



# Introduction to Machine Learning

## (Need for ML and ML Process)

**Dr. Virendra Singh Kushwah**

**Assistant Professor Grade-II**

**School of Computing Science and Engineering**

**[Virendra.Kushwah@vitbhopal.ac.in](mailto:Virendra.Kushwah@vitbhopal.ac.in)**

**7415869616**

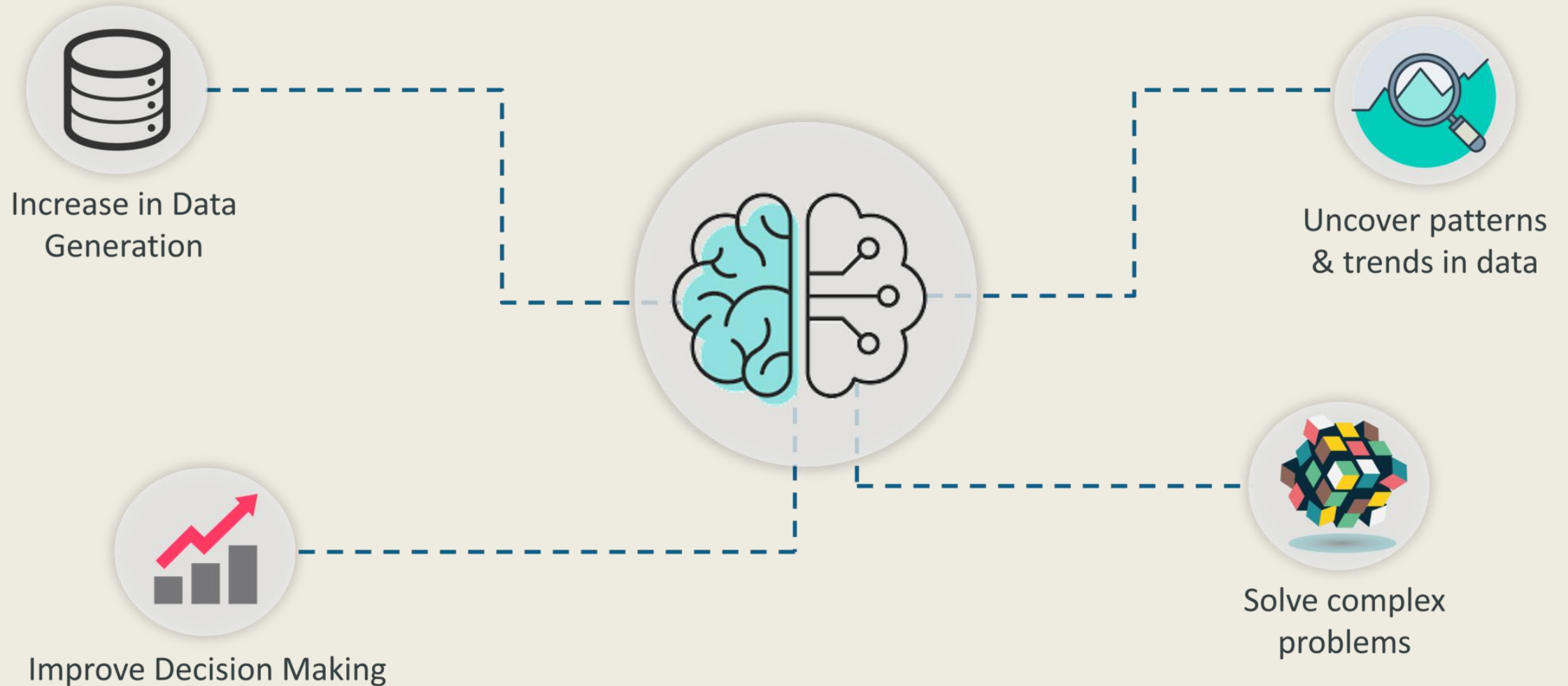


# Lecture-1

- Preface of Machine Learning
- Definition of ML by Tom. M. Mitchell
- What is ML?
- Difference between AI and ML
- Understanding ML by real life examples

# Need For Machine Learning

- **Increase in Data Generation:** Due to excessive production of data, we need a method that can be used to structure, analyze and draw useful insights from data. This is where Machine Learning comes in. It uses data to solve problems and find solutions to the most complex tasks faced by organizations.
- **Improve Decision Making:** By making use of various algorithms, Machine Learning can be used to make better business decisions. For example, Machine Learning is used to forecast sales, predict downfalls in the stock market, identify risks and anomalies, etc.



- **Uncover patterns & trends in data:** Finding hidden patterns and extracting key insights from data is the most essential part of Machine Learning. By building predictive models and using statistical techniques, Machine Learning allows you to dig beneath the surface and explore the data at a minute scale. Understanding data and extracting patterns manually will take days, whereas Machine Learning algorithms can perform such computations in less than a second.
- **Solve complex problems:** From detecting the genes linked to the deadly ALS disease to building self-driving cars, Machine Learning can be used to solve the most complex problems.

$$R_v = \{S_1, S_2, S_3, S_4\}$$



# Machine Learning Definitions

$$R_v = S_2$$

- ✓ **Algorithm:** A Machine Learning algorithm is a set of rules and statistical techniques used to learn patterns from data and draw significant information from it. It is the logic behind a Machine Learning model. An example of a Machine Learning algorithm is the Linear Regression algorithm.
- ✓ **Model:** A model is the main component of Machine Learning. A model is trained by using a Machine Learning Algorithm. An algorithm maps all the decisions that a model is supposed to take based on the given input, in order to get the correct output.
- ✓ **Predictor Variable:** It is a feature(s) of the data that can be used to predict the output.
- ✓ **Response Variable:** It is the feature or the output variable that needs to be predicted by using the predictor variable(s).
- ✓ **Training Data:** The Machine Learning model is built using the training data. The training data helps the model to identify key trends and patterns essential to predict the output.
- ✓ **Testing Data:** After the model is trained, it must be tested to evaluate how accurately it can predict an outcome. This is done by the testing data set.

Y	HS
17	5000
18	7500
19	9000
20	10000
21	?

Data set  
100%

T	S
80%	20%
70%	30%
60%	40%

1 R  
55%  
45%  
1 S

ML model ?

ML model

data → Algo

predefined  
expression

Build the model

Algo  
+ its data

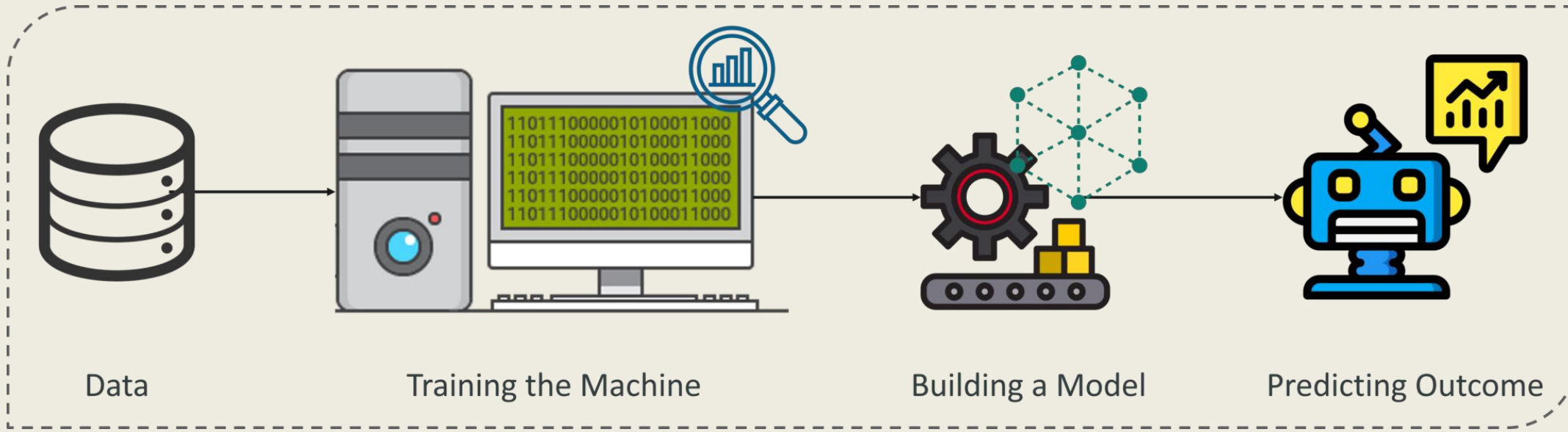
Output

predict

Input

new source  
or  
testing data



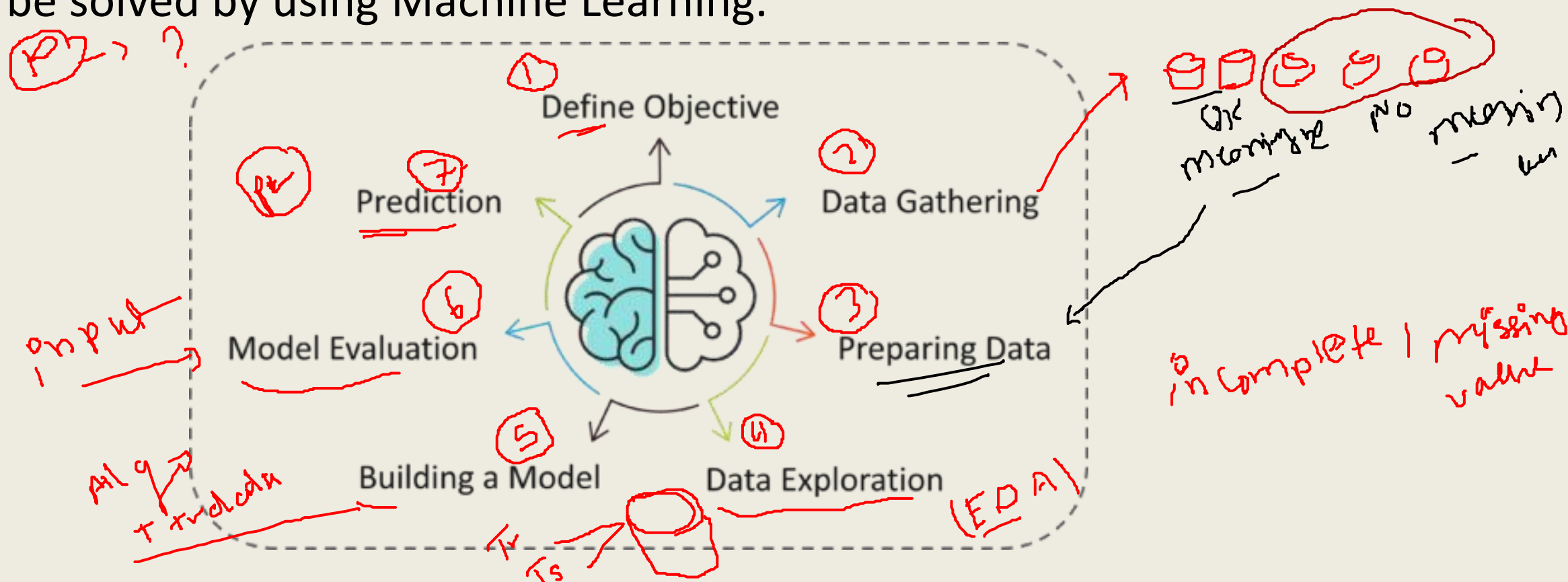


- To sum it up, take a look at the above figure. A Machine Learning process begins by feeding the machine lots of data, by using this data the machine is trained to detect hidden insights and trends. These insights are then used to build a Machine Learning Model by using an algorithm in order to solve a problem.



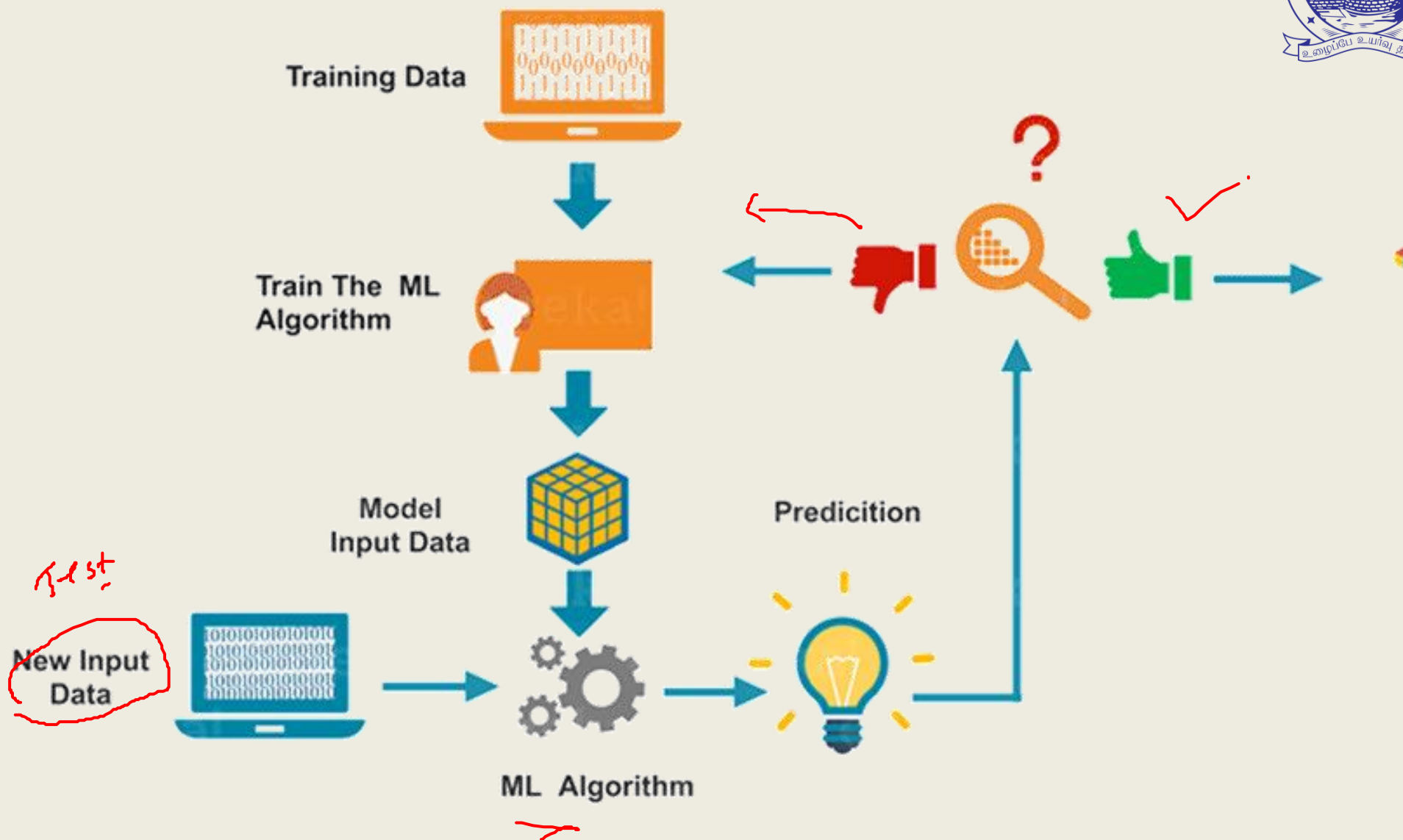
# Machine Learning Process

- The Machine Learning process involves building a Predictive model that can be used to find a solution for a Problem Statement. To understand the Machine Learning process let's assume that you have been given a problem that needs to be solved by using Machine Learning.



# How does Machine Learning Work?

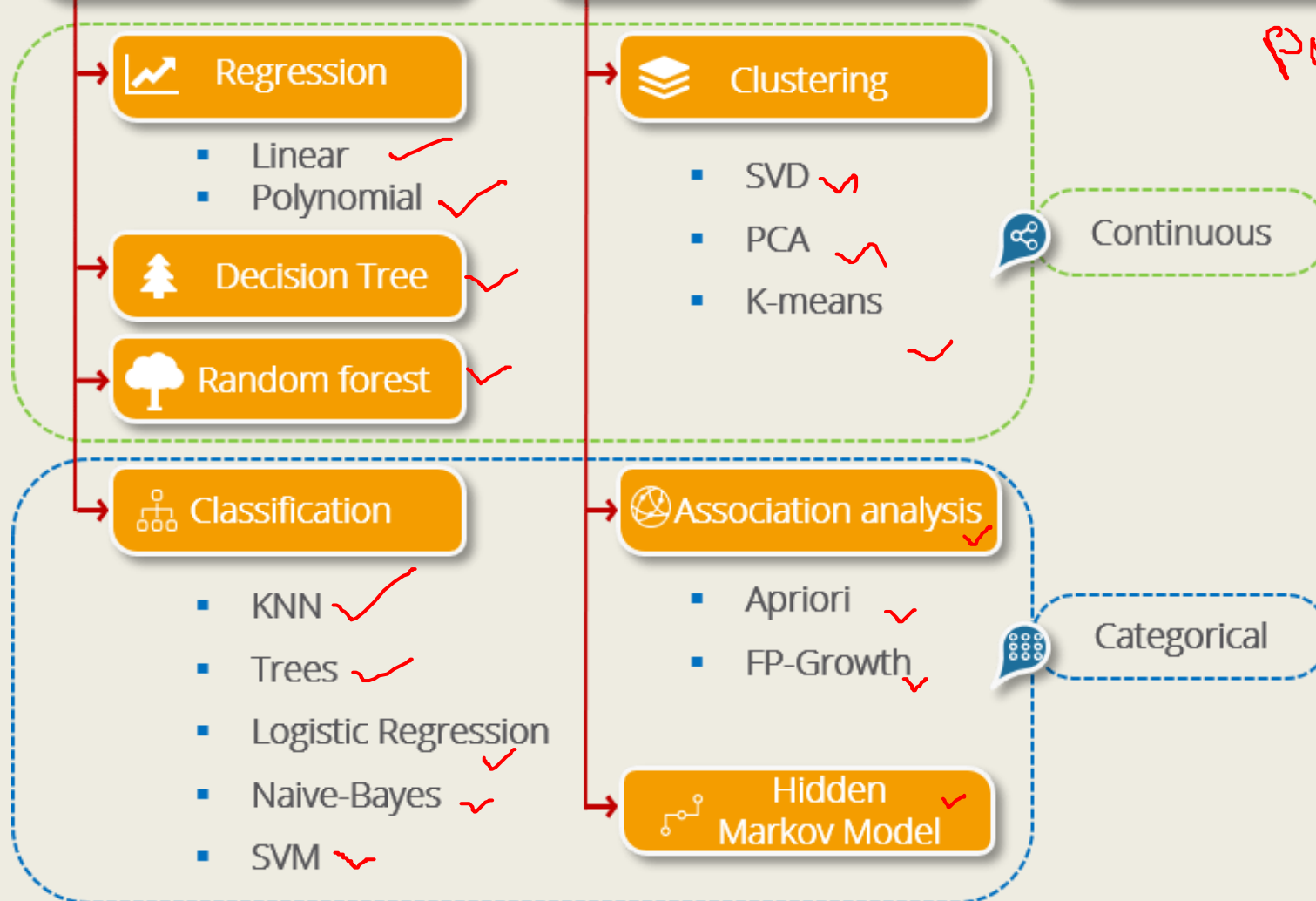
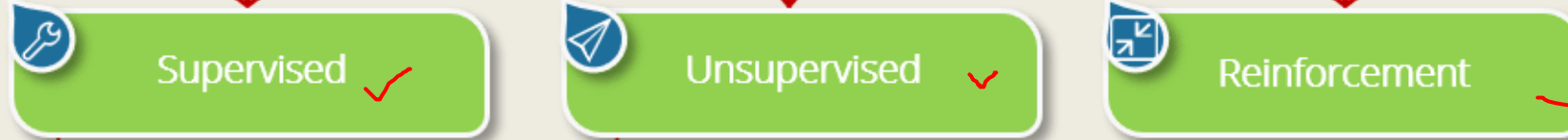
1. Machine Learning algorithm is trained using a training data set to create a model. When new input data is introduced to the ML algorithm, it makes a prediction on the basis of the model.
2. The prediction is evaluated for accuracy and if the accuracy is acceptable, the Machine Learning algorithm is deployed. If the accuracy is not acceptable, the Machine Learning algorithm is trained again and again with an augmented training data set.
3. This is just a very high-level example as there are many factors and other steps involved.



# Machine Learning Types

- A machine can learn to solve a problem by following any one of the following three approaches. These are the ways in which a machine can learn:
  1. Supervised Learning
  2. Unsupervised Learning
  3. Reinforcement Learning

# Machine learning



game  
policy

based

4	1
1	4
2	3
3	2

S	3	F
1	1	2
2	1	2
3	2	1



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