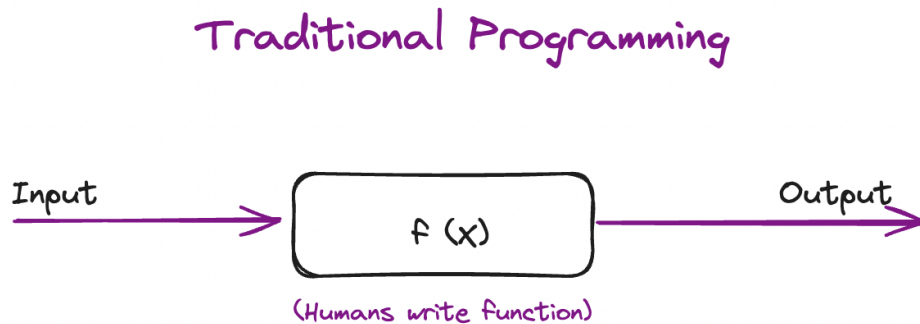


# Introduction to Machine Learning

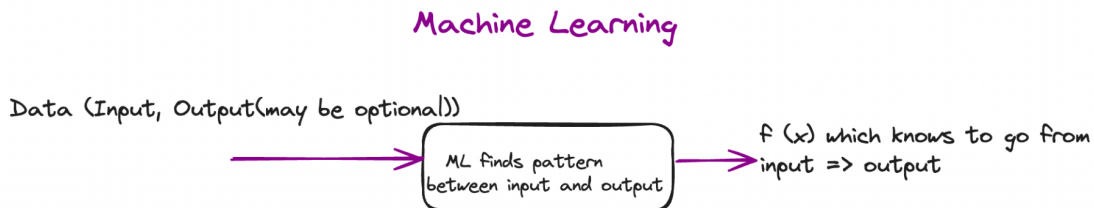
Machine learning is a subfield of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to solve complex problems.

## Traditional Programming vs Machine Learning

In traditional programming, we tell the computer what to do. Humans write the logic telling the computer what to do for a given input and produce the corresponding output. This can be shown as below:



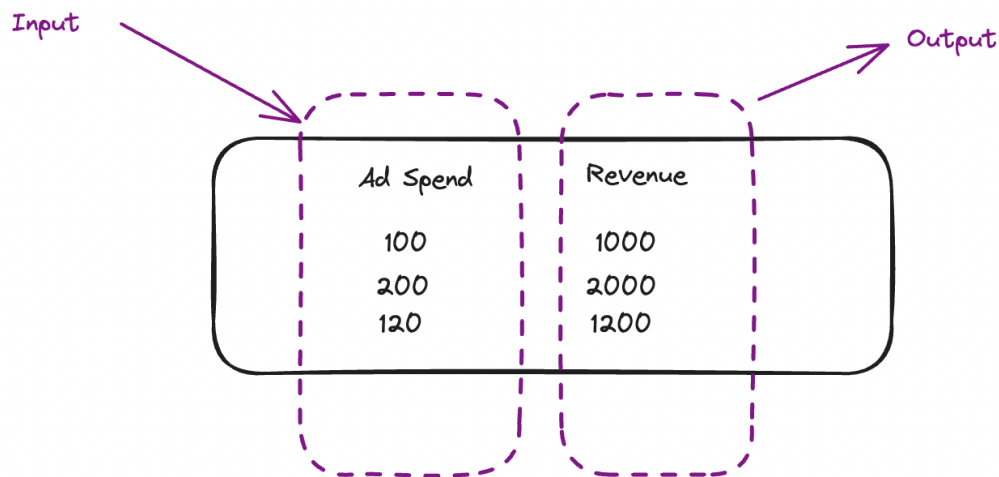
In Machine learning, we feed the data which comprises inputs and output(which may be optional), and the machine learning algorithms figure out the logic by identifying patterns between input and output. This is called the “training phase”, during which ML has figured the logic to go from input to output from the provided dataset. Once we have the ML model trained, then we move to the prediction phase, where we feed in the input to the ML derived logic and get the output value. ML is about providing data to the computer and asking it to work out the relationship between the data elements.



## Various types of Machine Learning Techniques

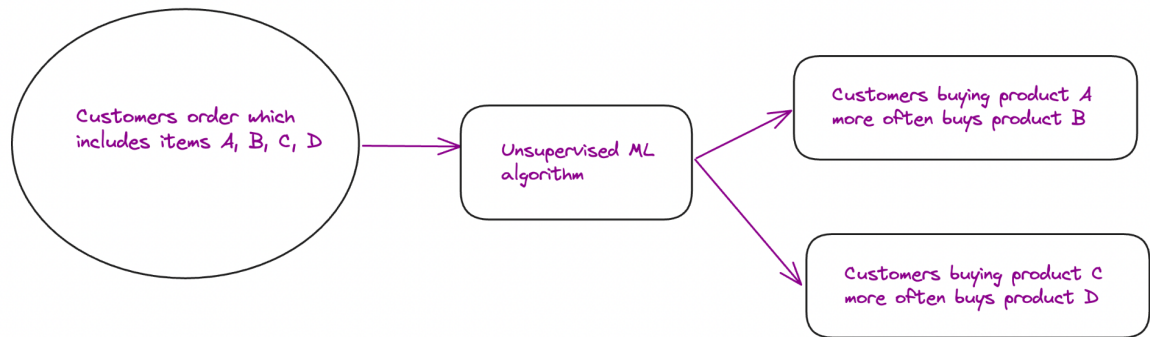
There are various types of Machine learning Techniques. Some of them are:

- **Supervised Learning** - It requires a labeled dataset for training. Input and output data is provided to a Supervised machine model, and the model is trained using these provided examples. Inputs are called “**Features**” and Outputs are called “**Labels**”. For example, if we are working in an online company, we collect daily data around marketing ad spend, revenue generated and we want to find the relation between marketing ad spend and revenue generated, we can use supervised learning which can map out the relationship from the provided dataset.



- **Unsupervised Learning** - In the case of unsupervised learning, we do not provide labeled output. We can think of it as self-organized learning. Its main aim is to explore the underlying patterns and predict the output. An example of unsupervised machine learning would be a case where an online eCommerce website wants to increase their revenue. They can implement an unsupervised machine learning algorithm on its sold products' data and infer that customers who bought product A more often tend to buy product B or those who buy

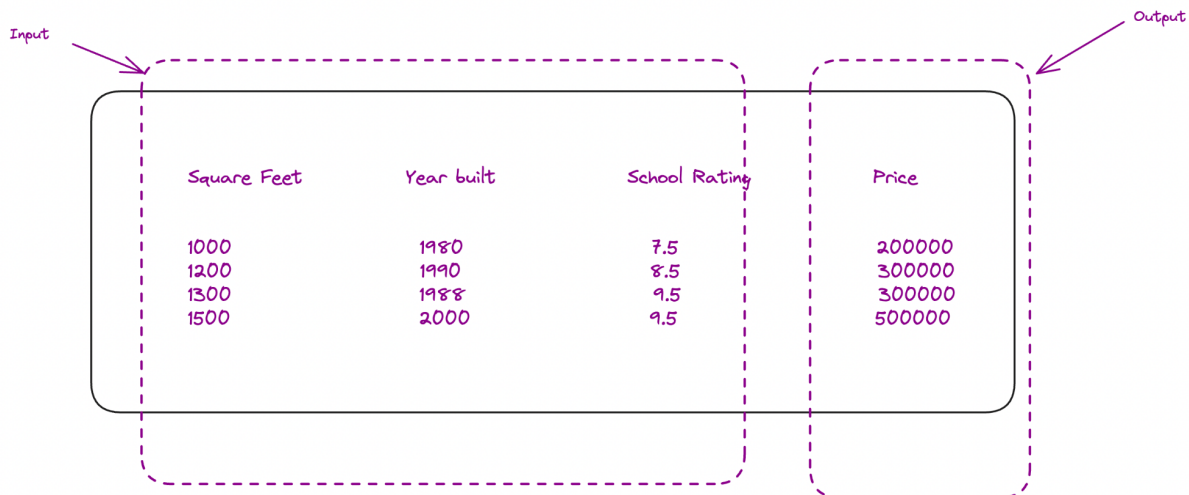
product C tend to buy product D.



- **Reinforcement Learning** - In the case of reinforcement learning, it does not require data as it learns by interacting with the environment. The model tries to take the best possible action in a given situation to maximize the total reward. The model learns by getting feedback on its past outcomes. For example, these algorithms are useful for machines to play games.

## Supervised Learning

As mentioned before, supervised learning requires a labeled dataset for training. Input and output data is provided to a Supervised machine model and the model is trained using these provided examples. Inputs are called “**Features**” and Outputs are called “**Labels**”. For example, we could have a House price dataset where the input data contains features like Square Feet, Year Built, School rating and Label which could be the price of the home.



In the above example, we can set the housing data containing a list of examples which has the inputs(features) and outputs(labels). The label in this case is numerical but it can also be a category, which can be a predefined set of things. For example, if we have a dataset for dogs mapping images to dog names, the label is a category mapping to dog breed.

## Phases of supervised learning

### Training Phase

During this phase, the ML algorithm does pattern matching to figure out the logic through which it can go from input to output.

### Prediction Phase

The ML algorithm knows how to go from input to output for a given problem. Now during the prediction phase we provide unlabeled data to the ML model and the algorithm gives us back the output.

## Relation between input and output

In functional programming when we are writing pure functions, programmers write logic which translates the given set of inputs to outputs. Basically, we can view the coded function logic as a way to describe a relationship between inputs and outputs. Likewise, in supervised learning, we are trying to approximate the given input and output data with a function which represents its relationship.

## Conclusion

In this post, we went over the basics of machine learning and discussed the various types of it. We delved a little bit more into Supervised learning discussing their different phases. Next up, we will look into one of the most popular supervised learning models, [Linear regression](#).