



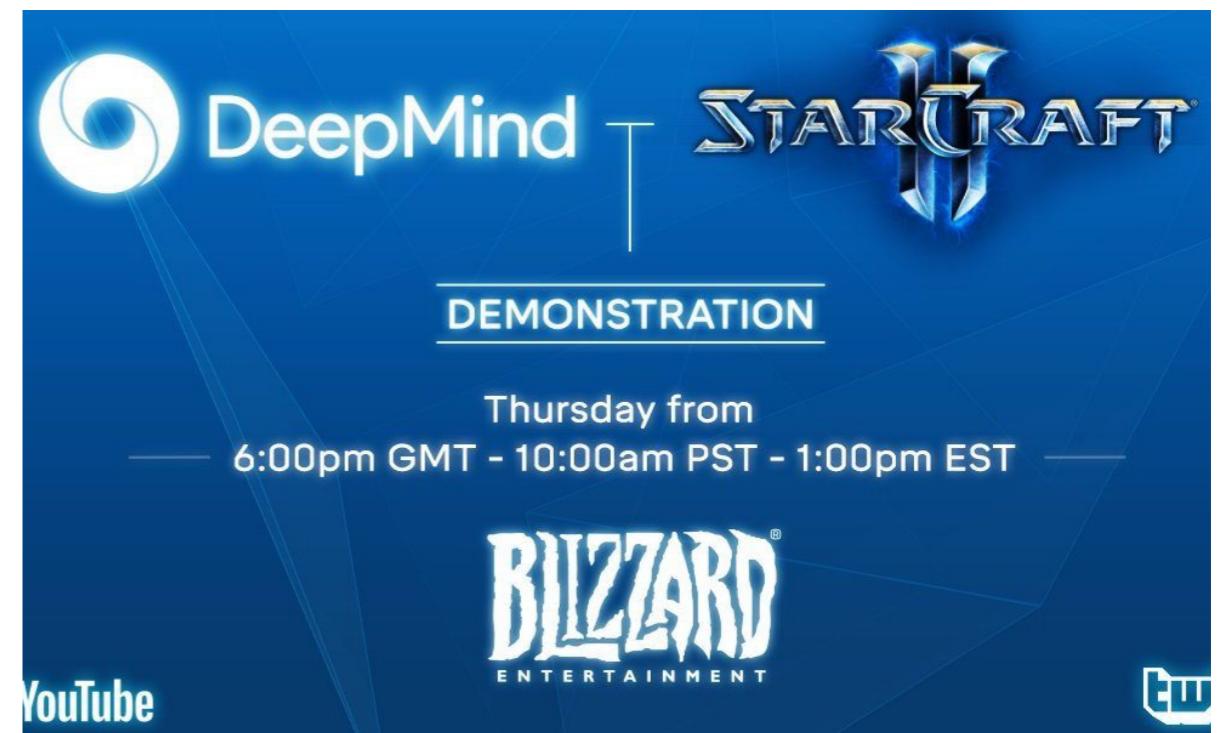
Introduction to Deep Learning

Introduction to Deep Learning

Application of deep learning

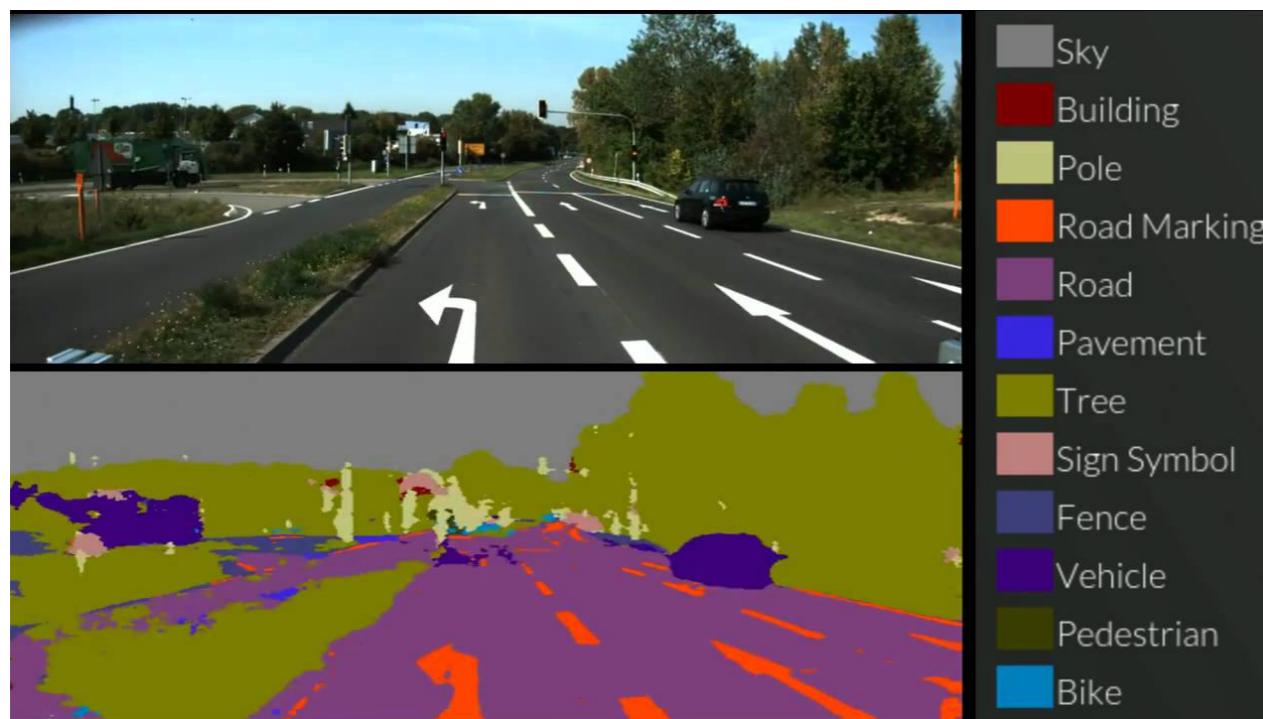


Play Go Game



Play StarCraft Game

Application of deep learning



Self driving Car



Self driving Car

Application of deep learning



Emotion Detection



Style Transfer

Application of deep learning



Figure 5. A selection of evaluation results, grouped by human rating.

Automatic writing poetry

Automatically generate image titles

Reference

<https://jiuge.thunlp.cn>

https://www.cv-foundation.org/openaccess/content_cvpr_2015/papers/

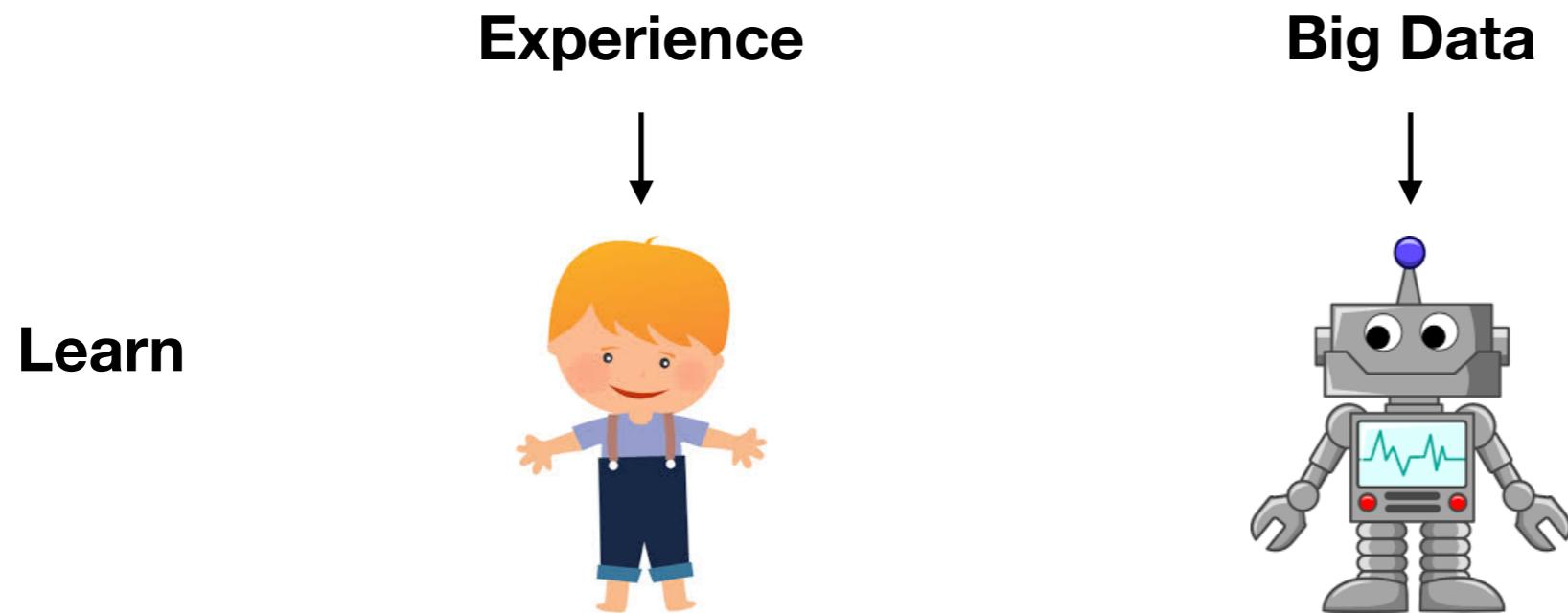
What is Artificial Intelligence?

- The intelligence demonstrated by machines is called Artificial Intelligence.
- Colloquially, the term “artificial intelligence” is used to describe machines that mimic “cognitive” functions that humans associate with other human minds, such as “learning” and “problem-solving”.



What is Machine Learning?

- A subset of Artificial Intelligence.
- It gives computers the ability to learn from data without explicitly being programmed.



What is Deep Learning?

- A subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called **artificial neural networks**.

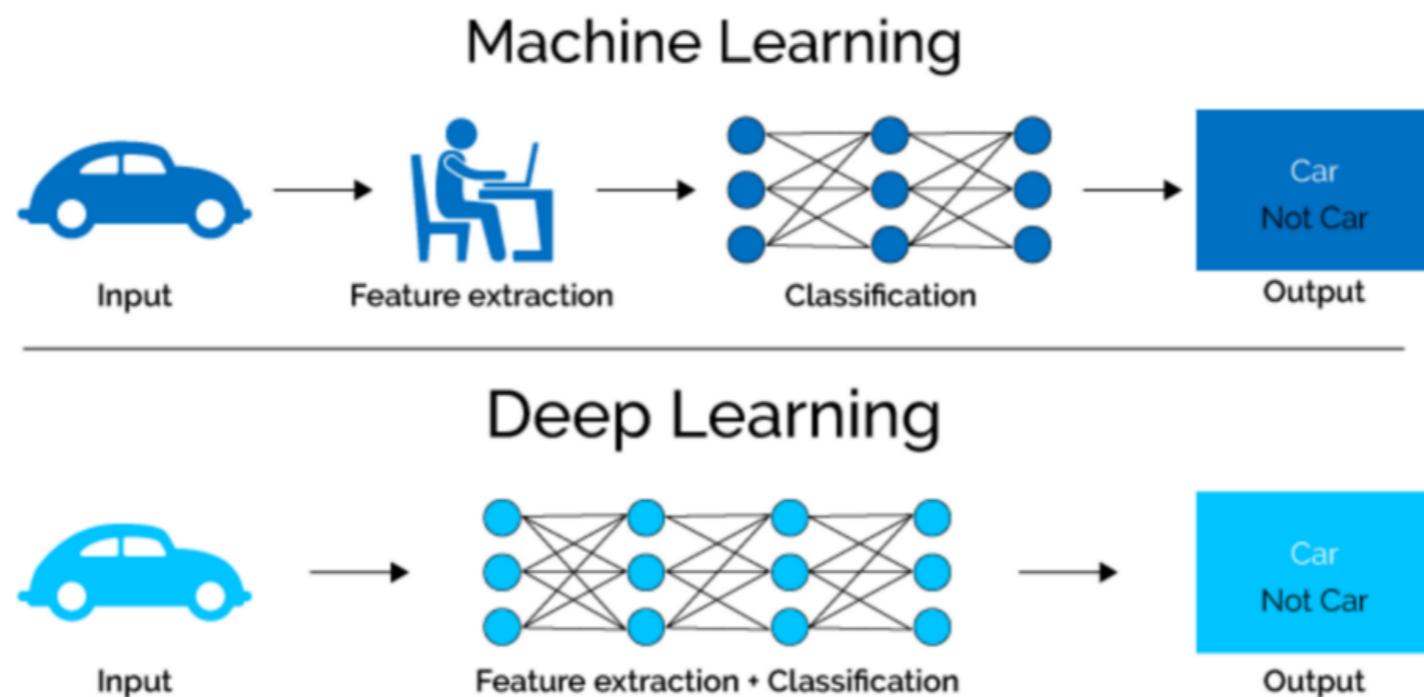


Figure 1: Machine Learning VS Deep Learning

AI, ML & DL

ARTIFICIAL INTELLIGENCE

Any technique that enables computers to mimic human behavior



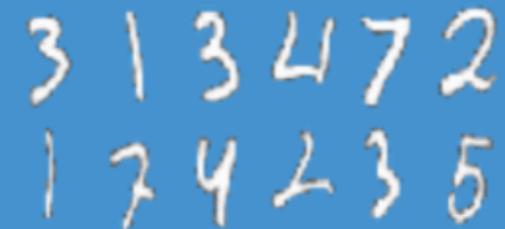
MACHINE LEARNING

Ability to learn without explicitly being programmed



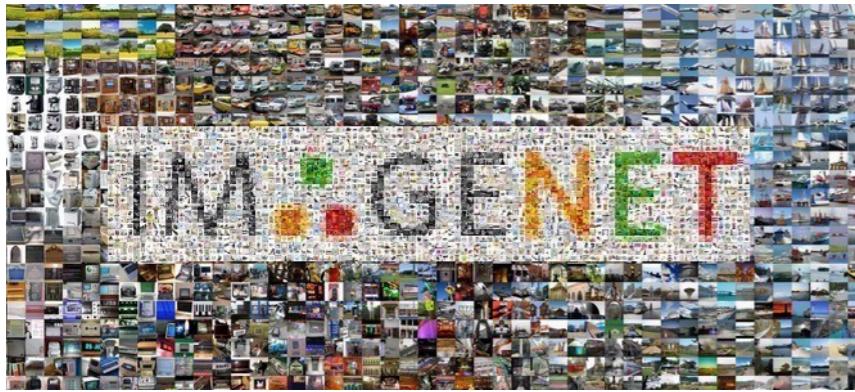
DEEP LEARNING

Extract patterns from data using neural networks



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Why Now?



Big Data

Larger Datasets Easier
Collection & Storage

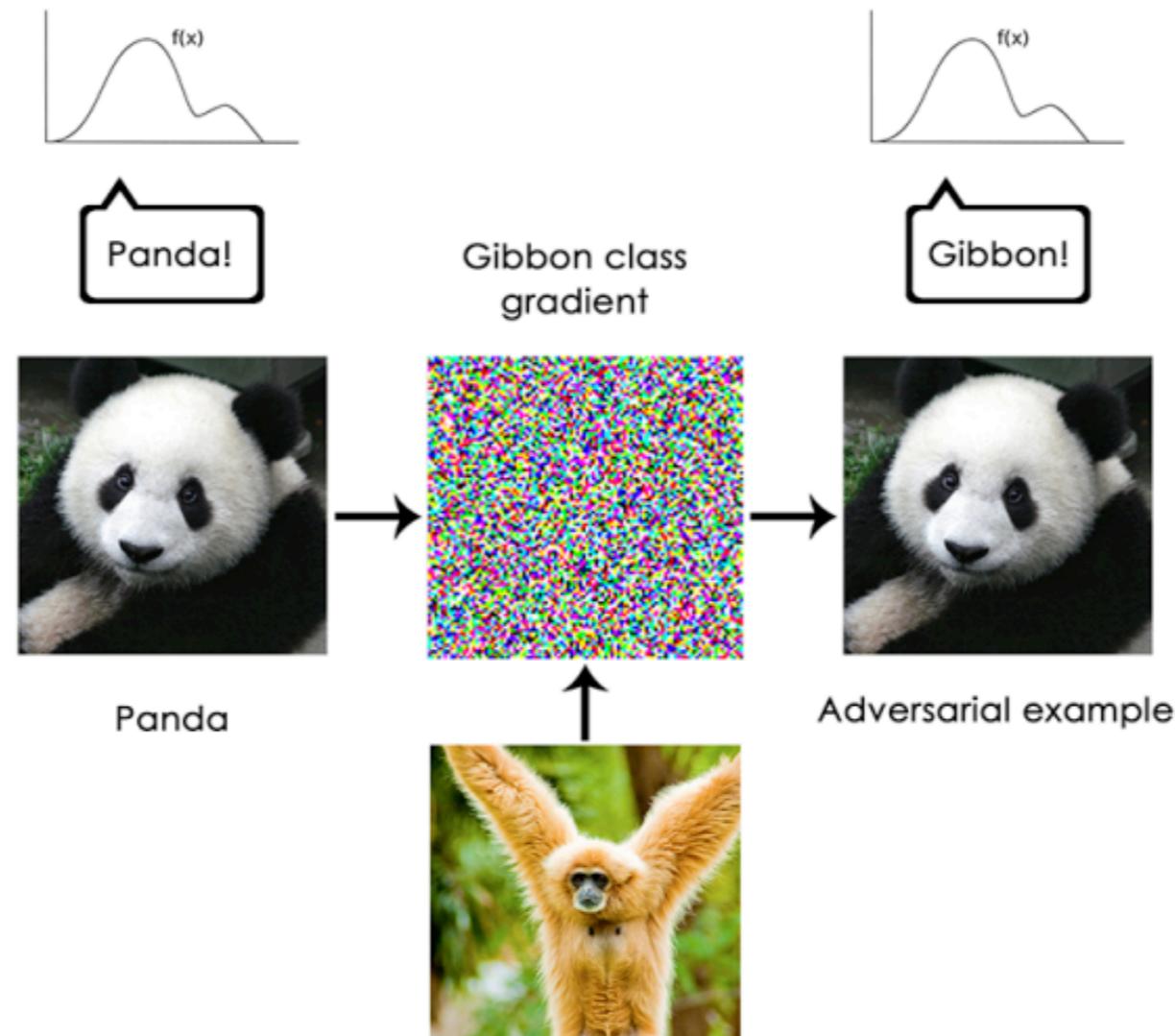
Hardware

- Graphics Processing Units (GPUs)
- Massively Parallelizable

Software

- Improved Tools

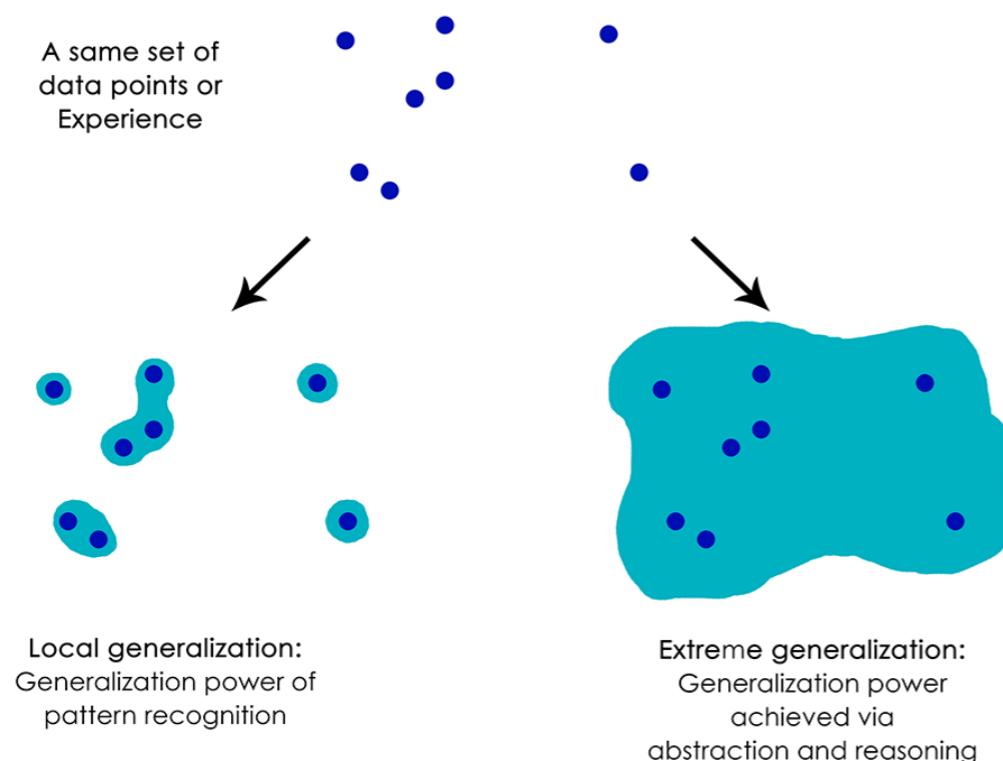
Limitation of deep learning



Adding to it a "gibbon" gradient, a neural network will classify this panda as a gibbon. This evidences both the **brittleness of these models**, and the deep difference between the **input-to-output mapping** that they operate and our own human perception.

Limitation of deep learning

Local generalization versus extreme generalization



- Human: ability to adapt to novel, never experienced before situations, using very little data or even no new data at all.
- Neural Network “local generalization”: the mapping from inputs to outputs performed by deep nets quickly stops making sense if new inputs differ even slightly from what they saw at training time.