

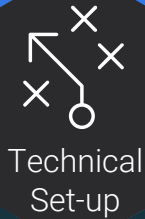
# Frameworks

**02** PyTorch  
Research oriented framework with many pretrained models

**03** Tensorflow  
Low-level FW by Google offering distributed learning support. (good documentation/ community)

**01** scikit-learn  
Machine Learning framework offering many algorithms out of the box + data analysis tools

**04** Keras  
Abstraction layer for Tensorflow, CNTK and PyTorch. Provides functionality for fast prototyping and offers pretrained models.



## Technical Set-up

# Datasets

**01** CIFAR10  
Image dataset with objects belonging to 10 different classes (famous benchmark).

**02** MNIST  
Artificial Dataset of black & white digits for scientific benchmarks

**03** Imagenet  
Dataset of over 14 million hand-annotated images for object recognition and classification tasks.

**04** Kaggle  
Platform offering many different datasets for their competitions

**05** MS COCO  
Object recognition and image segmentation dataset used for competitions

**06** Pascal VOC  
Image Segmentation dataset with real world objects

**Tip**  
«A visual introduction to machine learning»  
By R2D3  
[click for more](#)

**Tip**  
Requires labelled training data as base for the output

**Supervised Learning SL**

**01** Classification  
Prediction of discrete classes, e.g. image classification  
[click for more](#)

**01** Anomaly Detection  
Find anomalies in the data by finding outliers (data that does not fit the rest). Also works for UL.

**Tip**  
Is used to find patterns in input data and does not require labels

**Unsupervised Learning UL**

**01** Generative Modelling  
Generate new data from a set of known samples, useful for simulations of expensive physical operations

**02** Regression  
Prediction of continuous values, e.g. house price prediction

**03** Reinforced Learning RL  
Learns actions rather than labels with states as input and depends on time (past & future)

**02** Latent variable models  
Extract the underlying variables that influence the data for compression and further analysis.

**Methods & Applications**

**Tip**  
«10 real-world examples of ML and AI»  
By M. Feldmann  
[click for more](#)

**01** Reaction cases

**02** Optimal Control  
Optimally tune a controller which runs a physical system  
UL + RL

**03** Data Correction  
Automatically detect and optionally correct wrong user inputs  
SL + UL

**01** Predictive Maintenance  
Predict failures of machines from their logs and sensor data  
SL + RL

**02** User Input  
Learn from user inputs to create new interfaces (e.g. Human-Brain interfaces)  
SL

**02** Production Fault Check  
Automatically check manufactured objects for problems or defects  
SL + UL

**03** Object Localization  
Find objects in images and locate them  
SL

**04** Medical Analysis  
Crawl patients' medical histories to predict likelihoods of certain diseases  
SL + UL

**05** Detection cases

**01** Predictive Maintenance

**02** User Input

**03** Fraud Detection

**04** Medical Analysis

**01** Autonomous Control & Driving  
Autonomously drive a car  
SL + RL

**02** Reaction cases

**03** Optimal Control

**04** Production Fault Check

**05** Object Localization

**06** Detection cases

**01** Data Correction

**02** Regression

**03** Reinforced Learning RL



## Use cases

**MOTIUS** Cheat Sheet  
Machine Learning

For more information and step-by-step manuals  
The Motius Bible  
on  
[www.motius.de](http://www.motius.de)