

# Grasping AI as an Engineer

By Amara Keller  
IBM Developer Advocate



**Artificial intelligence** is the simulation of human intelligence by machines. Human's determine patterns (feature engineering). Then comes machine learning which is about recognizing pattern from data insights. Finally, we have deep learning.

## Machine Learning

Goal: Features extracted/ engineered from data

- Supervised Learning
  - o General idea: learning with the presence of an "expert", pre-labeled data
    - Classification (Naïve Bayes, SVM, Random Decision Forests)
    - Regression (Linear, Logistic)
  - o Example Credit Card Fraud, Spam
  
- Unsupervised learning
  - o General idea: find pattern in given data
    - Clustering (k-means)
    - Dimensionality reduction (Principle Component Analysis, SVD)
  - o Example: Recommender Systems like Netflix video recommendations.

Tools used: Jupyter Notebooks, Frameworks like PyTorch, pandas

- Important Concepts in Machine Learning
  - o Techniques – Classification, Clustering, Regression (CCR)
  - o Overfitting vs Underfitting
  - o Training vs test vs validation data
  - o Hyper parameter optimization
  - o Fine-tuning
  - o Reinforcement learning, and not just in video games

## **Deep Learning**

Goal: Learn high level features from data

- Rebranding of neural network learning
- Modern neural net with multiple hidden layers

Tools used: Jupyter Notebooks, Frameworks like TensorFlow

- Important Concepts in Deep Learning
  - o Hidden layers can create a variety of network topologies
  - o Computer is expensive and time consuming -> CPU vs GPU vs FPGA vs ASIC (TPU)
  - o Optimization for hardware, hardware agnostic layers
  - o Deep learning is about generalizations which requires tons and tons of data

Resources:

<https://arxiv.org/list/cs.AI/recent>  
<https://www.coursera.org/specializations/deep-learning>  
<https://www.coursera/learn/machine-learning>