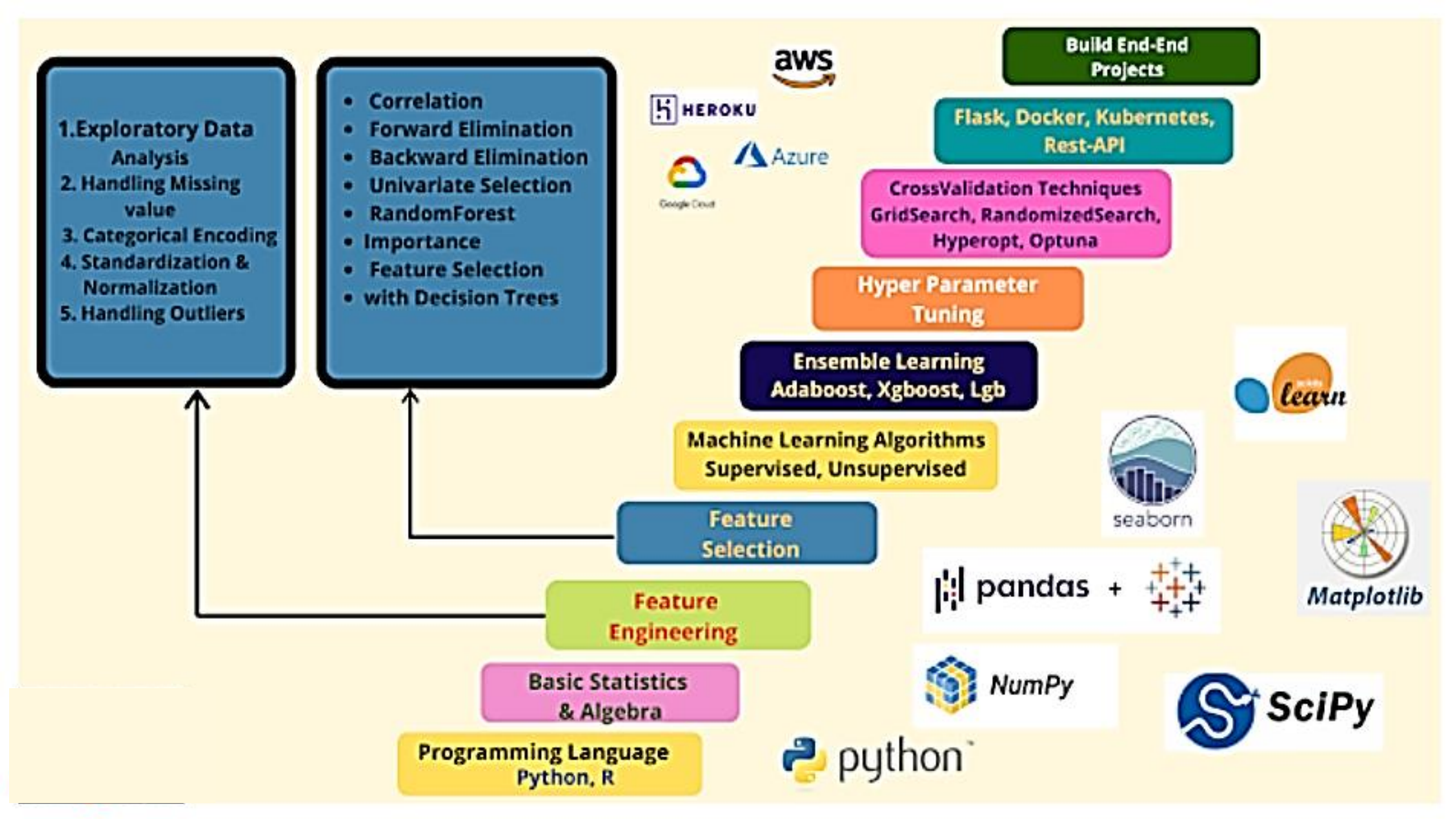
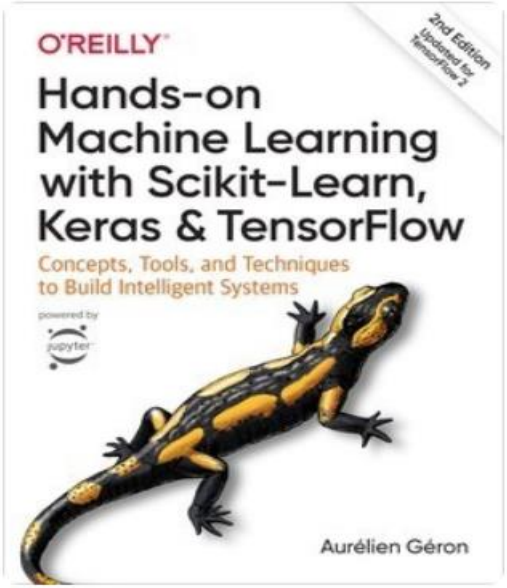
# Practical Machine Learning

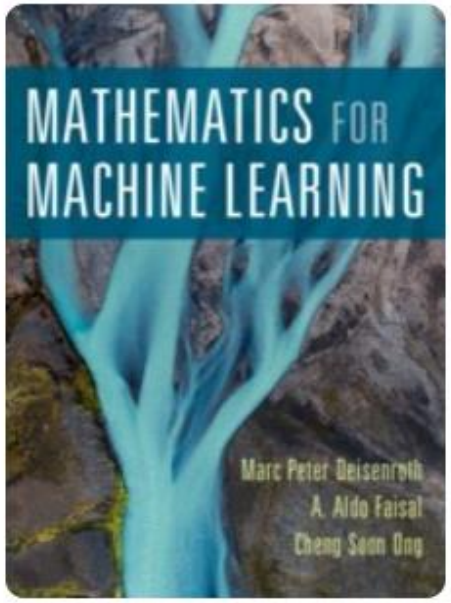
## Day 1: SEP23 DBDA

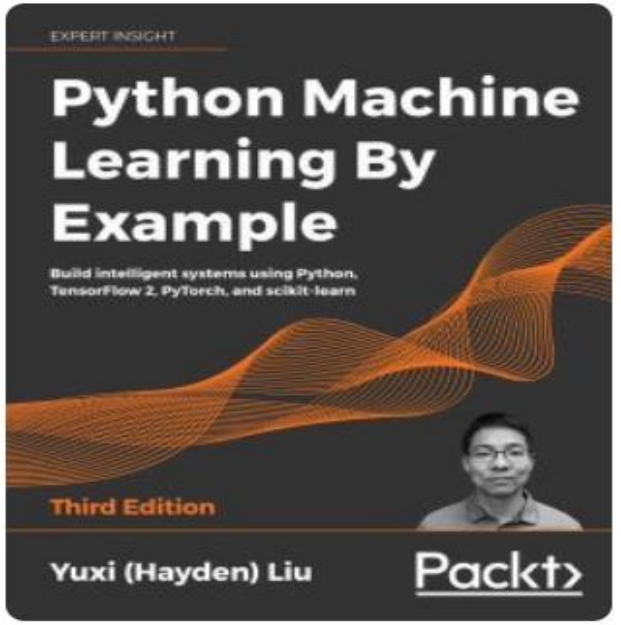
**Kiran Waghmare**

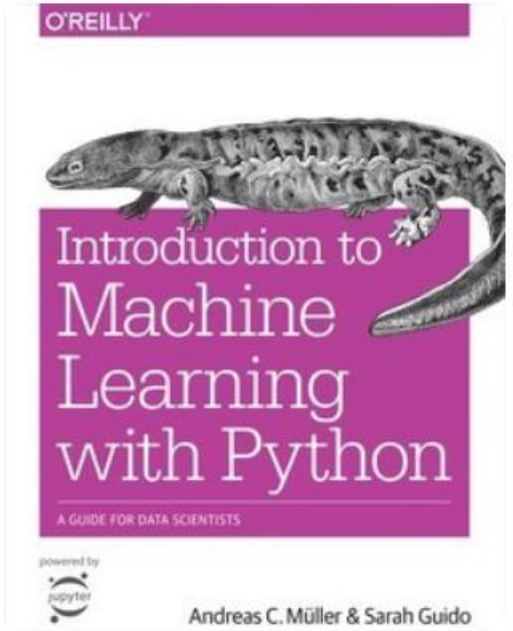
CDAC Mumbai


1.Exploratory Data Analysis
2. Handling Missing value
3. Categorical Encoding
4. Standardization & Normalization
5. Handling Outliers
Correlation
Forward Elimination
Backward Elimination
Univariate Selection
RandomForest
Importance
Feature Selection
with Decision Trees
aws
HEROKU
Azure
Google Cloud
Build End-End Projects
Flask, Docker, Kubernetes, Rest-API
CrossValidation Techniques GridSearch, RandomizedSearch, Hyperopt, Optuna
Hyper Parameter Tuning
Ensemble Learning Adaboost, Xgboost, Lgb
Machine Learning Algorithms Supervised, Unsupervised
Feature Selection
Feature Engineering
Basic Statistics & Algebra
Programming Language Python, R
learn
seaborn
pandas
Matplotlib
NumPy
SciPy
python


O'REILLY
2nd Edition
Updated for TensorFlow 2
Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow
Concepts, Tools, and Techniques to Build Intelligent Systems
powered by
jupyter
Aurélien Géron


MATHEMATICS FOR MACHINE LEARNING
Marc Peter Deisenroth
A. Aldo Faisal
Cheng Soon Ong


EXPERT INSIGHT
Python Machine Learning By Example
Build intelligent systems using Python, TensorFlow 2, PyTorch, and scikit-learn
Third Edition
Yuxi (Hayden) Liu
Packt>


O'REILLY
Introduction to Machine Learning with Python
A GUIDE FOR DATA SCIENTISTS
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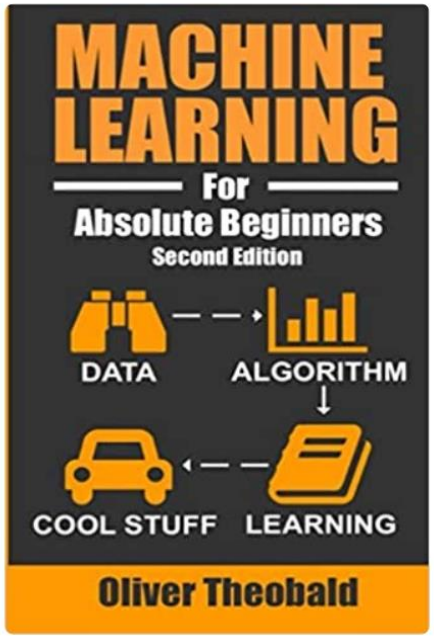
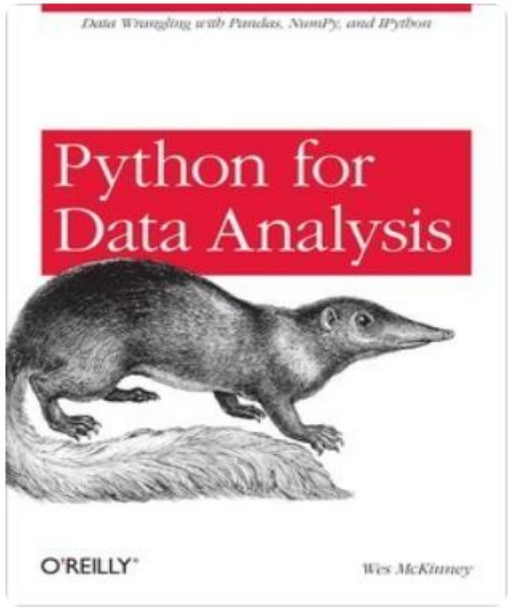
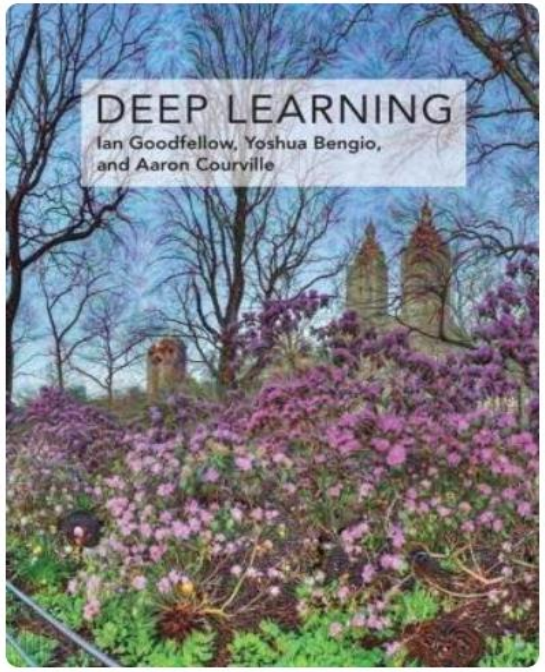
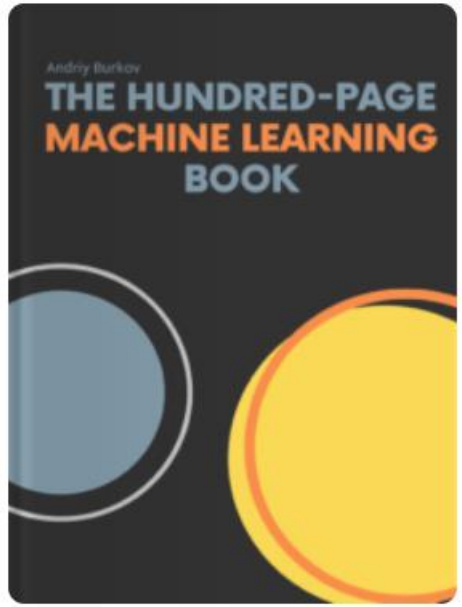
Andreas C. Müller & Sarah Guido


MACHINE LEARNING
For
Absolute Beginners
Second Edition
DATA
ALGORITHM
COOL STUFF
LEARNING
Oliver Theobald

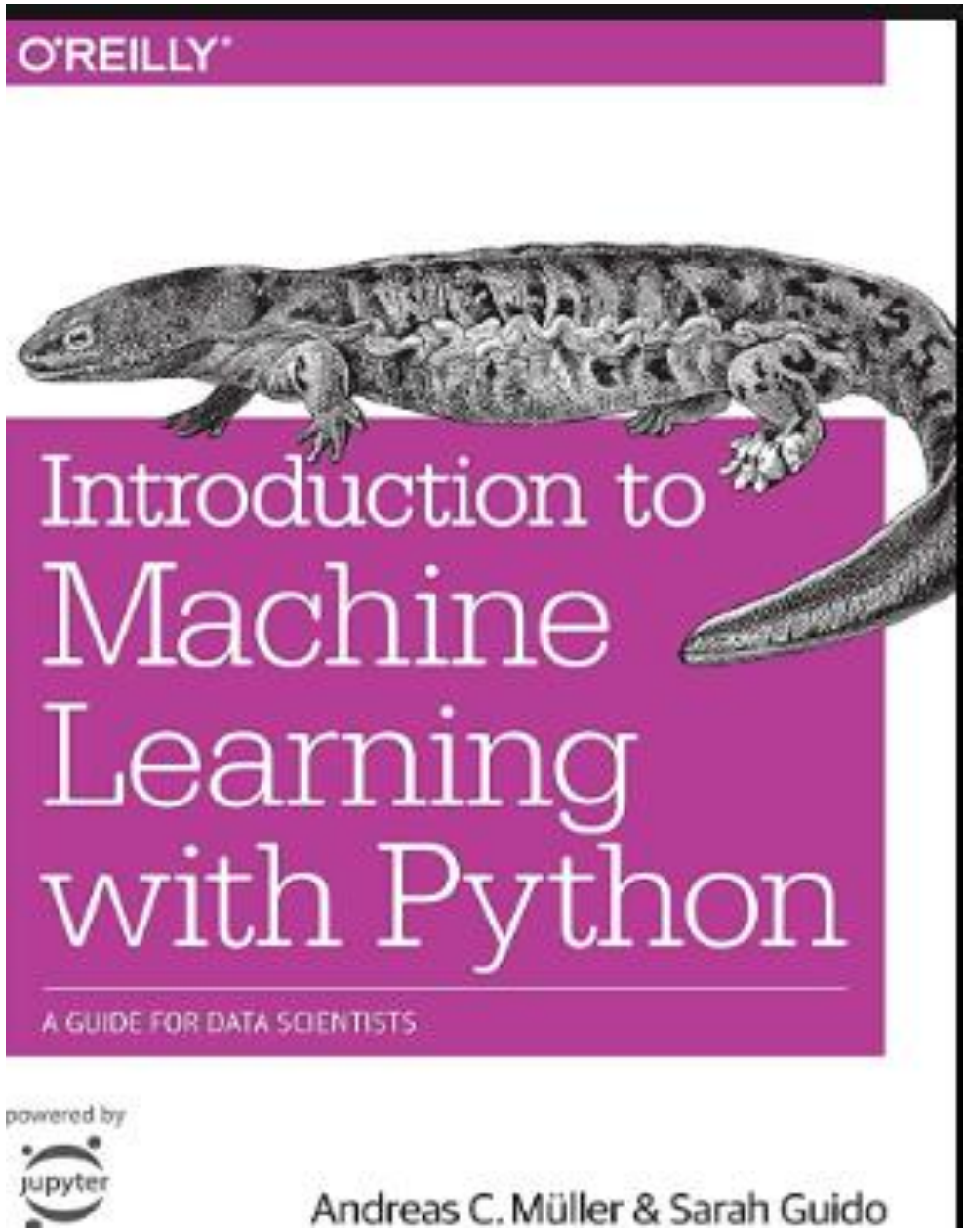

Data Wrangling with Pandas, NumPy, and IPython
Python for Data Analysis
O'REILLY
Wes McKinney


DEEP LEARNING
Ian Goodfellow, Yoshua Bengio, and Aaron Courville


Andriy Burkov
THE HUNDRED-PAGE MACHINE LEARNING BOOK

# Agenda

- What is machine learning?
- Algorithm types of Machine learning
- Supervised and Unsupervised Learning
- Uses of Machine learning
- Evaluating ML techniques
- Introduction to Scikit Learn



## Traditional Programming

## Machine Learning

# Why Machine Learning?

- Develop systems that can automatically adapt and customize themselves to individual users.
  - Personalized news or mail filter
- Discover new knowledge from large databases (***data mining***).
  - Market basket analysis (e.g. diapers and beer)
- Ability to mimic human and replace certain monotonous tasks - which require some intelligence.
    - like recognizing handwritten characters
- Develop systems that are too difficult/expensive to construct manually because they require specific detailed skills or knowledge tuned to a specific task (knowledge engineering bottleneck).

# Machine Learning

- **Herbert Alexander Simon**:
  "Learning is any process by which a system improves performance from experience."
- "Machine Learning is concerned with computer programs that automatically improve their performance through experience. "

**Herbert Simon**
Turing Award 1975
Nobel Prize in Economics 1978

## The concept of learning in a ML system

- Learning = Improving with experience at some task
  - Improve over task *T*,
  - With respect to performance measure, *P*
  - Based on experience, *E*.

## Definition

A computer program is said to
learn from **experience E** with respect to
some class of **tasks T** and
performance **measure P**,
if its performance at tasks T, as measured by P, **improves** with experience E.

# What is Machine Learning?

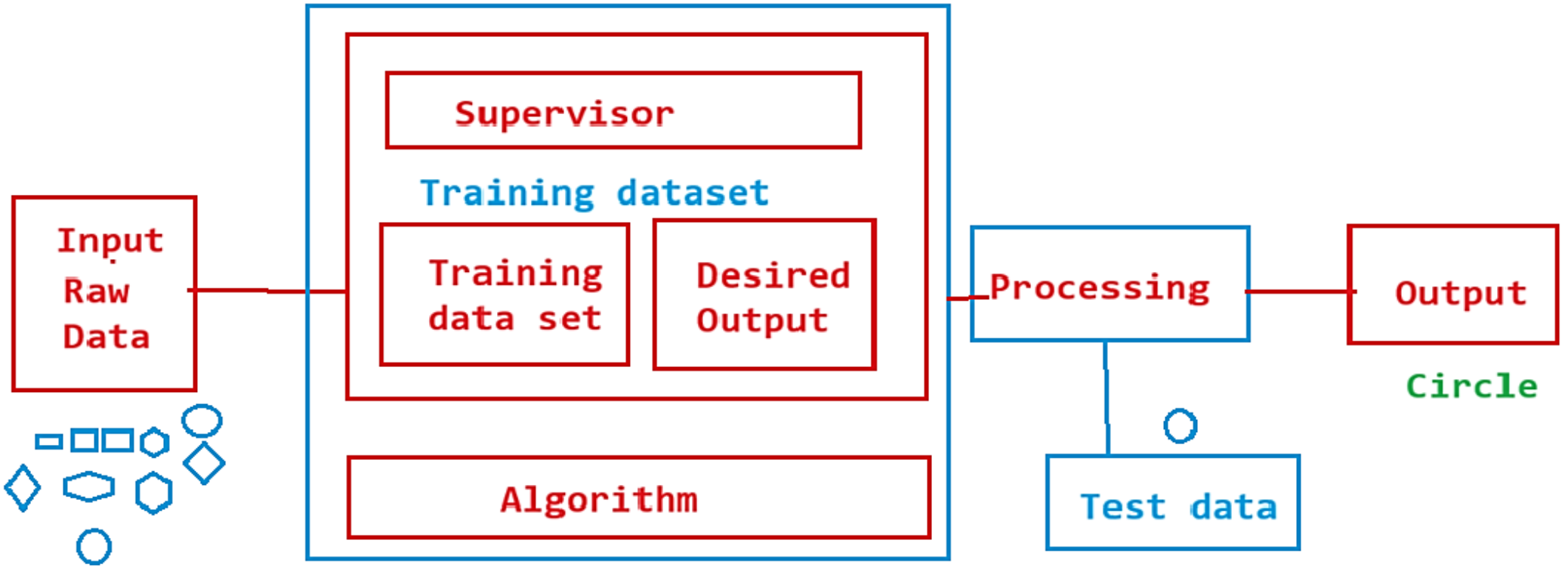
- [Arthur Samuel, 1959]
  - Field of study that gives computers
  - the ability to learn without being explicitly programmed

- [Kevin Murphy] algorithms that
  - automatically detect patterns in data
  - use the uncovered patterns to predict future data or other outcomes of interest

- [Tom Mitchell] algorithms that
  - improve their performance (P)
  - at some task (T)
  - with experience (E)

# Working of Machine Learning:

# Supervised Learning



# Machine Learning End Product

Ordinary System

With AI

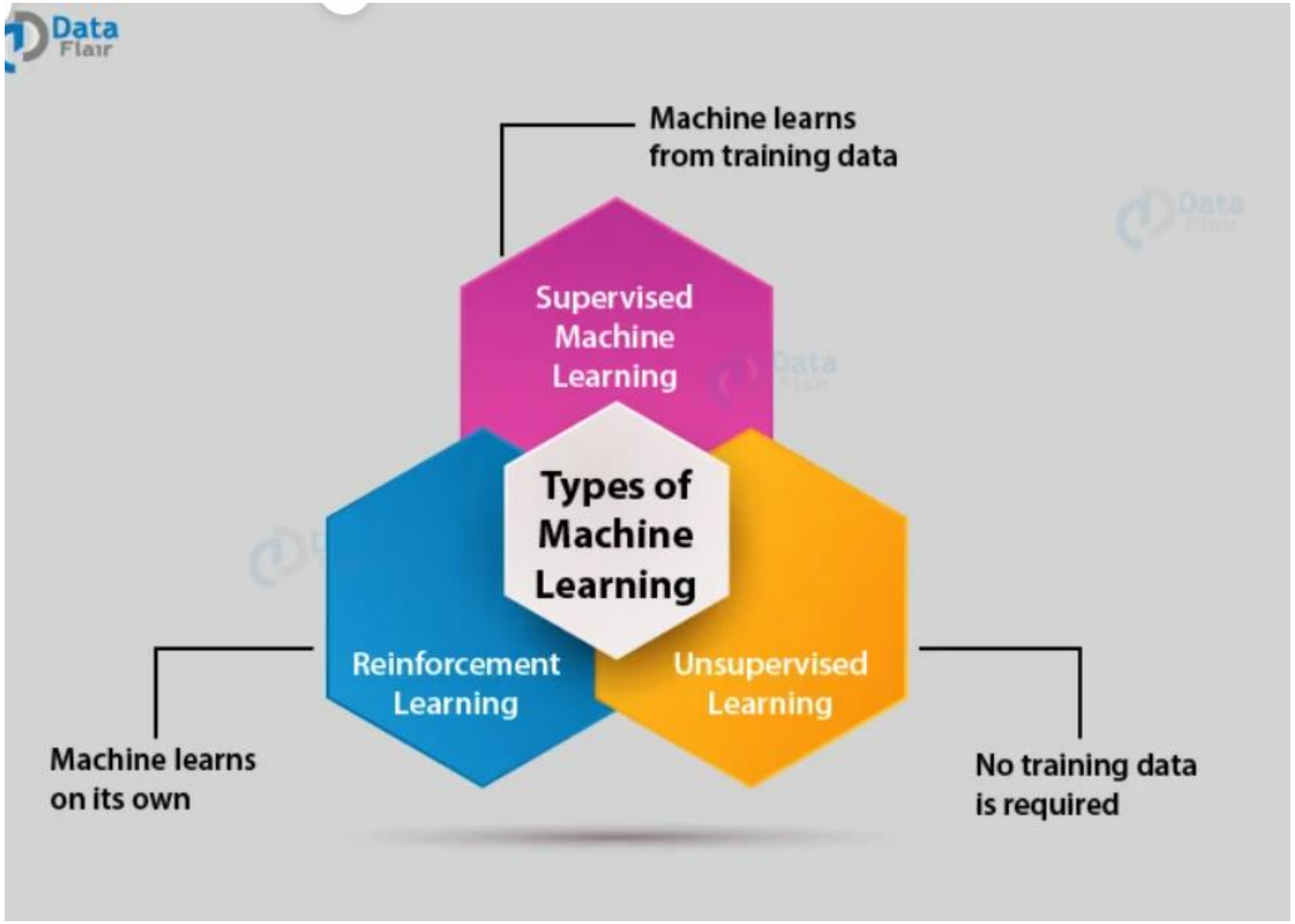
Machine Learning

Learns

Predicts

# Types of Machine Learning

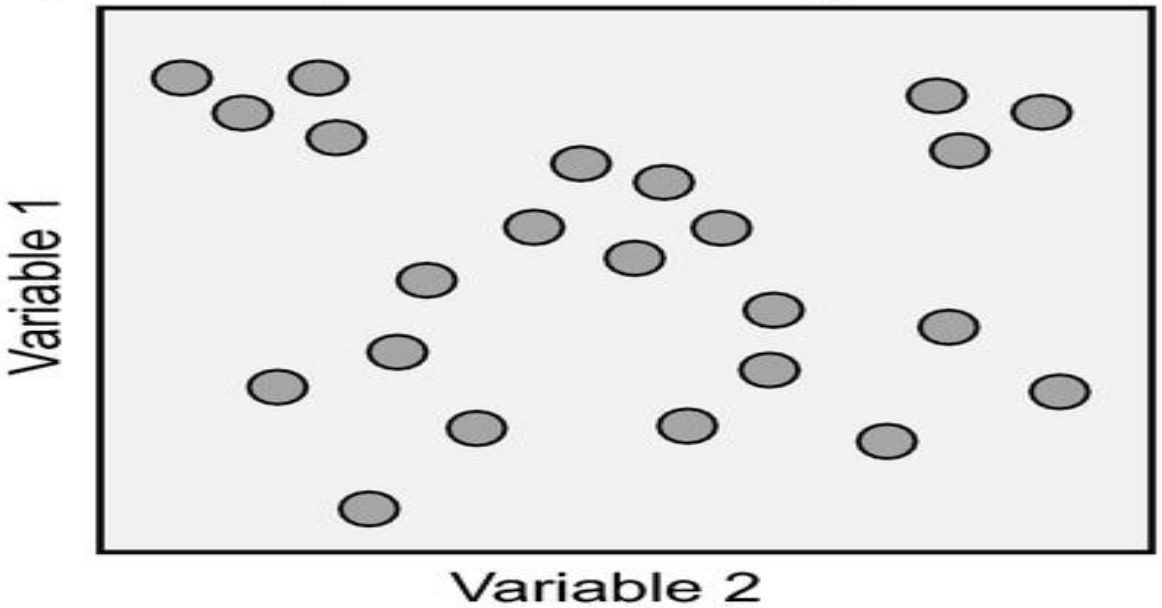
- Machine Learning Algorithms can be classified into 3 types as follows –
  - **Supervised Learning**
  - **Unsupervised Learning**
  - **Reinforcement Learning**



Supervised Learning

Unsupervised Learning

a) **Unsupervised learning**



# Supervised Learning

Input

Annotations

These are grapes

Model

It's Grapes

Prediction

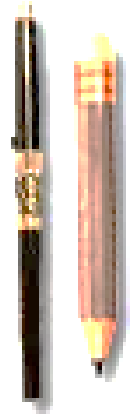
# Unsupervised Learning

Input

Annotations

Unsorted Information

Model

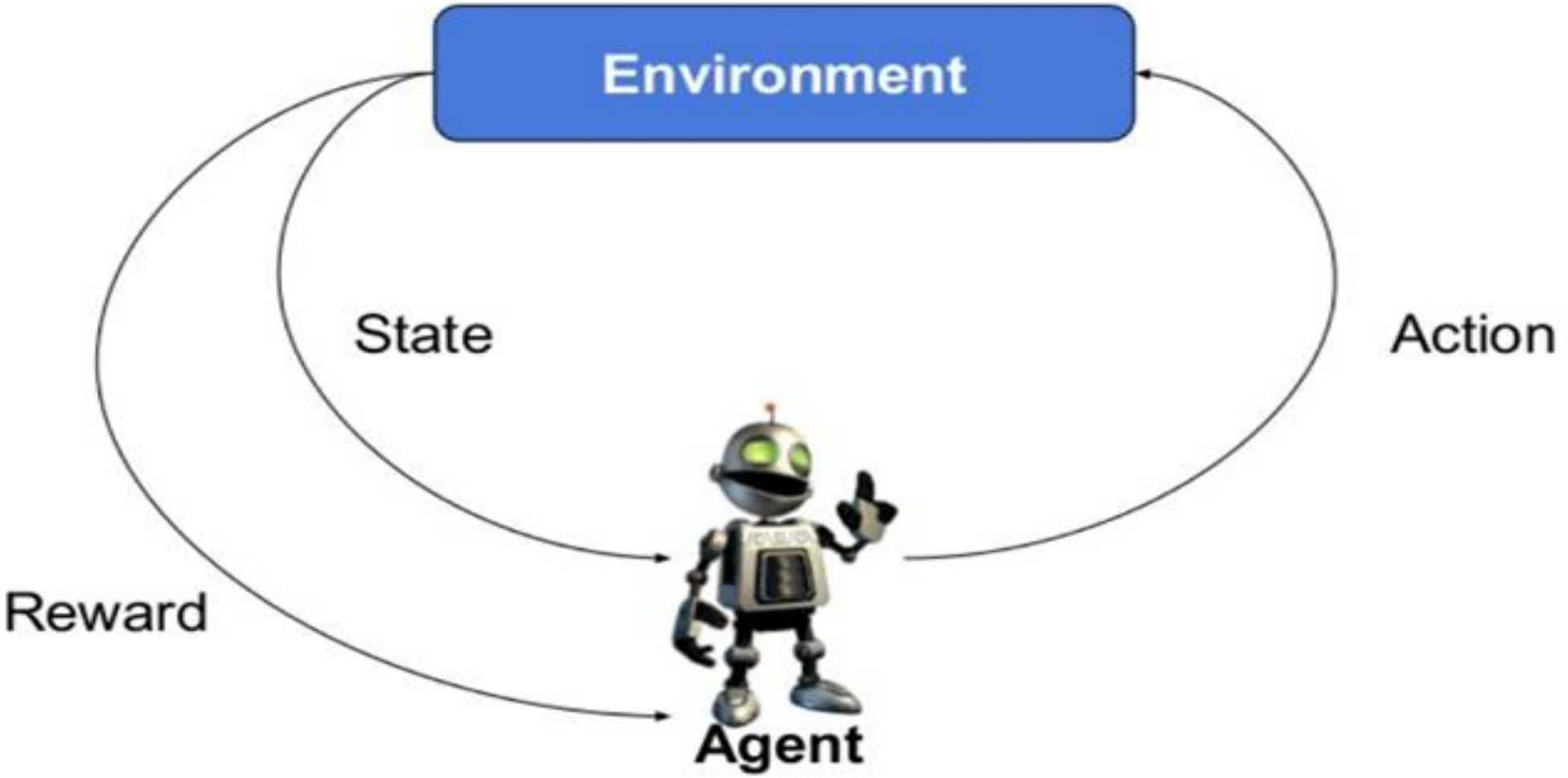
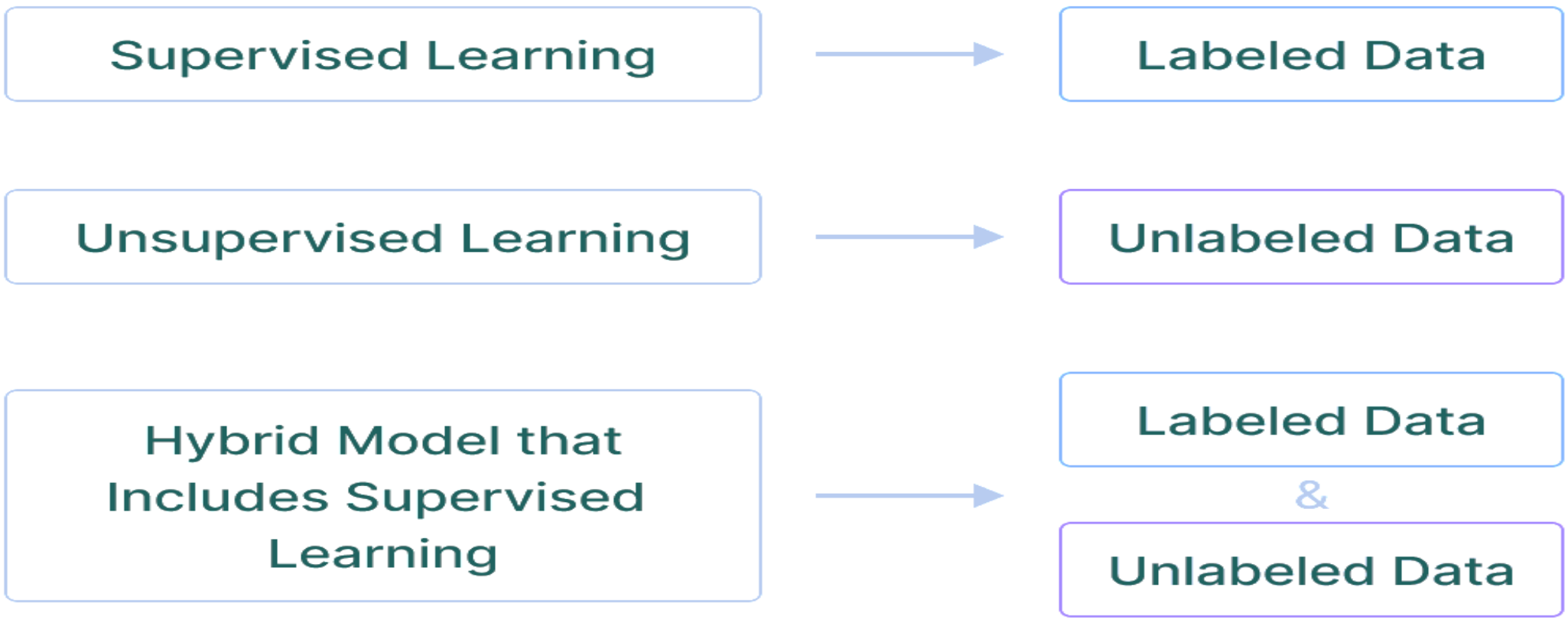


Pen & Pencil

**Predictions**

# Reinforcement Learning

# Typical RL scenario



# Data in Supervised vs. Unsupervised Learning