

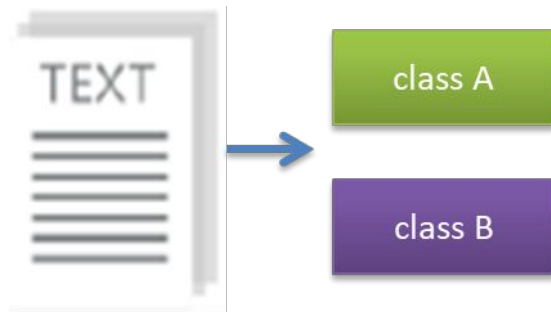


Introduction to Deep Learning

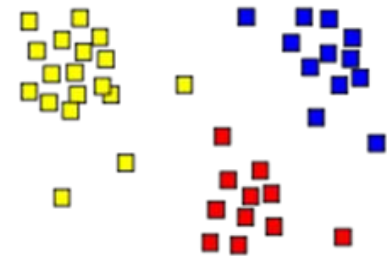
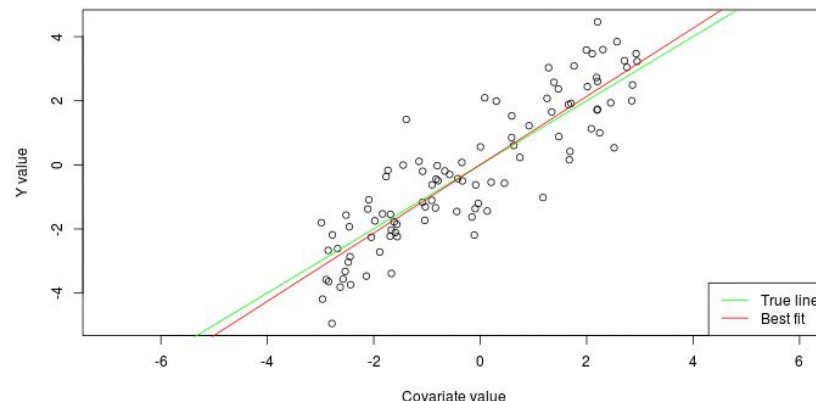
PhD. Msc. David C. Baldears S.
PhD(s). Msc. Diego López Bernal

Machine Learning Types

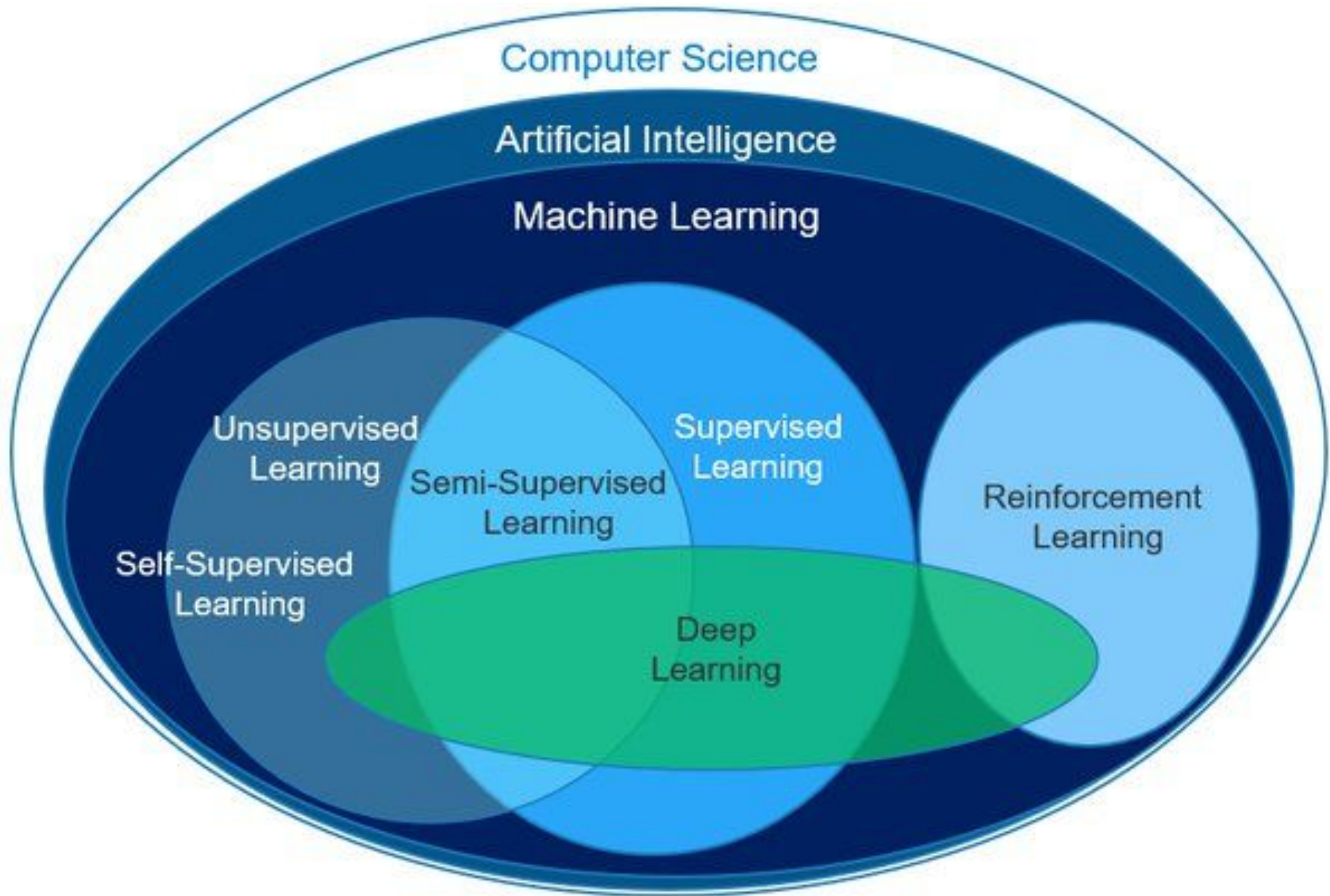
- **Supervised**: learning with **labeled data**
 - Example: email classification, image classification
 - Example: regression for predicting real-valued outputs
- **Unsupervised**: discover patterns in **unlabeled data**
 - Example: cluster similar data points
- **Reinforcement learning**: learn to act based on **feedback/reward**
 - Example: learn to play Go



Classification



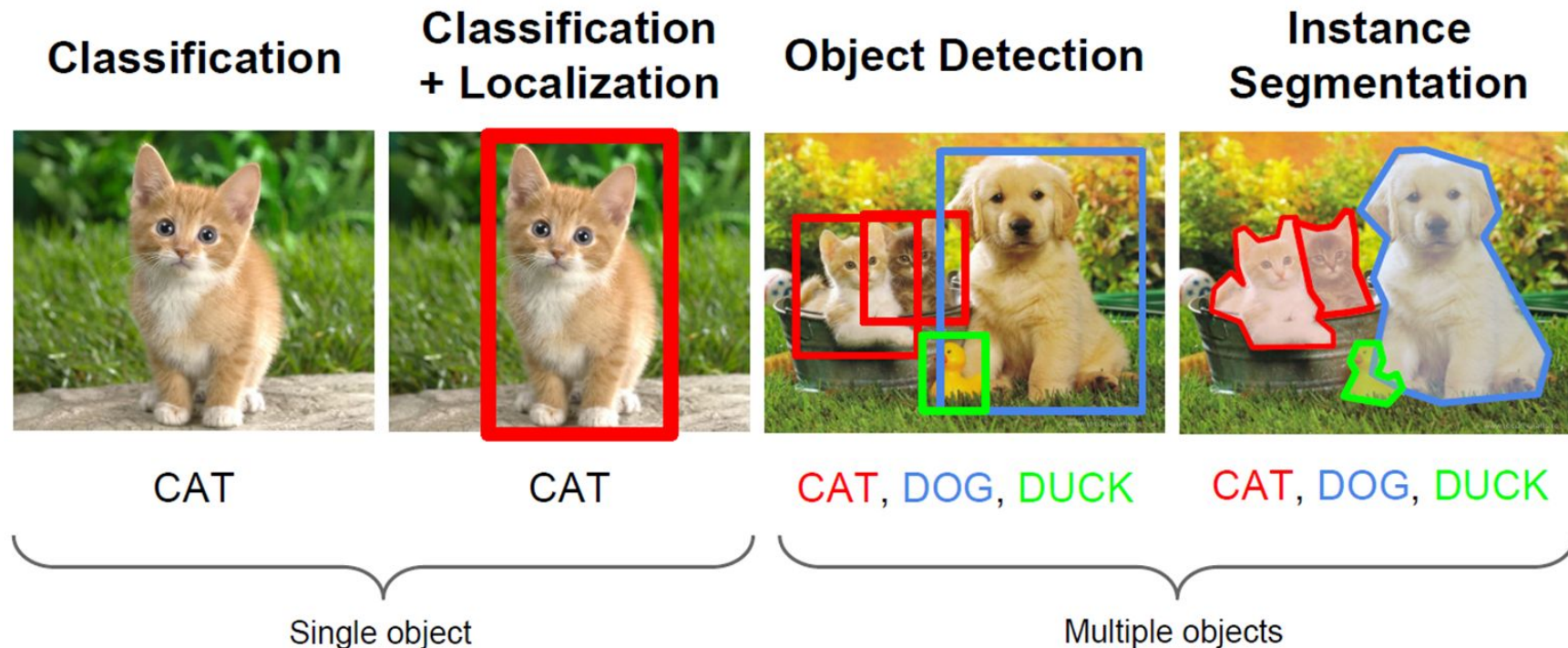
Clustering



Computer Vision Tasks

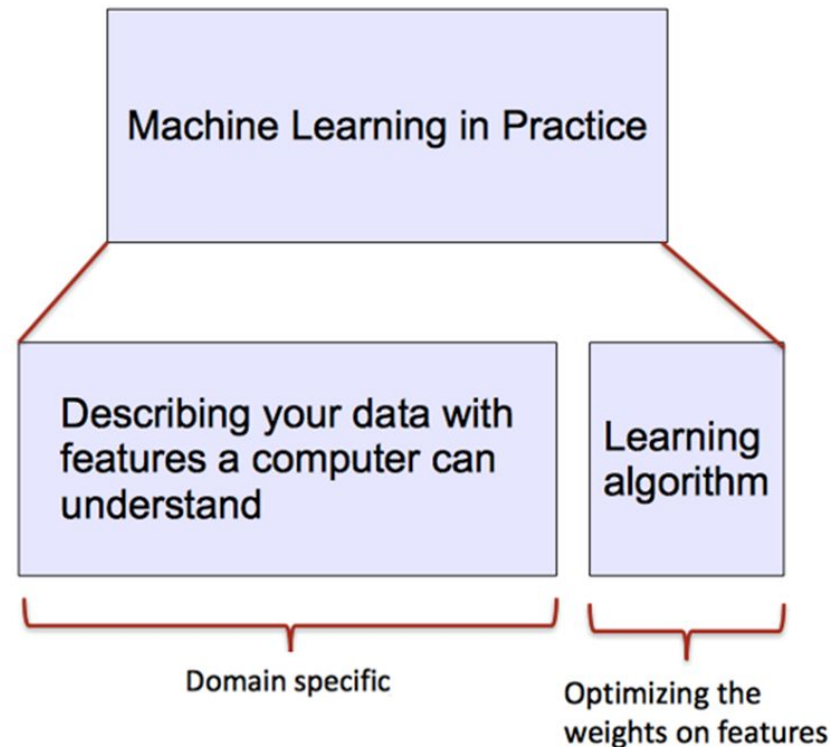
Computer vision has been the primary area of interest for ML

The tasks include: classification, localization, object detection, instance segmentation



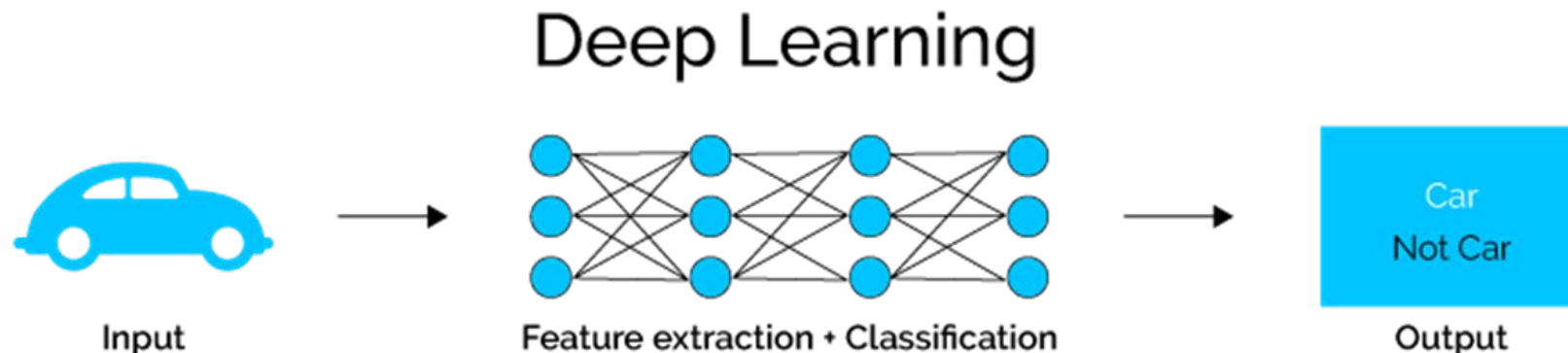
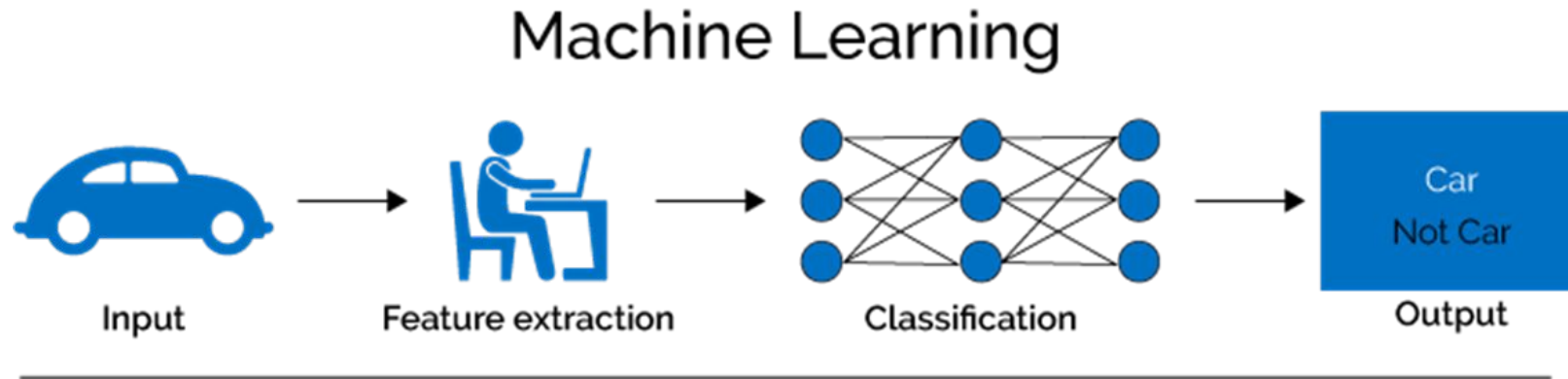
ML vs. Deep Learning

- Conventional machine learning methods rely on human-designed feature representations
- ML becomes just optimizing weights to best make a final prediction



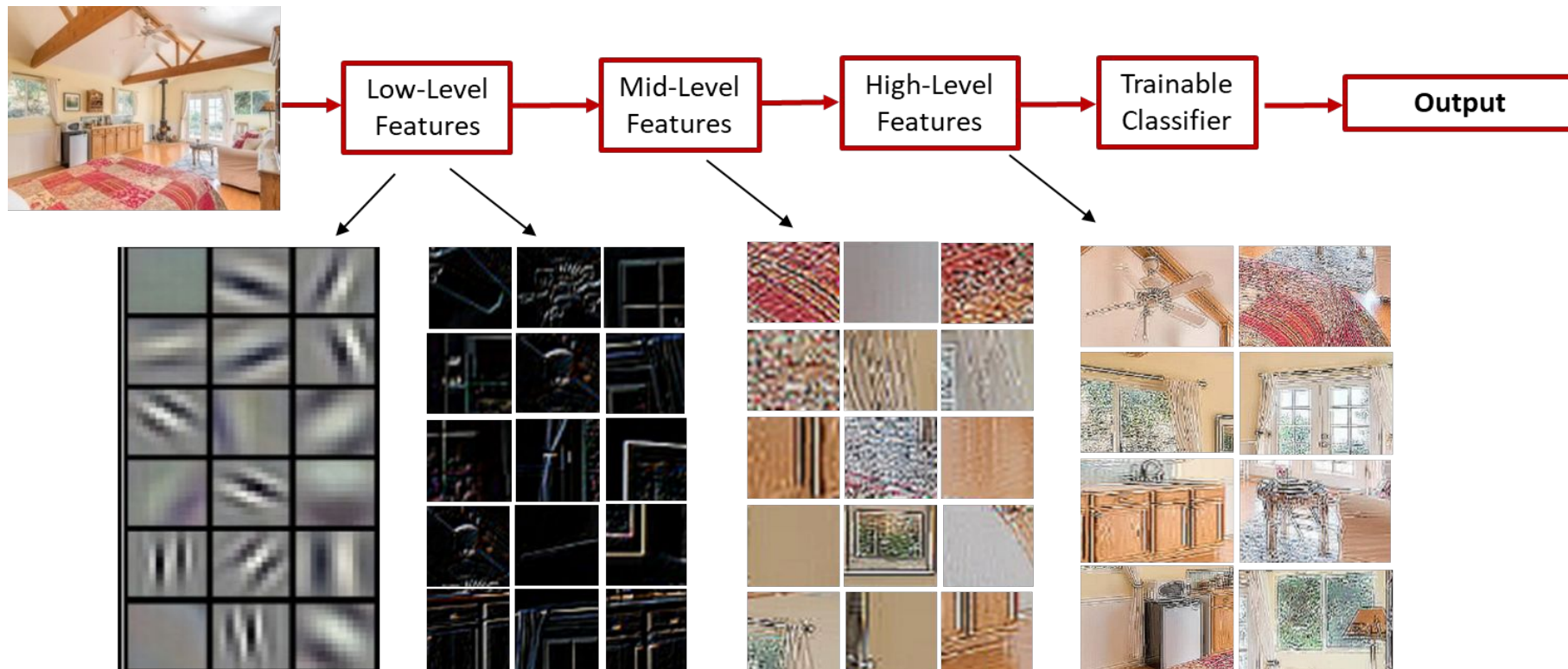
ML vs. Deep Learning

- **Deep learning (DL)** is a machine learning subfield that uses multiple layers for learning data representations
 - DL is exceptionally effective at learning patterns



ML vs. Deep Learning

- DL applies a multi-layer process for learning rich hierarchical features (i.e., data representations)
 - Input image pixels → Edges → Textures → Parts → Objects



Why is DL Useful?

- DL provides a flexible, learnable framework for representing visual, text, linguistic information
 - Can learn in supervised and unsupervised manner
- DL represents an effective end-to-end learning system
- Requires large amounts of training data
- Since about 2010, DL has outperformed other ML techniques
 - First in vision and speech, then NLP, and other applications

AI for Beginners

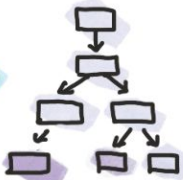
GOFAI → Good Old Fashioned AI

ethics

★ Knowledge Representation



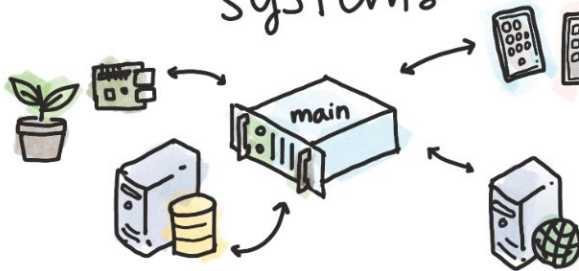
★ Ontologies



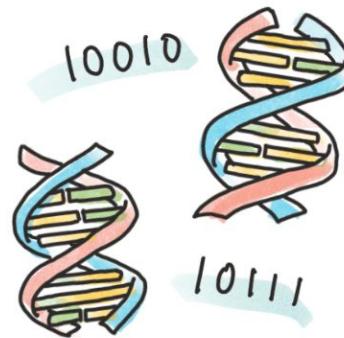
★ Expert Systems



★ Multi-agent systems



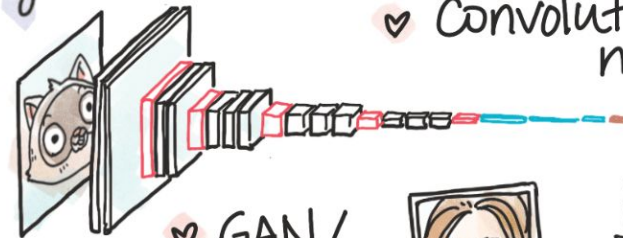
★ Genetic Algorithms



Neural Networks / Deep Learning

★ Computer Vision

♥ Convolutional networks



♥ GAN / VAE



★ NLP



- Word2Vec
- Embedding
- Recurrent Networks
- Transformers

Machine Learning

aka.ms/ml-beginners