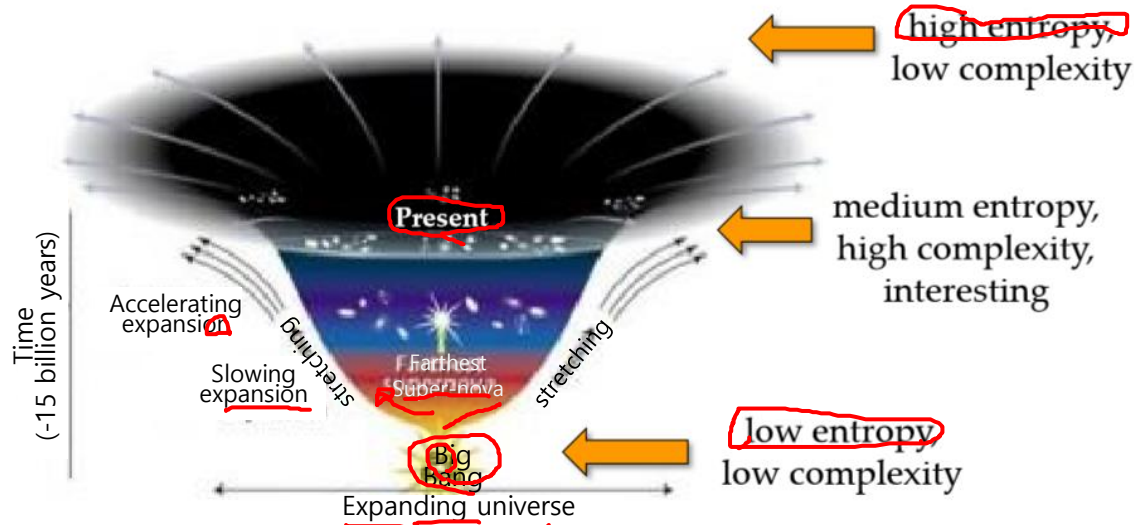Subset of ML which make the computation of multi-layer neural network feasible

Term of Deep Learning

- Deep learning is
  - a class of machine learning algorithms that uses multiple layers to progressively extract higher level features from the raw input.
  - For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces.

- The term *Deep Learning* was introduced
  - to the machine learning community by Rina Dechter in 1986,
  - and to artificial neural networks by Igor **Aizenberg** and colleagues in 2000, in the context of Boolean threshold neurons.
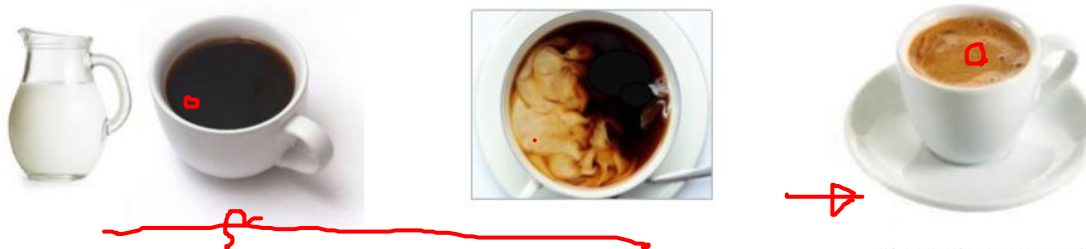
Deep Learning의 잠재력과 Bing Bang 이론

High-Level Analogy with Astrophysics and Coffee

high entropy,
low complexity

medium entropy,
high complexity,
interesting

low entropy
low complexity

Present

Time
(~15 billion years)

Accelerating
expansion

Slowing
expansion

stretching

Farthest
Super-nova

stretching

Big
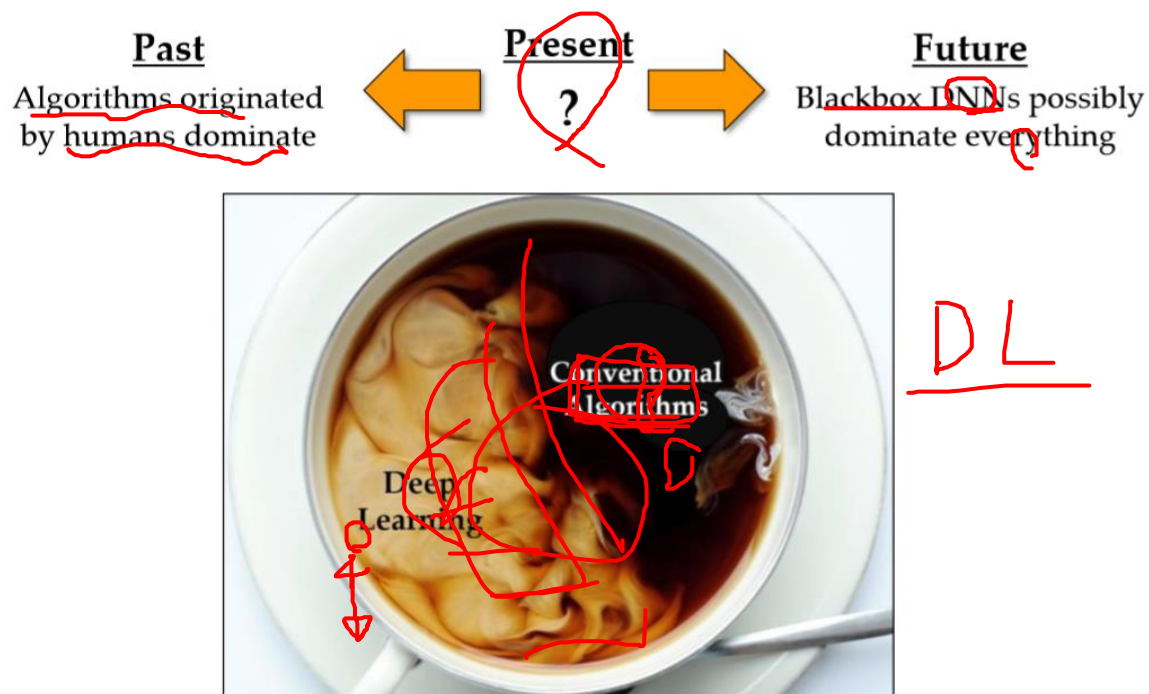Bang

Expanding universe

Likewise for coffee:

[based on Sean Carroll lecture]

Similar for iterative algorithms and DNN?

Replacing/Enhancing Iterative Algorithms with Neural Networks, Dadiv Wipf, Microsoft Research Beijing, ICASSP 2018
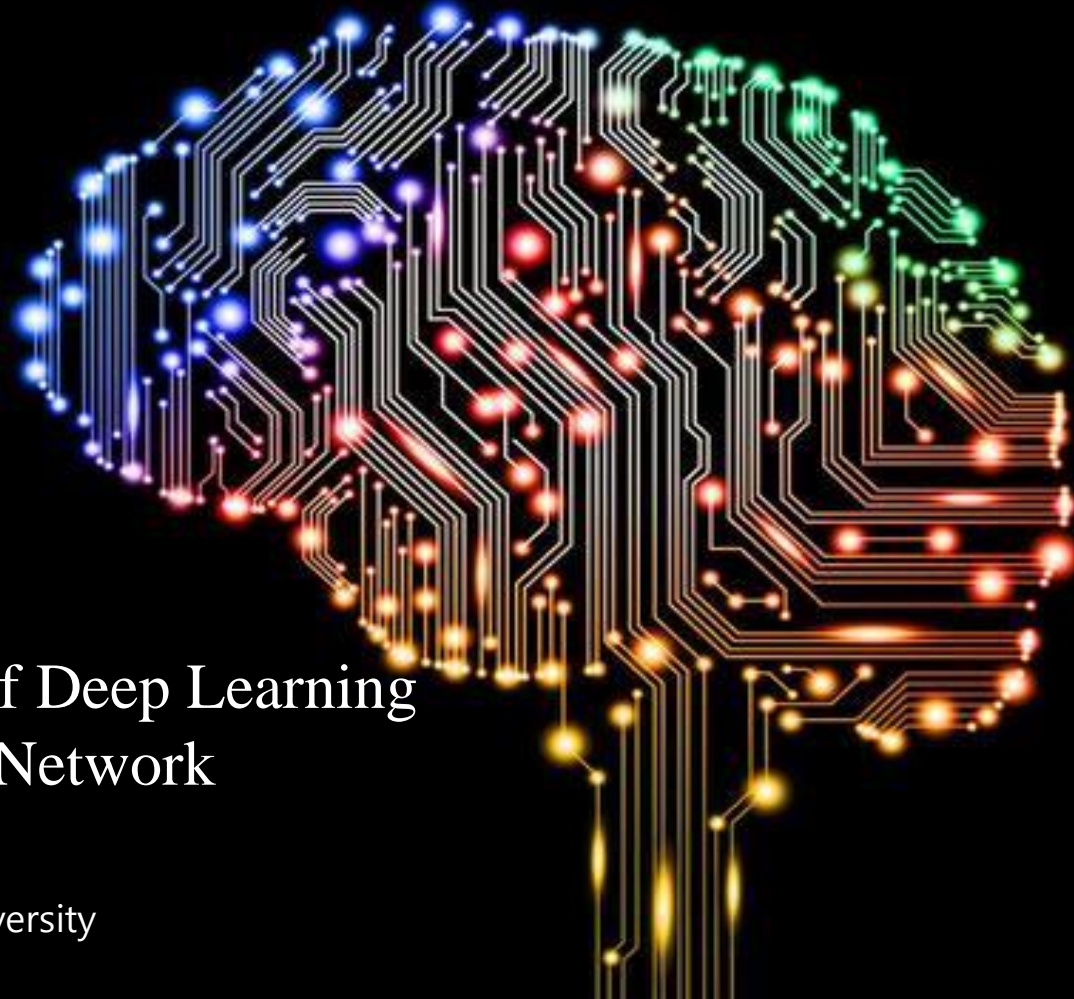
Books and Resources

- 파이썬 라이브러리를 활용한 머신러닝 (Introduction to Machine Learning by Python) [link],
  - 안드레아스 뮐러 , 세라 가이도/박해선 역, 한빛미디어

- 딥러닝의 정석() [link]
  - 니킬 부두마 / 고광원 , 금경목 역, 한빛미디어

- We will mostly follow Deep Learning
  - by Ian Goodfellow Yoshua Bengio and Aaron Courville (MIT Press, 2016)

- Learning Deep Architectures for AI
  - Yoshua Bengio (Foundations and Trends in Machine Learning, 2009)

Goals of the Course

● 지도학습 신경망(Feedforward, Recurrent, Convolution Neural Network)
의 기본원리에 대한 확실한 이해

GAN, Attention

● 심층 아키텍쳐의 학습을 가이드 할 수 있는 최적화 전략에 대한 일반
적인 이해

● 기초부터 심층 신격망의 아키텍처를 디자인하고 학습하는 능력

● 범용 신경망용 사용도구의 사용법을 습득

P. T

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