Introduction to Machine Learning

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Machine Learning (ML)

Machine Learning (ML):

- Is a method to analyse data.
- Automates analytical model building using optimization algorithms that iteratively learn from data.
- Allows computers to find hidden insights without being explicitly programmed where to look.
- General steps of ML is presented in Fig. 1.

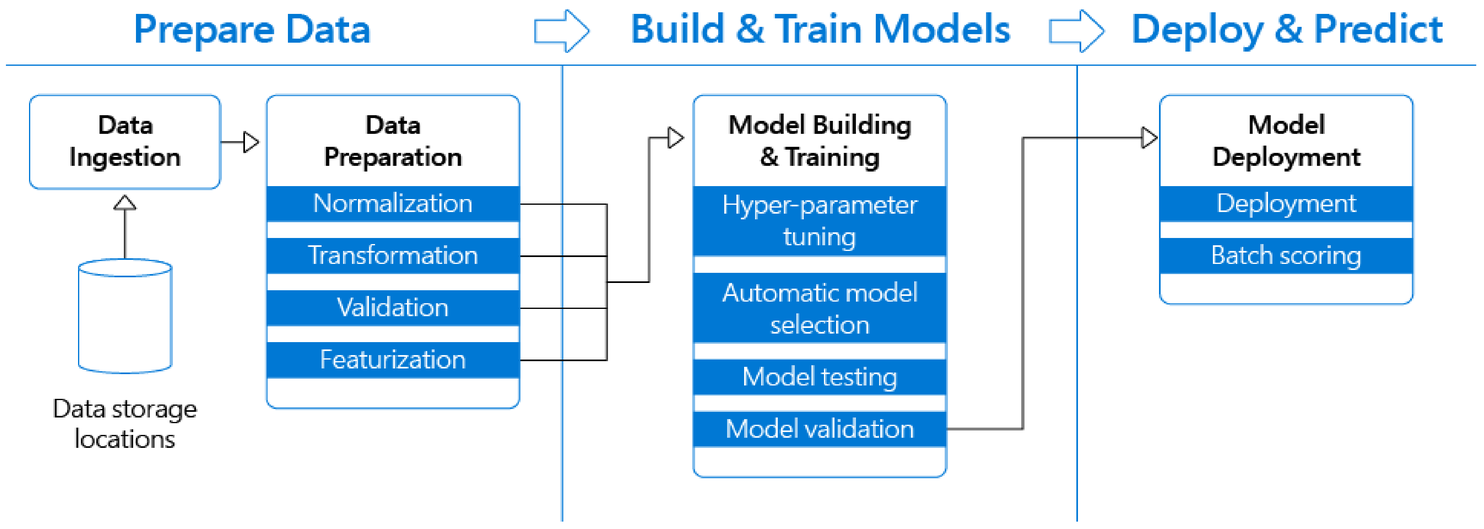

Fig. 1: Machine Learning pipeline [2].

- Fig 2 shows some applications of ML.

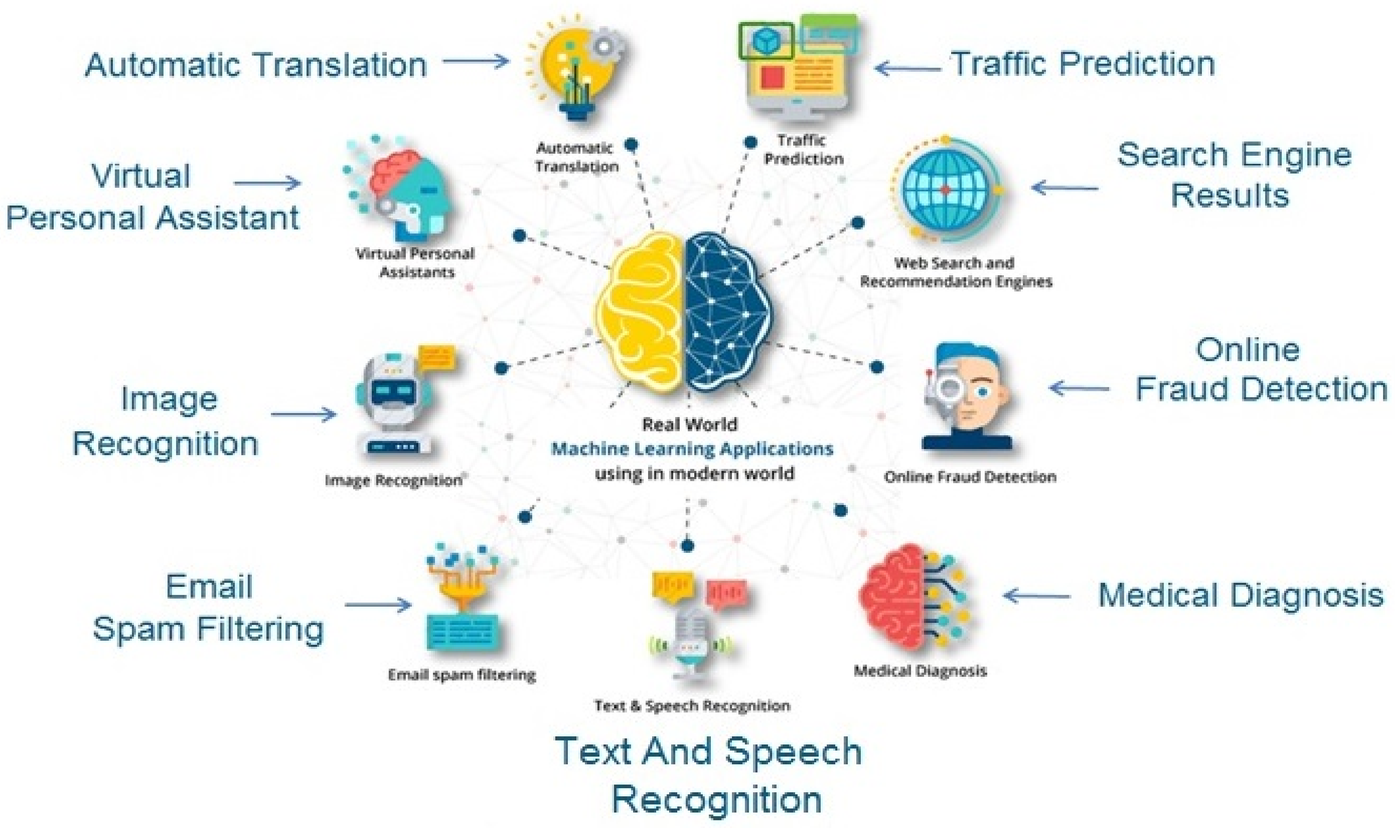

Fig. 2: Machine Learning Applications [3].

Types of Machine Learning Algorithms

ML algorithms can be categorized as follows: (1) Supervised Learning, (2) Semi-supervised Learning, (3) Unsupervised Learning, and (4) Reinforcement Learning.

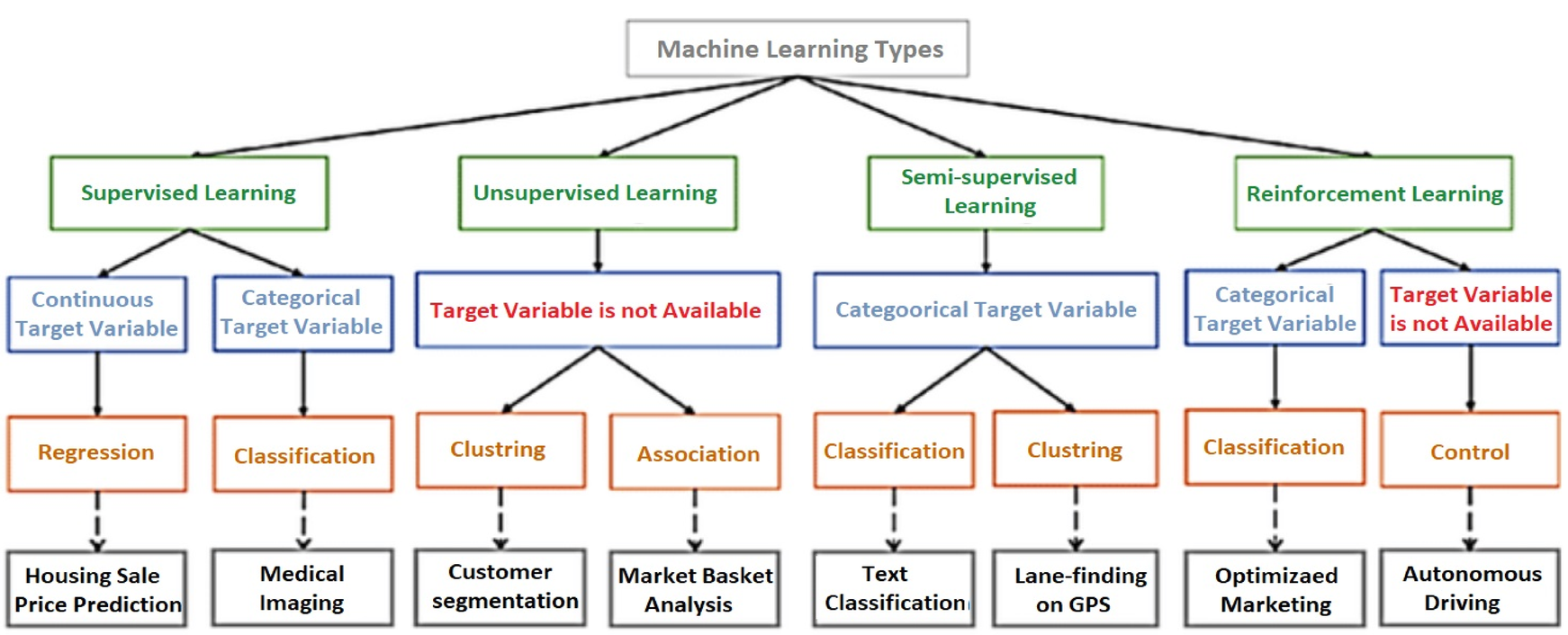

Fig. 3: Machine Learning Types [1]

Supervised Learning

In Supervised Learning

- The input data is **labeled** (i.e. the desired output is known).
- Th goal is mapping input to output labels.

Unsupervised Learning

In Unsupervised Learning

- The input data is **unlabeled**.
- Th goal is finding a pattern/structure within the given data.

Semi-supervised Learning

Semi-supervised Learning falls between supervised learning and unsupervised learning. It combines a small amount of labeled data with a large amount of unlabeled data during training.

Reinforcement Learning

In Reinforcement Learning, agent and environment are two important components. An RL agent

- learns from the consequences of its actions.
- selects its actions on basis of its past experiences (exploitation) and by new choices (exploration).
- explores environment to learn which actions lead to the best reward.
- seeks to learn to select actions that maximize the reward over time.

Note: Reward is RL signal that the RL agent receives, which encodes the success of an action's outcome [4].

References

[1] david Fumo. Types of machine learning algorithms you should know. Last accessed 2021.

[2] Francesca Lazzeri. How to accelerate devops with machine learning lifecycle management, 2019. Last accessed 2021.

[3] Javatpoint. Applications of machine learning. Last accessed 2021.

[4] Richard S Sutton and Andrew G Barto. *Reinforcement learning: An introduction*. MIT press, 2018.