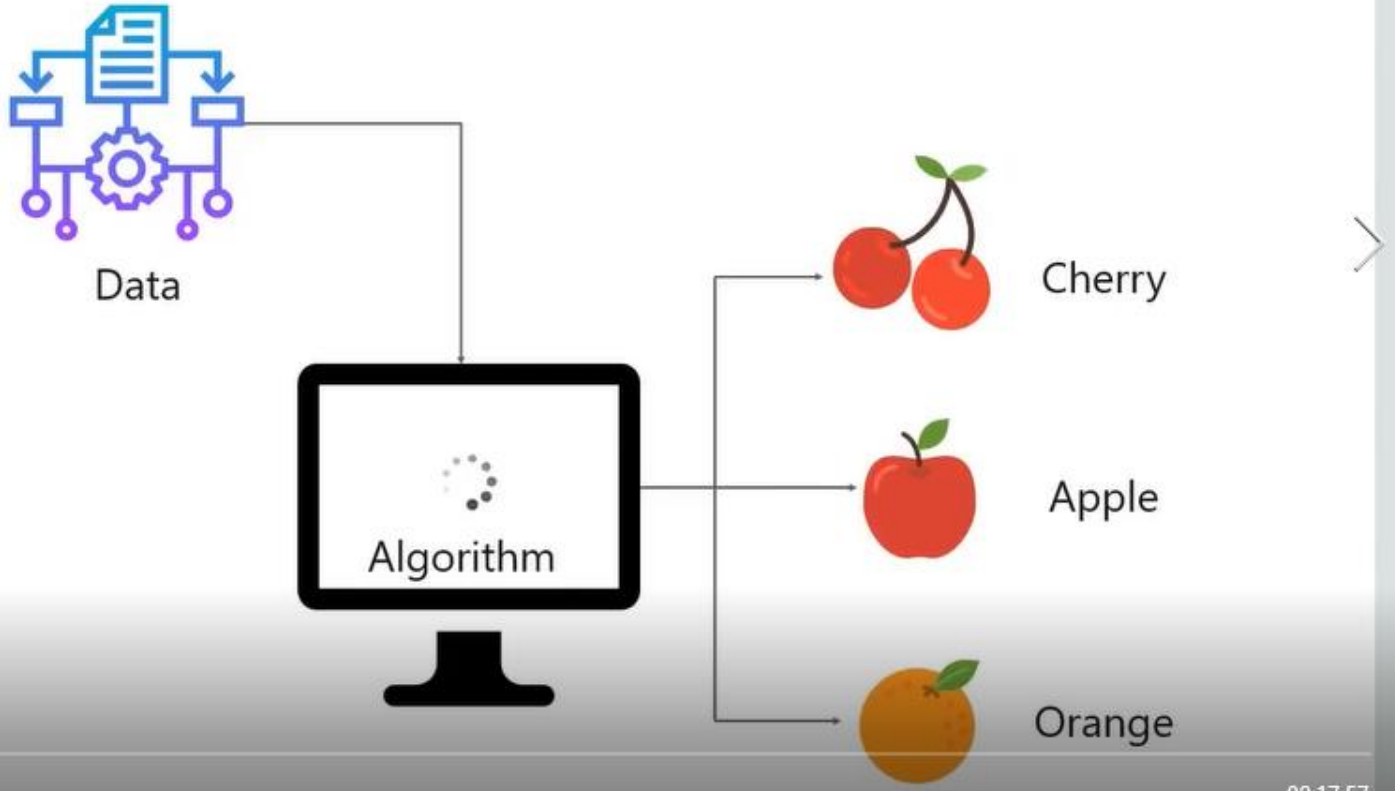
MACHINE LEARNING

What Is Machine Learning?

Machine learning is a subset of artificial intelligence (AI) which provides machines the ability to learn automatically & improve from experience without being explicitly programmed.



Previous video

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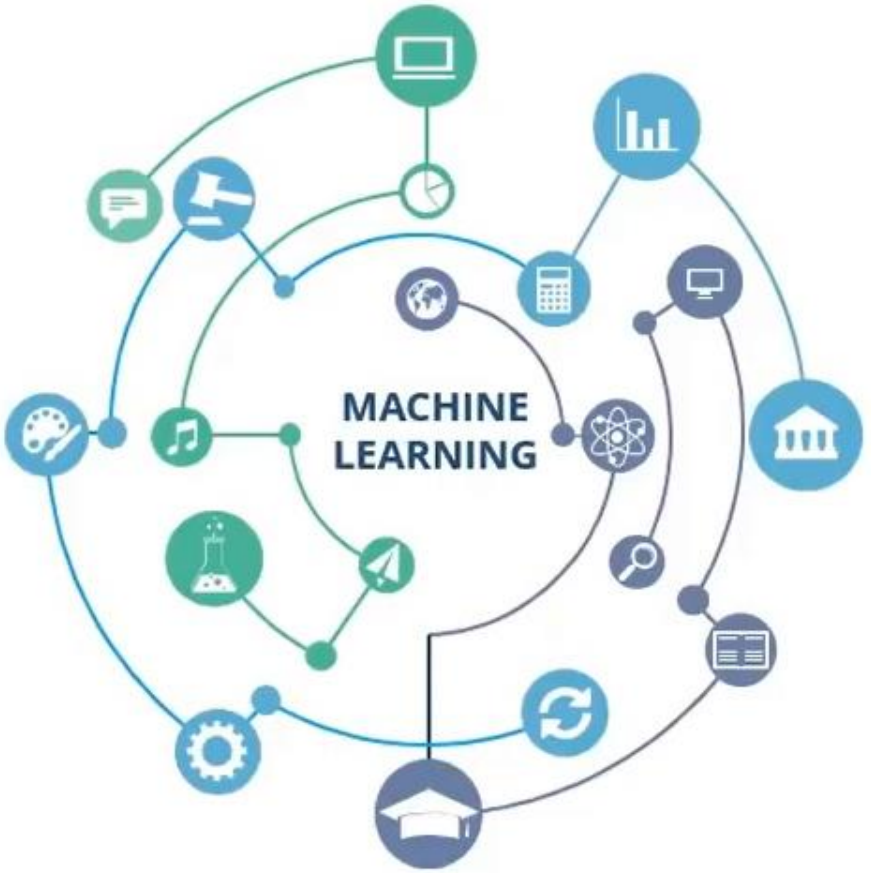
Explaining Machine Learning

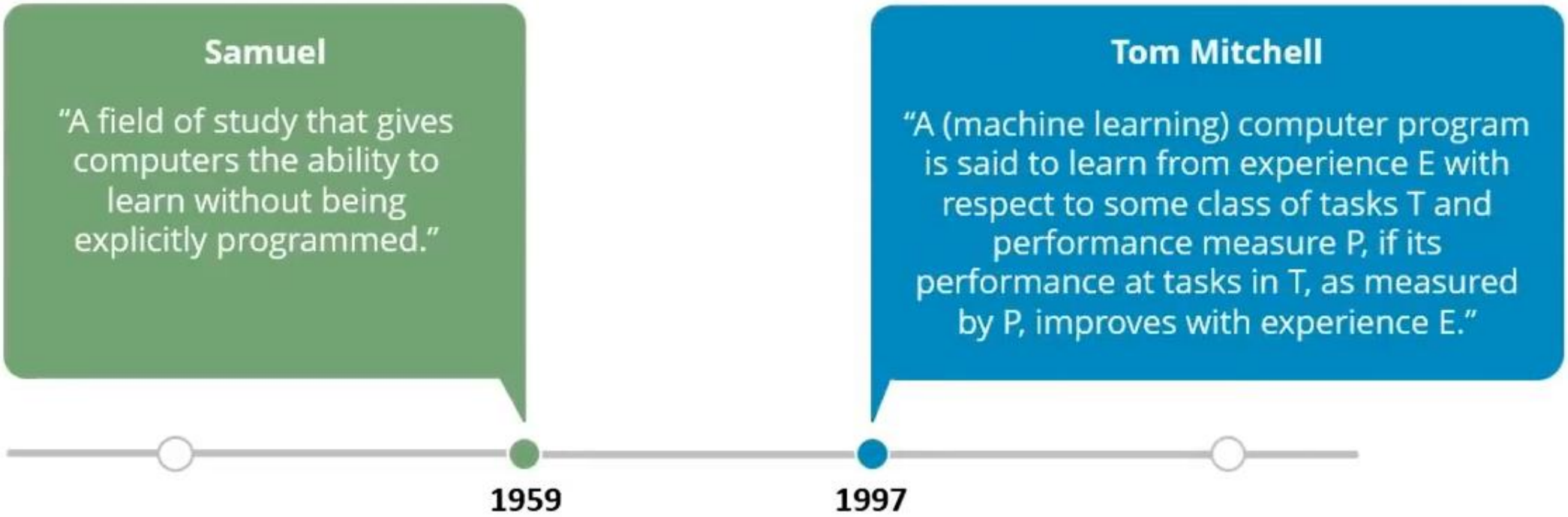
Machine Learning is a sub-field of Artificial Intelligence that has empowered various smart applications.

Its functions are as follows:

- Deals with the construction and study of systems that can learn from data
- Aims to let a computer predict something
- Predicts unknown things or events



Explaining Machine Learning



Example: Spam Filtering

Spam - is all email the user does not want to receive and has not asked to receive

T: Identify Spam Emails

P:

% of spam emails that were filtered

% of ham/ (non-spam) emails that were incorrectly filtered-out

E: a database of emails that were labelled by users

Common Terminologies in Machine Learning

Vector Feature	It is an n-dimensional vector of numerical features that represent some object.

Common Terminologies in Machine Learning

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Samples

They are the items to process.

Common Terminologies in Machine Learning

Vector Feature	It is an n-dimensional vector of numerical features that represent some object.
Samples	They are the items to process.
Feature Space	It refers to the collections of features that are used to characterize your data.

Common Terminologies in Machine Learning

Vector Feature	It is an n-dimensional vector of numerical features that represent some object.
Samples	They are the items to process.
Feature Space	It refers to the collections of features that are used to characterize your data.
Labeled Data	It is the data with known classification results.

Examples of Features

Color - Red

Type - Fruit

Shape - Round

Color - Green

Type – Fruit

Shape – Round

Applications of Machine Learning

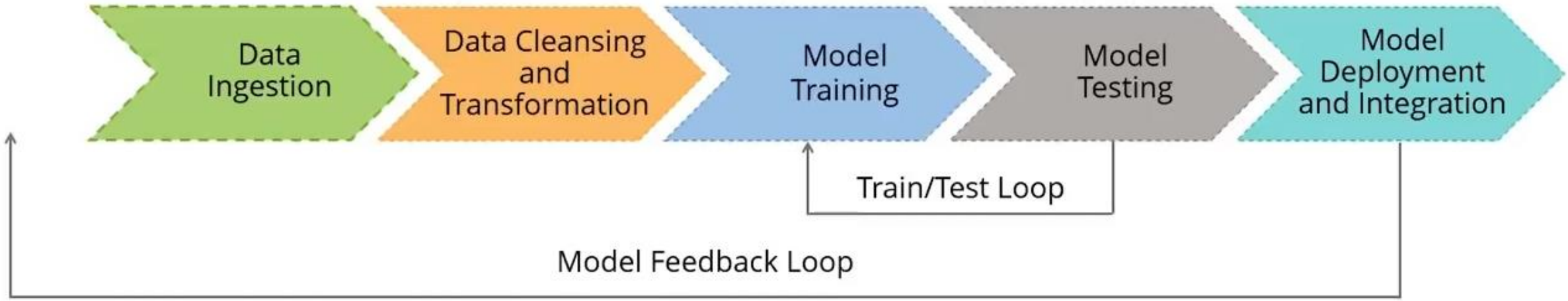
Machine learning is helping companies make new discoveries,
and identify and remediate issues faster.

Speech Recognition

Effective Web Search

Recommendation Systems

Steps of General Machine Learning Pipeline



Types Of Machine Learning

Supervised Learning

Unsupervised Learning

Reinforcement Learning

Types of Machine Learning

Supervised

Known Data

Model

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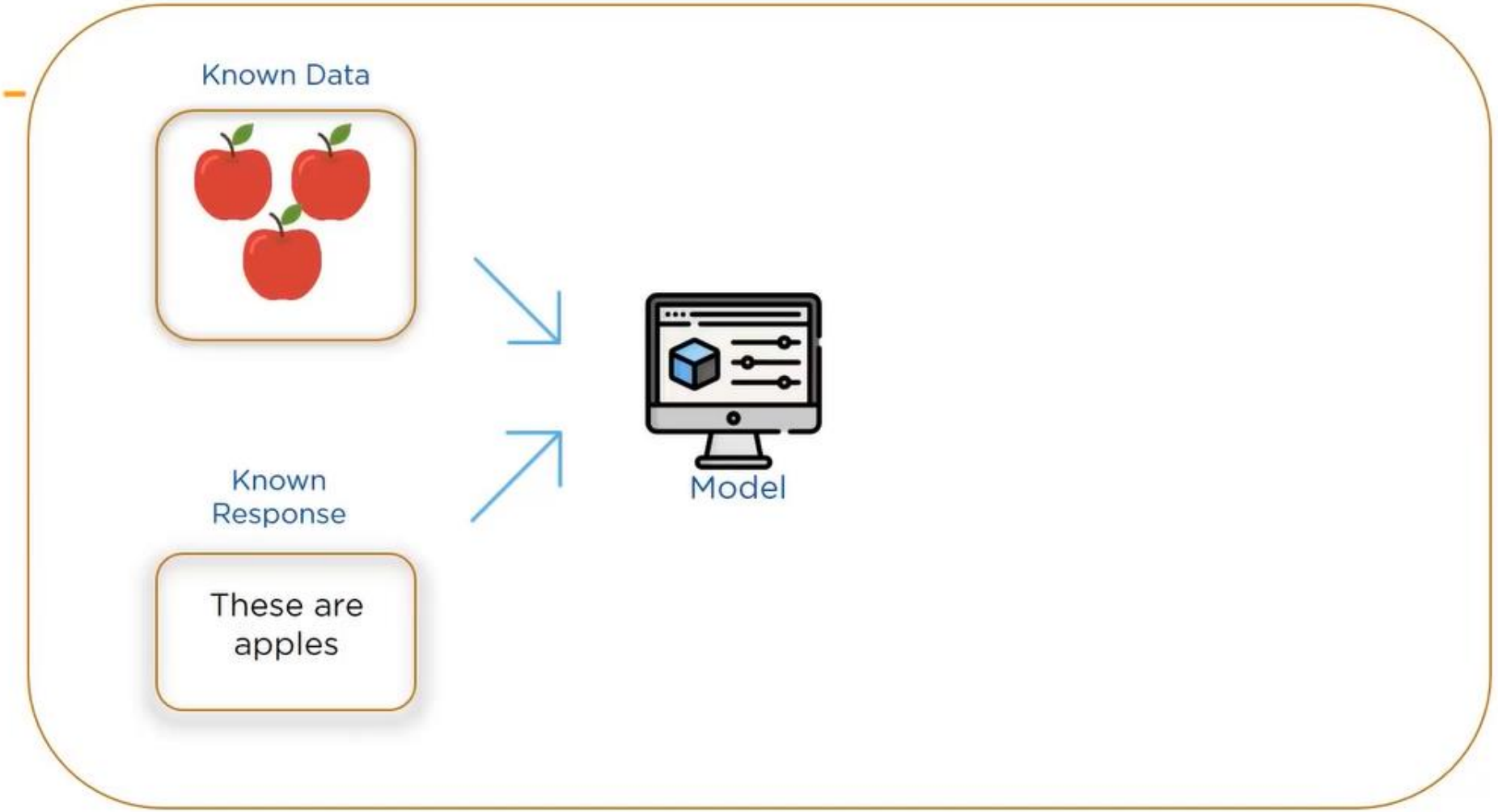
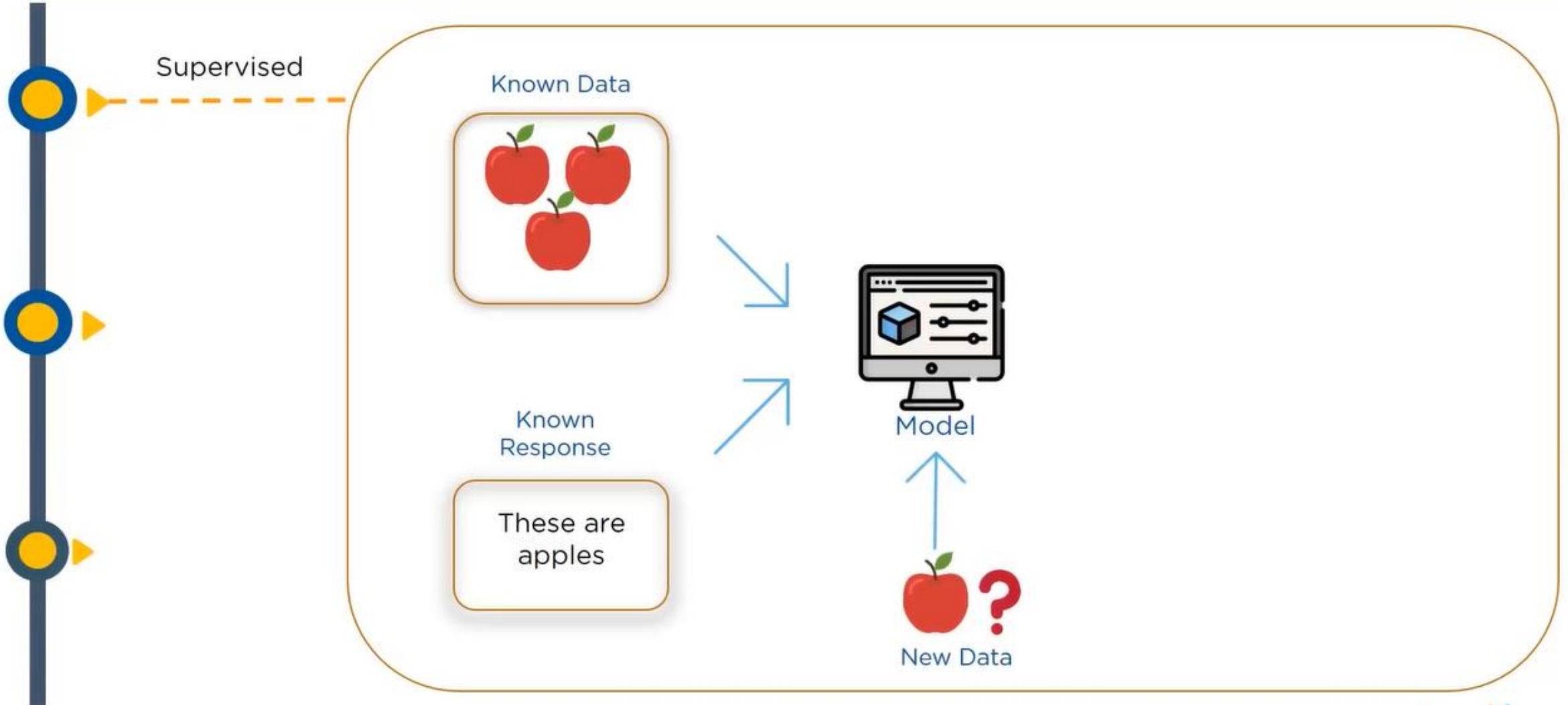
Types of Machine Learning

Supervised

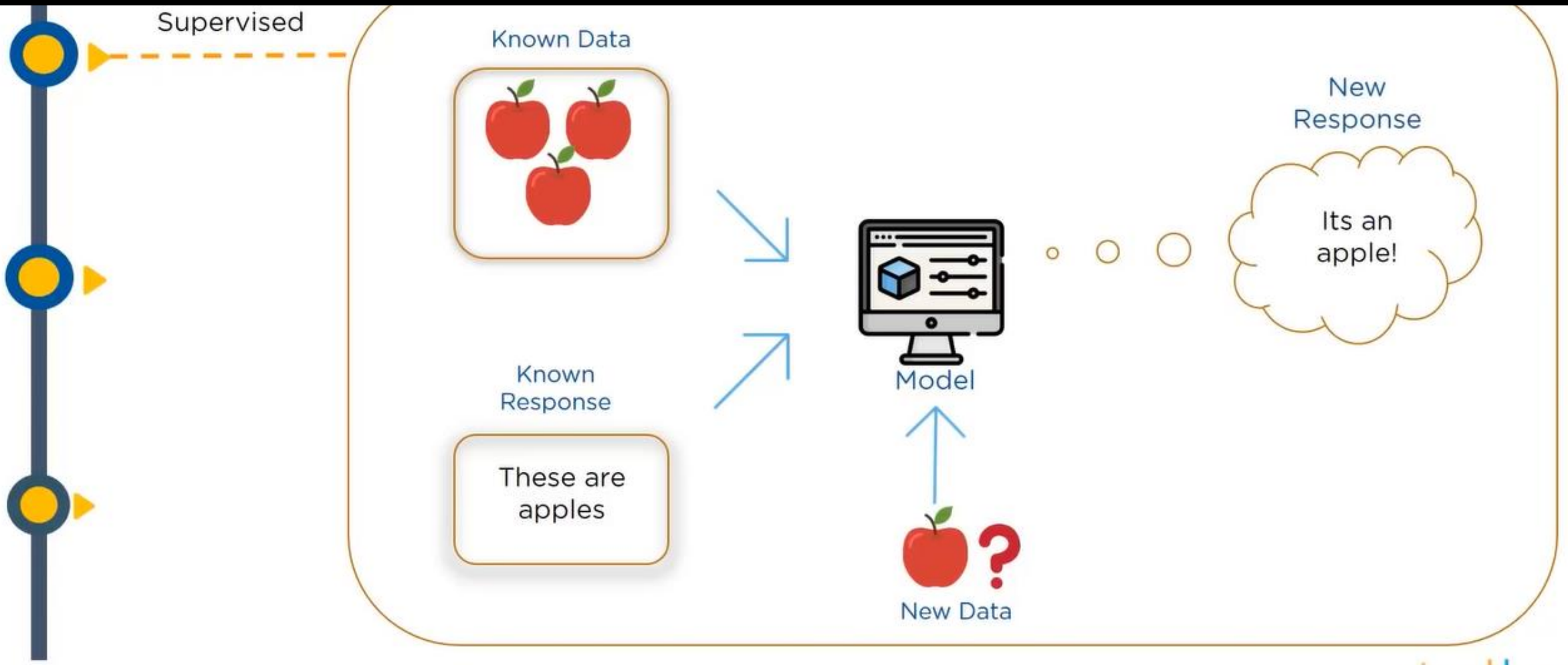


Types of Machine Learning



Types of Machine Learning

In this type of machine-learning system, the data that you feed into the algorithm, with the desired solution, are referred to as "labels."



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Types of Machine Learning

Unsupervised

Input Data

Model

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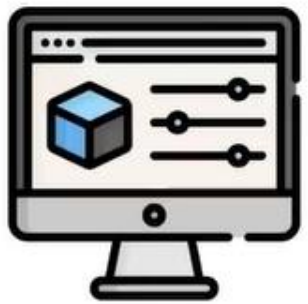
Types of Machine Learning

Unsupervised

Input Data



Model

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Types of Machine Learning

Unsupervised

Input Data

Model

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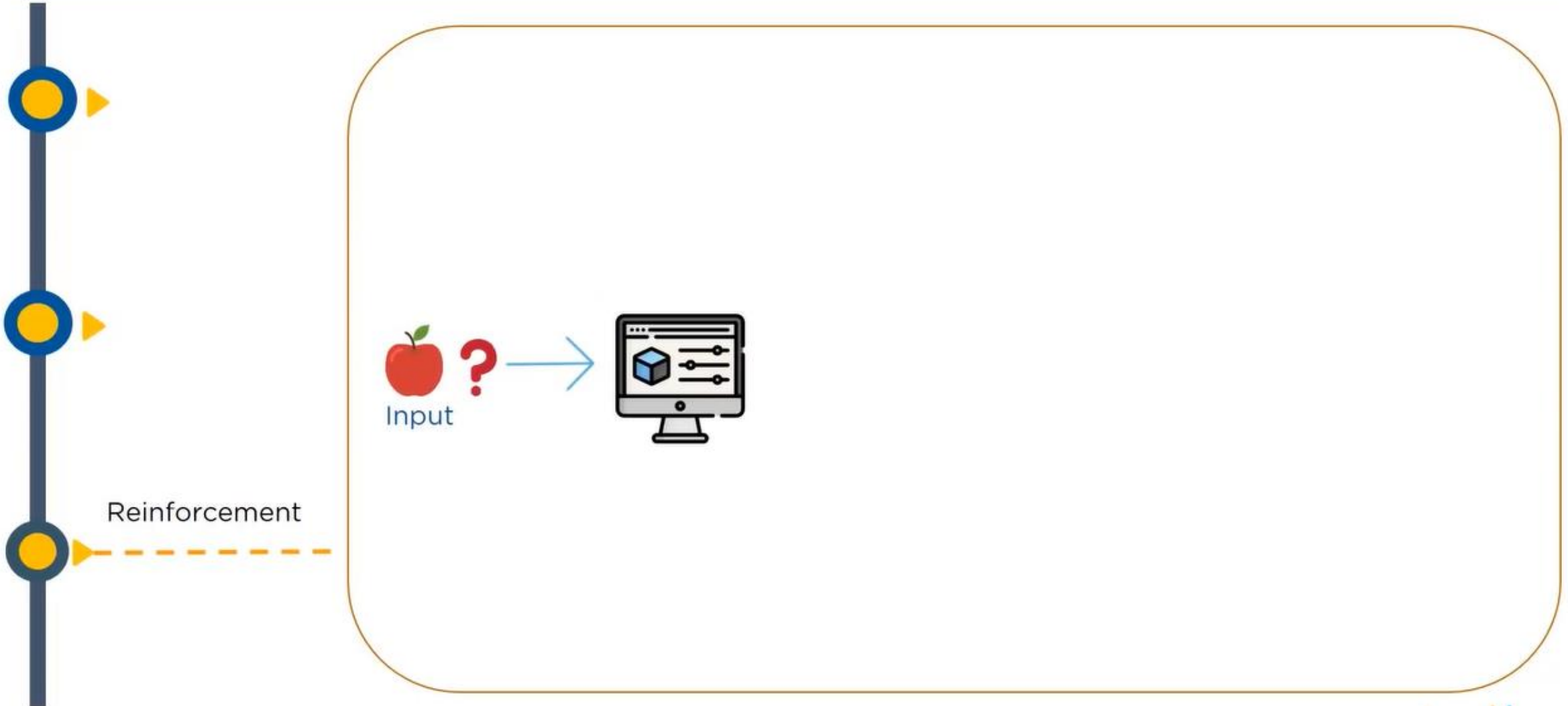
Types of Machine Learning



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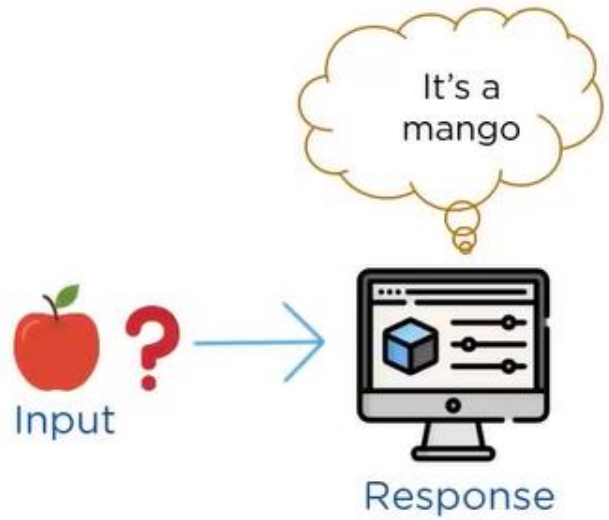
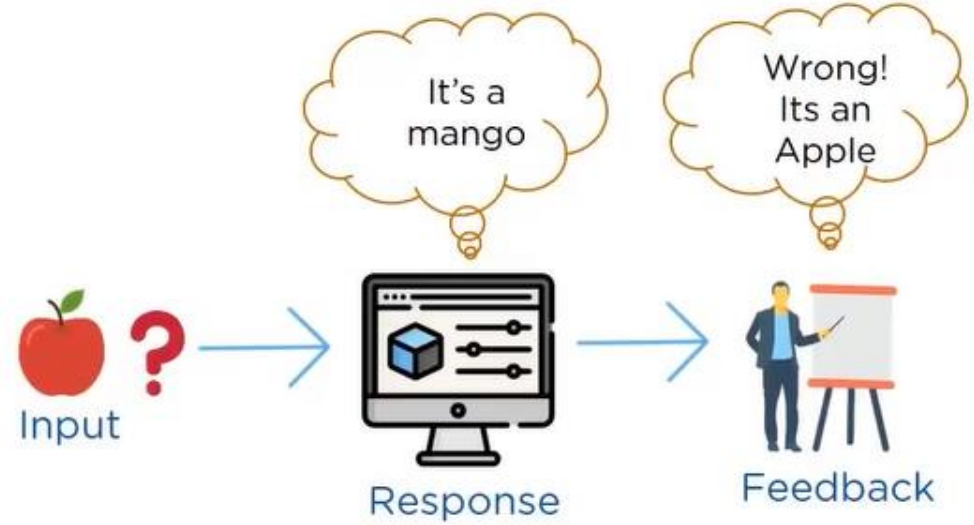
Types of Machine Learning

Reinforcement



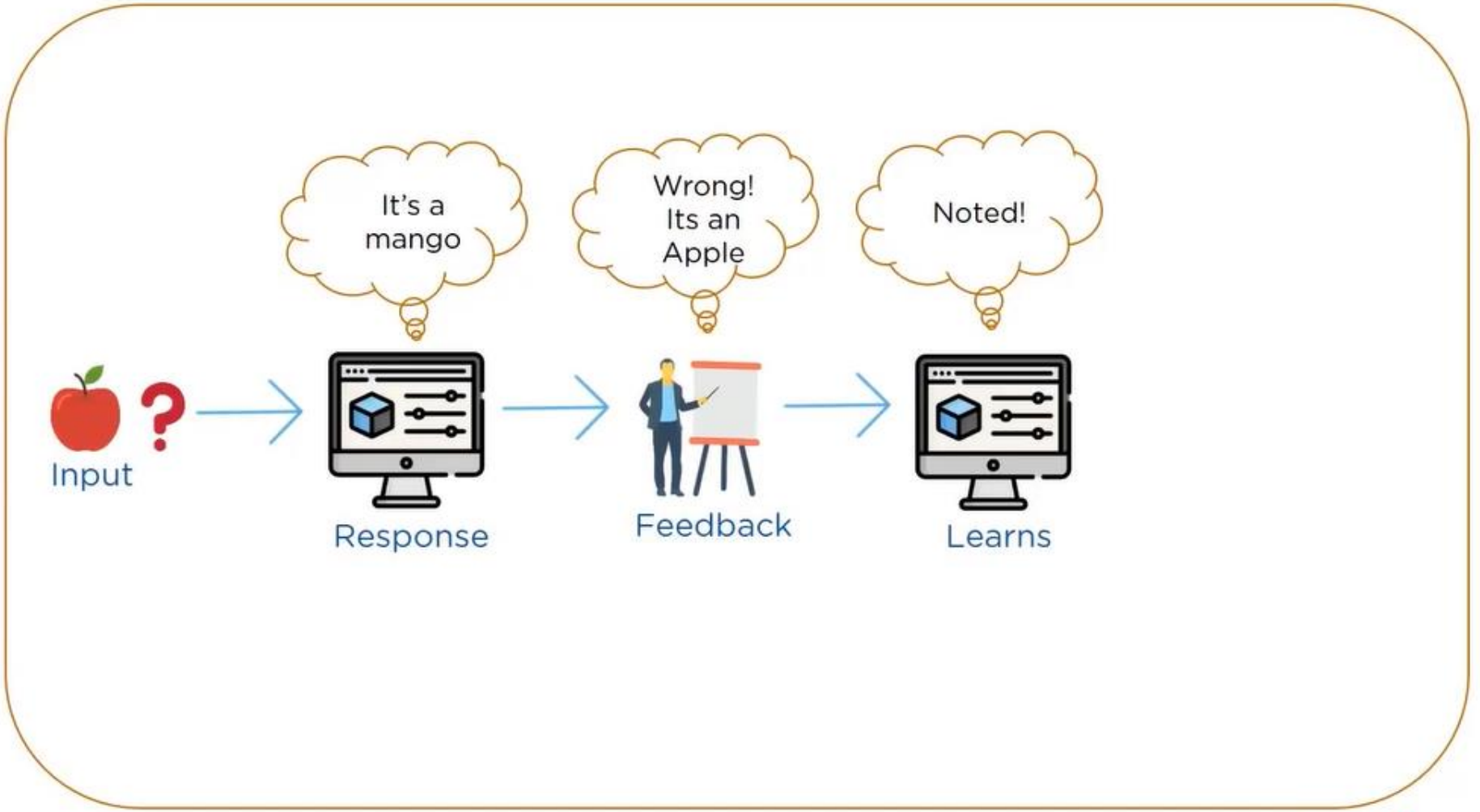
Types of Machine Learning

Reinforcement



Types of Machine Learning

Reinforcement



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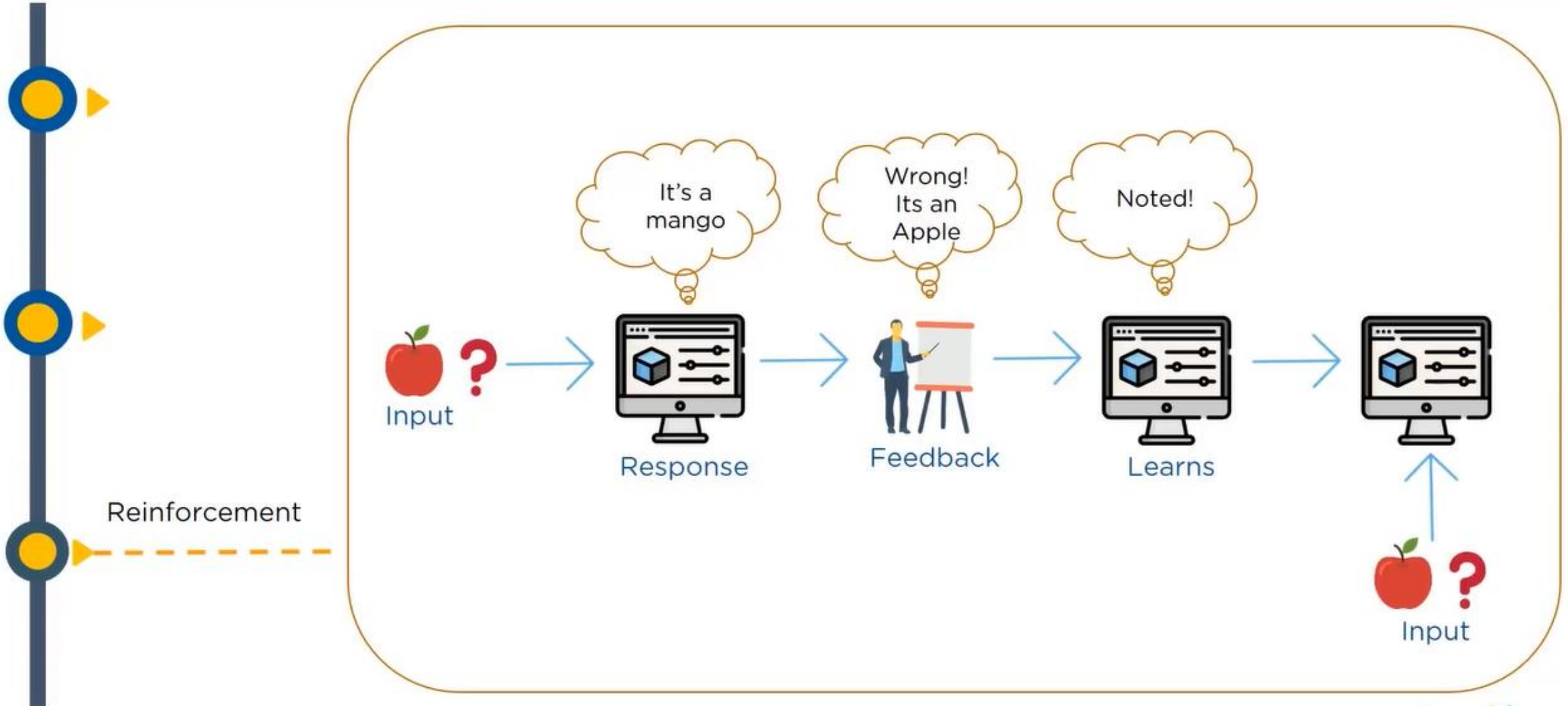

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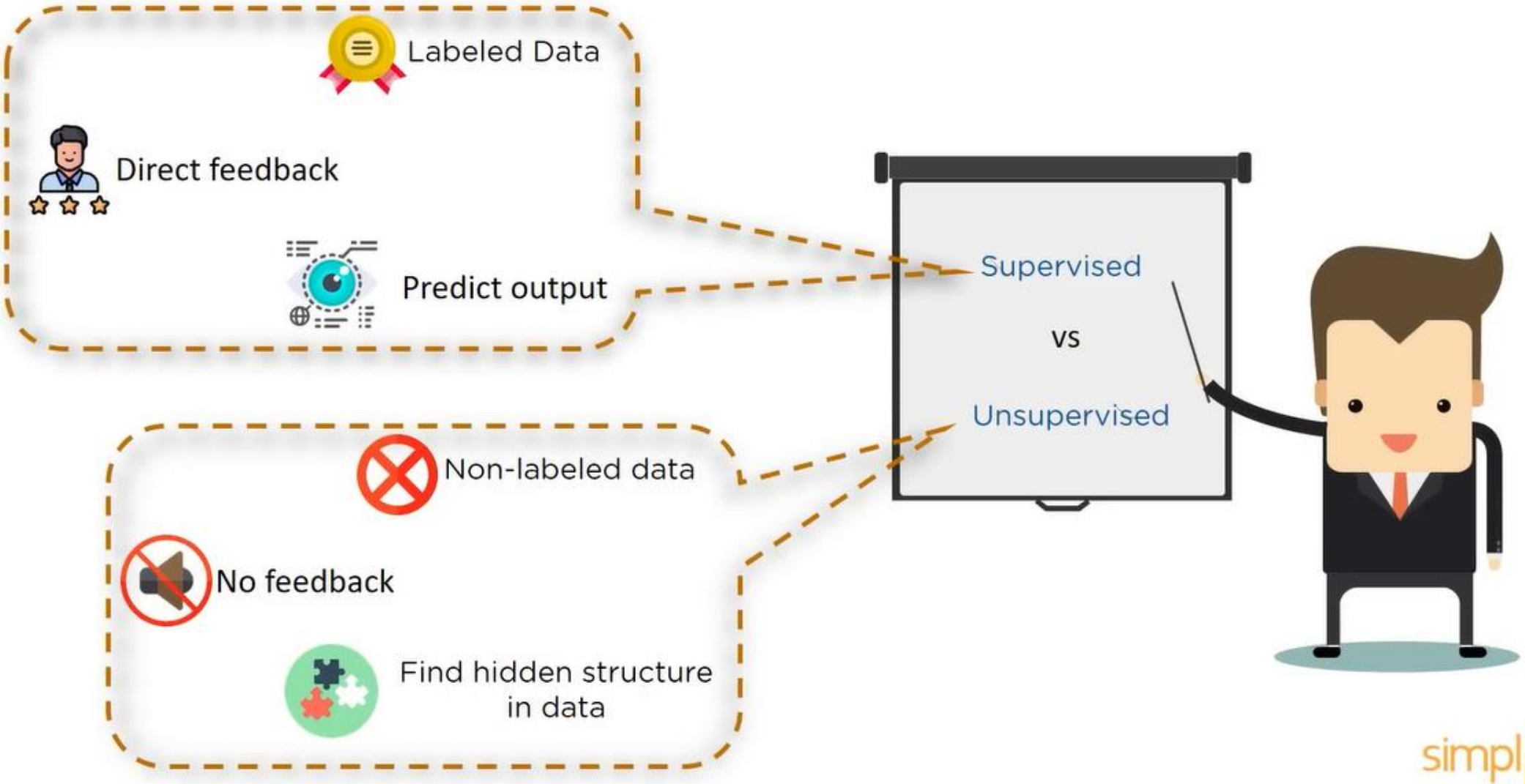
Supervised vs Unsupervised



Definition

- Definition
- Type of Problems
- Type of data
- Training
- Aim
- Approach
- Output Feedback
- Popular Algorithms
- Applications

Supervised learning is a method in which we teach the machine using labelled data

In unsupervised learning the machine is trained on unlabelled data without any guidance

In Reinforcement learning an agent interacts with its environment by producing actions & discovers errors or rewards

Problem Type

- Definition
- Type of Problems
- Type of data
- Training
- Aim
- Approach
- Output Feedback
- Popular Algorithms
- Applications

Supervised Learning

Regression

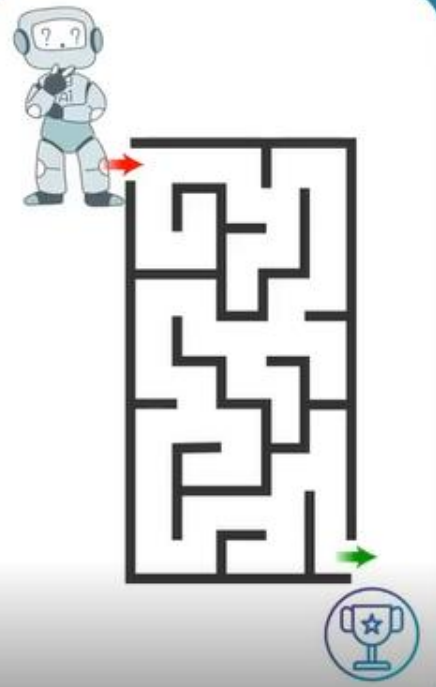
Classification

Unsupervised Learning

Association

Clustering

Reinforcement Learning



Another example is to predict a numeric value like the price of a flat, given a set of features (location, number of rooms, facilities) called predictors; this type of task is called regression.

Type of data

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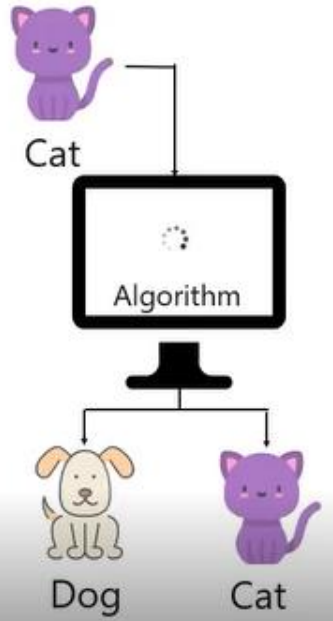
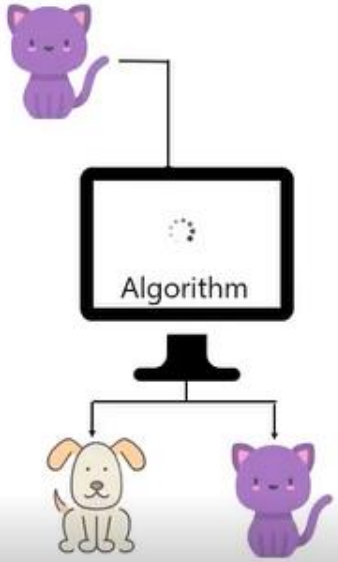
Supervised Learning

Labelled Data



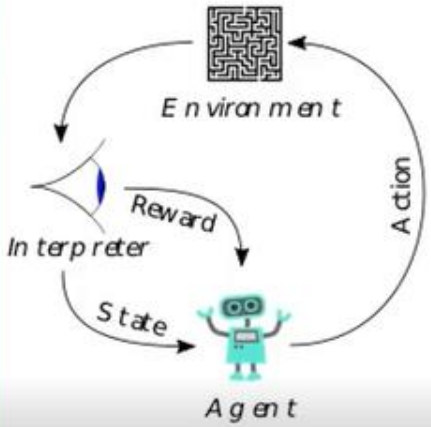
Unsupervised Learning

Unlabelled Data



Reinforcement Learning

No Predefined Data



Training

- Definition
- Type of Problems
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Supervised Learning

External supervision

Unsupervised Learning

No supervision

Reinforcement Learning

No supervision

Aim

- Definition
- Type of Problems
- Type of data
- Training
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- Approach
- Output Feedback
- Popular Algorithms
- Applications

Supervised Learning

Forecast outcomes

Unsupervised Learning

Discover underlying patterns

Reinforcement Learning

Learn series of action

edureka!

Approach

- Definition
- Type of Problems
- Type of data
- Training
- Aim
- Approach
- Output Feedback
- Popular Algorithms
- Applications

Supervised Learning

Map labelled input to known output

Labelled Input → Training → Algorithm → Known Output

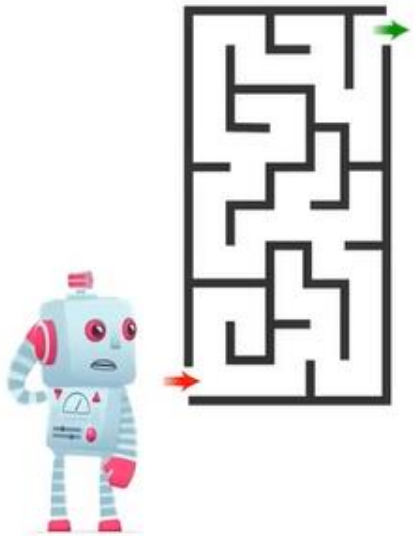
Unsupervised Learning

Understand patterns and discover output

Unlabelled Input → Explore patterns & trends → Algorithm → Output

Reinforcement Learning

Follow Trail and Error method



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Output Feedback

- Definition
- Type of Problems
- Type of data
- Training
- Aim
- Approach
- Output Feedback
- Popular Algorithms
- Applications

Supervised Learning

Direct Feedback

Labelled Input → Training → Known Output

Unsupervised Learning

No Feedback

Unlabelled Input → Explore patterns & trends → Output

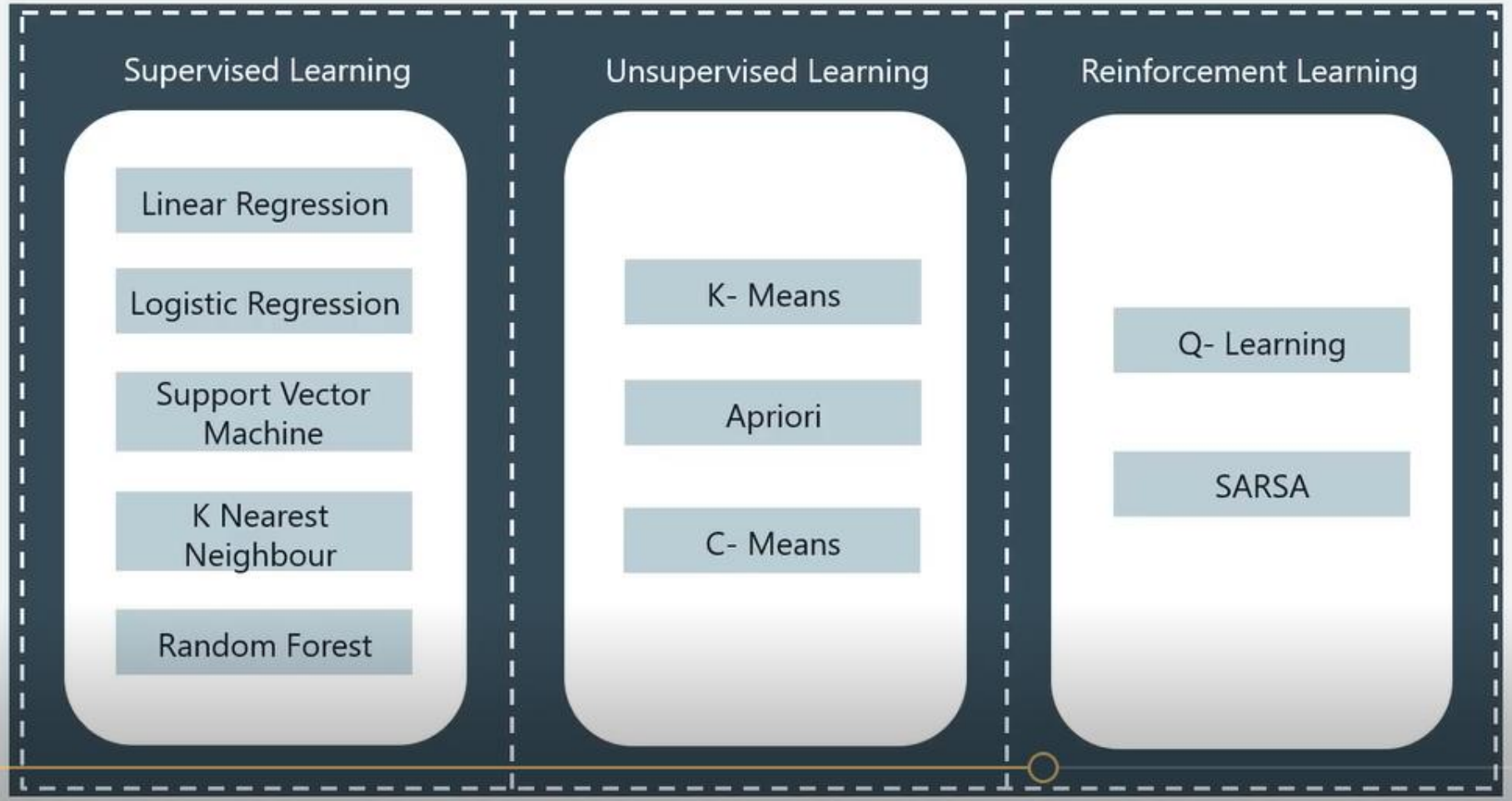
Reinforcement Learning

Reward system

Input state → Environment

Reward

Popular Algorithms



Classification and Regression

In classification, the goal is to predict **a class label**, which is a choice from a predefined list of possibilities

- Classification is sometimes separated into binary classification, which is the special case of distinguishing between exactly two classes, and multiclass classification

- Classifying emails as either spam or not spam is an example of a binary classification problem.

Generalization, Overfitting, and Underfitting

unseen data that has the same characteristics as the training set that we used. If a model is able to make accurate predictions on unseen data, we say it is able to generalize from the training set to the test set.

Applications

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- Type of Problems
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Supervised Learning

Risk Evaluation

Forecast Sales

Unsupervised Learning

Recommendation Systems

Anomaly Detection

Reinforcement Learning

Self driving cars

Gaming

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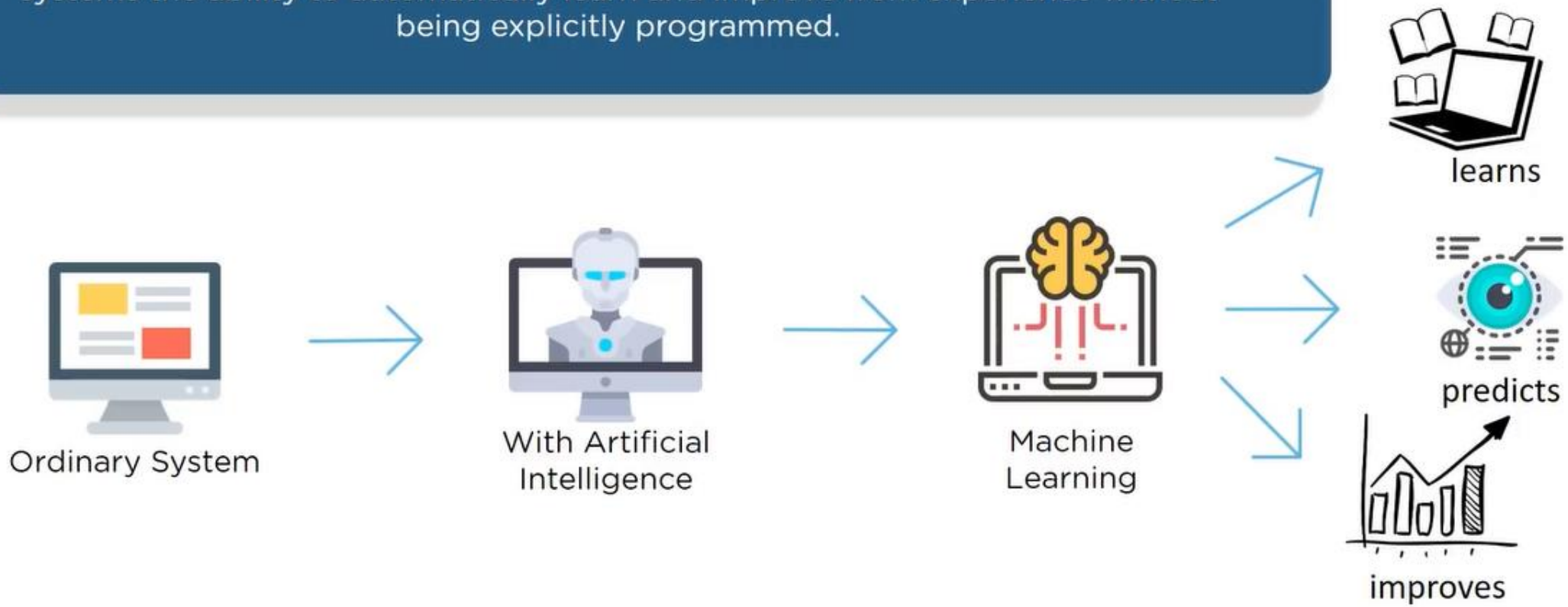
What is Machine Learning?

Machine Learning is an application of Artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.



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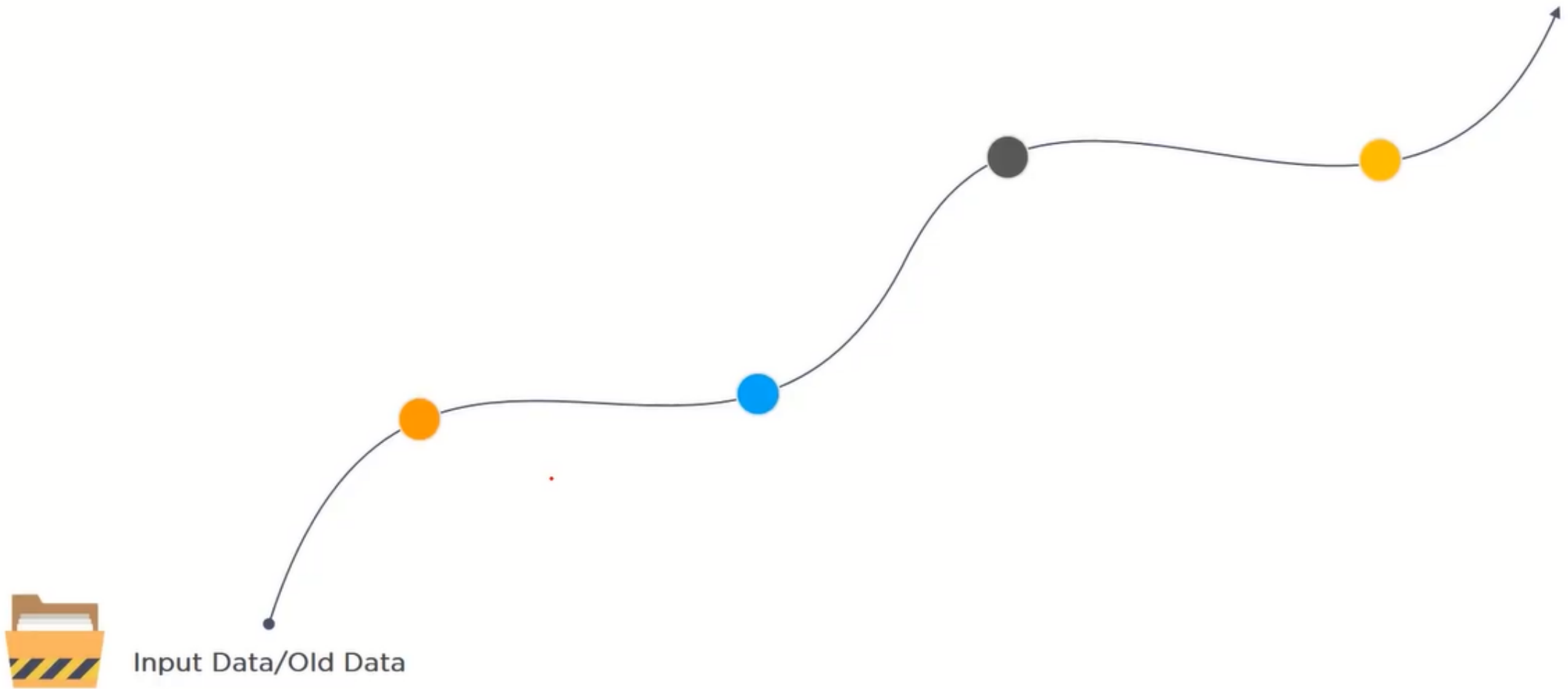
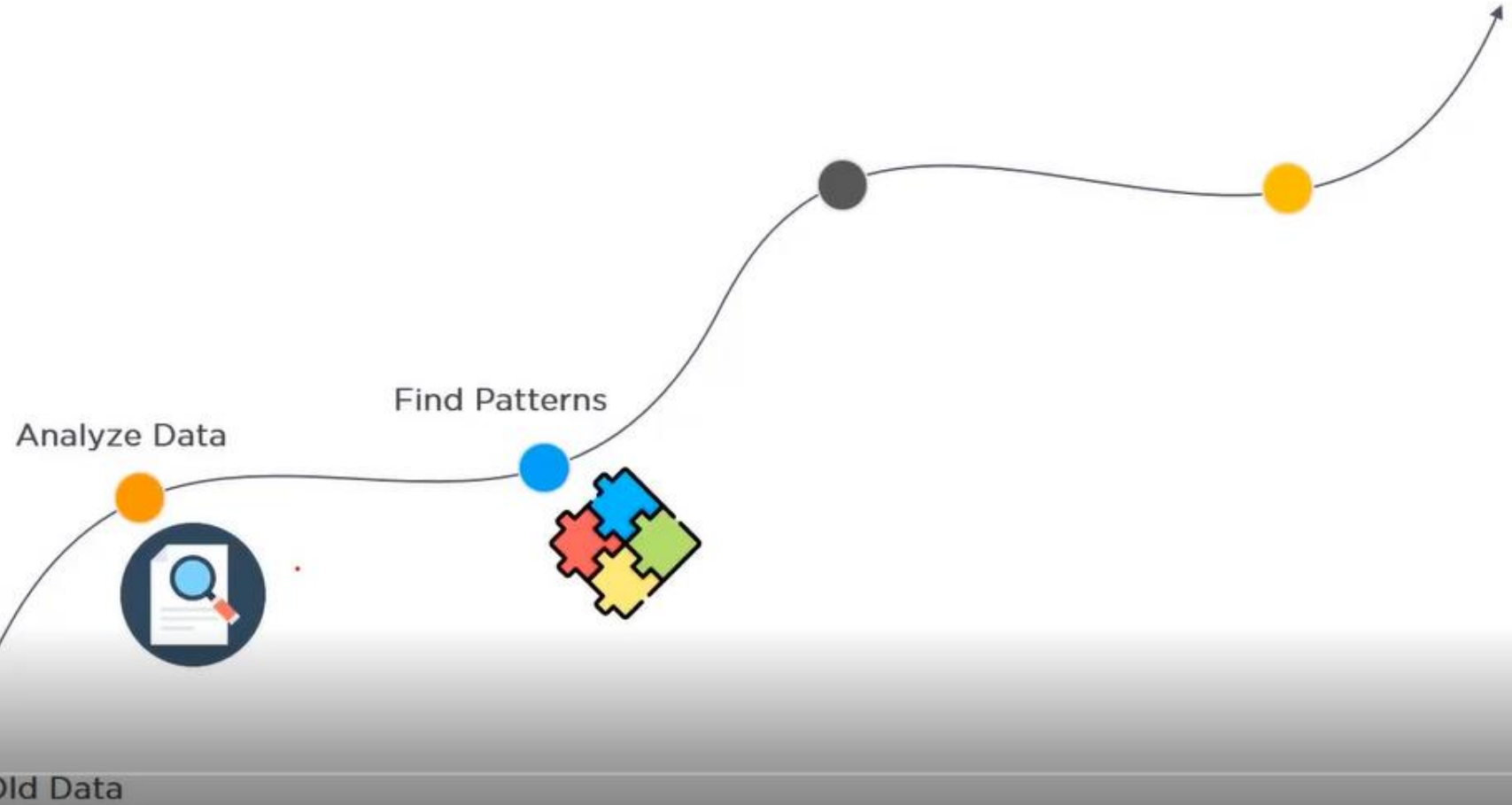
Machine Learning process



Machine Learning process

Machine Learning process



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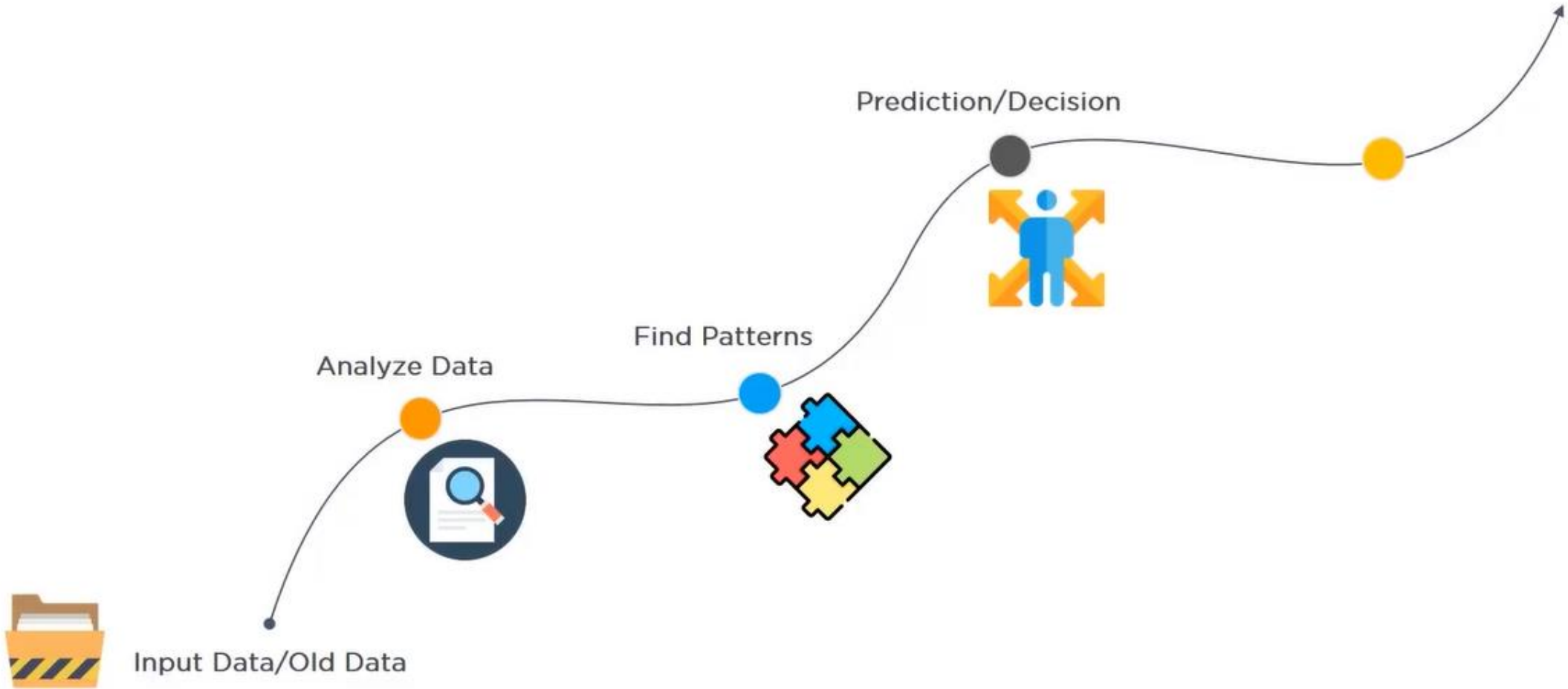
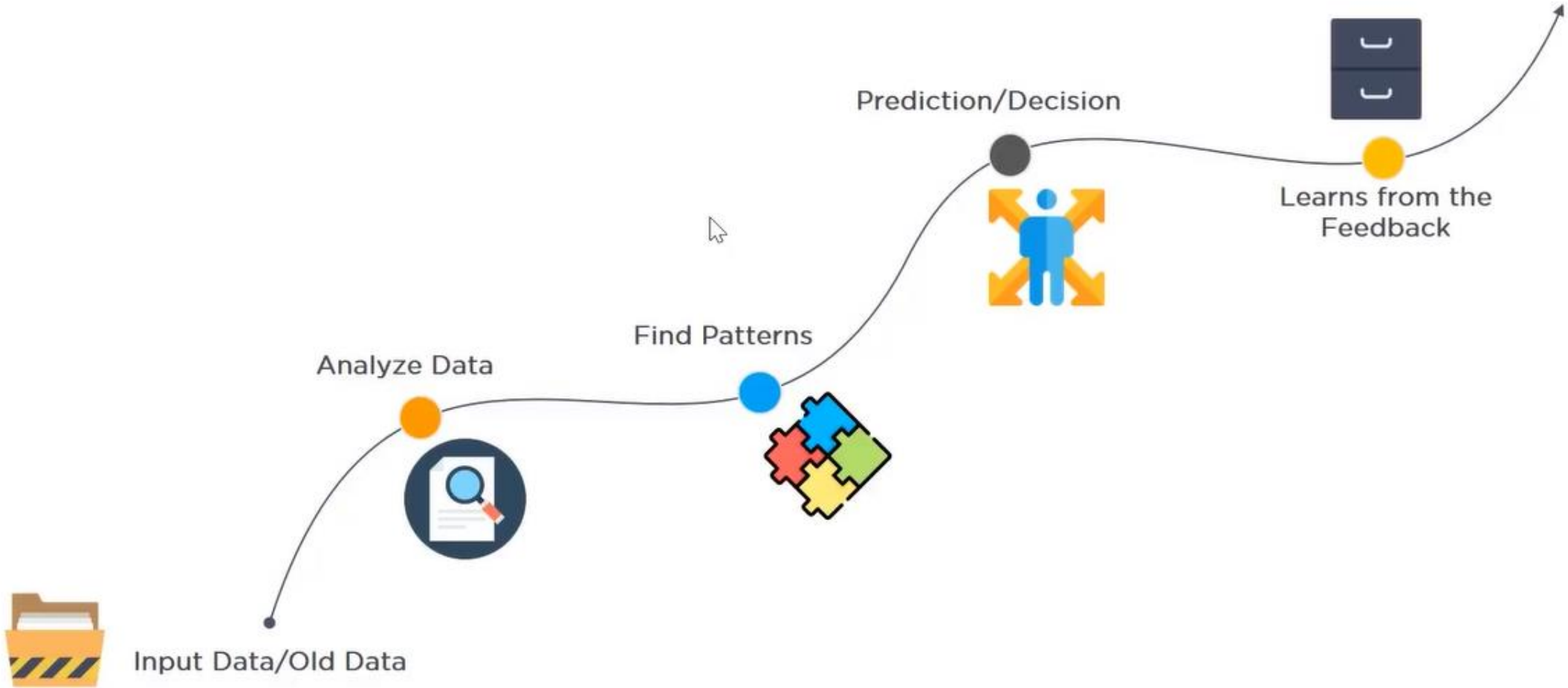


Machine Learning process



The right Machine Learning solution?

Classification

Used when the output is categorical like 'YES' or 'NO'

Algorithms used

- Decision Tree
- Naïve Bayes
- Random Forest
- Logistic regression
- KNN

The right Machine Learning solution?

Classification

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Regression

Used when a value needs to be predicted like the 'stock prices'

Algorithms used

- Linear Regression

The right Machine Learning solution?

Classification

Used when the output is categorical like 'YES' or 'NO'

Clustering

Used when the data needs to be organized to find patterns in the case of 'product recommendation'

Algorithms used

- Decision Tree
- Naïve Bayes
- Random Forest
- Logistic regression
- KNN

Algorithms used

- K Means

Regression

Used when a value needs to be predicted like the 'stock prices'

Algorithms used

- Linear Regression

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Machine learning Algorithms